



Ex-post Evaluation of Directive 2009/33/EC on the promotion of clean and energy efficient road transport vehicles

Final Report

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EXECUTIVE SUMMARY

Objectives

This ex-post evaluation covers Directive 2009/33/EC on the promotion of clean and energy efficient road transport vehicles (the "Clean Vehicles Directive").

The Directive aims to stimulate the market for clean and energy-efficient vehicles by requiring various procurers to take account of lifetime environmental and energy impacts when purchasing road transport vehicles.

Clean Vehicles Directive. The Clean Vehicles Directive is included in the European Commission's Regulatory Fitness and Performance programme¹ (REFIT) in order to assess if it has delivered against its objectives and is still fit for purpose.

Methodology

The methodology followed the standard evaluation framework for an assessment of legislation and the key evaluation questions related to relevance, effectiveness, efficiency, EU added-value, coherence and sustainability.

The main research tools used included:

- Desk research and literature review. Reports and studies directly related to Directive 2009/33/EC, Directives and their assessment in the wider policy context, European strategy documents and work previously performed by the study team - all of the literature is referenced throughout the report, as well as following the Annexes.
- Extensive stakeholder engagement. Including EU-level stakeholders (11 interviews and a workshop), Procurers (13 interviews, additional written responses, and 547 online survey responses), manufacturers (3 interviews and additional written responses), contractors (65 online survey responses), Member States (completed MS fiches and a workshop).
- Case studies. Illustrative examples for the assessment of the methodology of the monetisation of costs in Article 6, and qualitative case studies drawing upon existing case studies, e.g. Clean Fleets, Clean vehicle Portal, GPP 2020 etc. - contributing to the quantification of the impacts of CVD.

The main quantitative analytical tools were:

- **Comparative analysis with a baseline/counterfactual scenario.** The baseline was used for quantifying the effects of the intervention on costs and other key outcome indicators including CO₂ emissions, air pollutant emissions, and cost-effectiveness.

The quantitative techniques described above were supplemented by qualitative analysis conducted on the basis of the literature review, stakeholder engagement and collation of data.

The main limitations of the research were due to a lack of data availability and the limited time that the Directive has been in force and therefore its ability to deliver impacts.

The lack of existing evidence in relation to the implementation of the Directive and its associated impacts is due to:

¹ EC's REFIT - action taken to make EU law simpler and to reduce regulatory costs, thus contributing to a clear, stable and predictable regulatory framework supporting growth and jobs European Commission. (2013). "EU Regulatory Fitness (REFIT) -- Key Documents." from http://ec.europa.eu/smart-regulation/better_regulation/key_docs_en.htm.

- There is no EU level monitoring mechanism in place other than the production of consultancy reports;
- There are no reporting requirements in place for Member States;
- Few Member States have undertaken any monitoring or evaluation of effects on their own in this respect, and so there is a lack of information on MS implementation; and
- There is little in the way of published views/position papers from stakeholders currently available.

The issues that are likely to limit the extent to which impacts will have been realised by the Directive include the limited number of vehicles procured publicly (compared to the rest of the vehicle fleet); the lifetime of road transport vehicles (typically 10-15 years); and proportion of road transport vehicles procured falling below the CVD threshold value (i.e. out of scope of the Directive, therefore reducing the number of potentially affected vehicles further).

Main findings/conclusions

Relevance

- The needs at which the Directive is targeted, i.e. the need to decrease transport's CO₂ and pollutant emissions and to increase its energy efficiency and competitiveness, are pertinent, and are likely to remain pertinent in the future.
- Overall, targeting publicly procured vehicles is considered to be a relevant tool to increase the energy efficiency and to reduce the CO₂ and pollutant emissions from road transport. Even though stimulating the public procurement of clean vehicles is not by itself sufficient to achieve these objectives, it is still beneficial. While publicly procured vehicles represent a small share of the overall vehicle market, there is still a case for using public procurement to stimulate the market for clean vehicles, as part of a more comprehensive approach to delivering the stated objectives.
- Furthermore, in the case of specific categories of vehicles (such as buses) the potential for stimulating the market for clean vehicles is significantly greater.
- It is argued that (and there is theoretical justification for) 'stimulating the public procurement of clean vehicles' has the potential to contribute to increasing the competitiveness of the wider EU economy and of cities, although difficult to prove in practice.
- However, in addition to the small market share of publicly procured vehicles, the extent of the contribution of the Directive to increasing the energy efficiency of and reducing the CO₂ and pollutant emissions from transport also depends on whether the focus is on the 'right type' of clean vehicle. This is an aspect that is currently not clearly defined by the Directive and for which there are very different approaches followed by contracting authorities.

Effectiveness

- Our estimates of the impacts of the CVD – on the basis of available evidence and a set of important assumptions – suggests that these are much more limited than was initially expected. Furthermore, the estimated impacts of up to 5.5% CO₂ emissions reduction for passenger cars and 2.3% for vans in comparison to the baseline represent a best-case scenario, which, most probably, does not take full account of the impact of other relevant policies in place (such as the passenger car CO₂ Regulation). Our analysis suggests that the impacts directly associated with the Directive are more limited, although it has not been possible to get more precise estimates.
- In addition, the analysis suggests that, in terms of air pollutant emissions, the contribution may even be negative, as a result of the tendency of some of the options (see below) being biased towards diesel vehicles.

- A key underlying reason for limited effectiveness of the Directive is the absence of a definition of what a “clean vehicle” is and of relevant provisions for minimum requirements (e.g. limit values in terms of fuel/energy consumption, CO₂ and air pollutant emissions) that contracting authorities should meet when setting their requirements. In their absence, it is very often the case that contracting authorities set requirements that can be met by the majority, if not all, vehicles on the market.
- Another key issue related to the implementation and the effectiveness of the Directive is the perceived complexity of the monetisation methodology and the much greater preference by public authorities for the use of the other options given in the Directive. On the one hand, the monetisation methodology is the most effective approach in terms of ensuring the internalisation of the operational costs and its more widespread use could ensure a greater level of harmonisation in the approach followed by authorities. On the other hand, in its current form, the monetisation option is perceived to be complicated and demanding by a large share of authorities. In addition, our analysis suggests that, in its current form, it has certain limitations and weaknesses.
- The absence of any harmonised community standard for measuring fuel consumption or CO₂ emissions in the case of heavy duty vehicles, the category of vehicles where public procurement has the greatest potential, means that it is difficult for most contracting authorities to obtain objective, comparable data on these vehicles. As a result, there are possible missed opportunities for contracting authorities to select the most appropriate vehicles.

Efficiency

- The estimated overall benefit to cost ratio of the Directive is relatively low. Total expected benefits of the policy – reflecting CO₂ and pollutant emissions reduction and fuel efficiency savings - are estimated to be in the range of €42.6 to €521.1 million, against total costs of around €34.6 to €431.0 million. The low cost benefit ratio is expected as the direct impacts associated with public procurement are very limited. In most respects the Directive acts in a complementary way to other policy tools (e.g. CO₂ and emissions requirements, car-labelling etc.) and any wider benefits cannot be quantified.
- At the same time, the administrative costs associated with the Directive are relatively limited (less than €2.3 million on an annual basis). Our analysis suggests that this is primarily a reflection of the limited use of the monetisation methodology and the fact that in most cases the information/data required is readily available.
- It is not clear that the impacts of the Directive could have been achieved in a more efficient way through additional measures or initiatives, as there was – and indeed still is – a rationale for using public procurement to stimulate the market for cleaner vehicles. The analysis suggests that there are certain aspects that need to be addressed in that respect, including the need to simplify those aspects of the Directive that are currently considered to be complex and demanding by public authorities as mentioned above.

EU added value

- Based on the assessment of effectiveness and feedback from various stakeholders, it is likely that the limited impacts estimated to have been achieved by the CVD could have been achieved without EU intervention, i.e. the Directive.
- However, despite the lack of clear benefits, stakeholders have stated a preference for retaining the Directive, although with improvements focussing on making it more effective and delivering better results. Stakeholders believed that a repeal of the Directive would give out the wrong political message. Secondly they generally felt that a mechanism to stimulate the purchase of clean vehicles was still required (as barriers to their uptake still exist) and that public procurement is still potentially

useful in this respect. Finally, stakeholders thought that the Directive may become more useful and relevant over time as more clean vehicles come onto the market.

- There is some evidence to suggest that the Directive and the accompanying initiatives have supported best practice exchange.

Coherence

- The Clean Vehicles Directive largely complements other EU policies and legislation with similar objectives. The overarching objectives of EU policy and legislation strive to increase environmental protection, reduce GHG and air pollutant emissions and attain energy security. The CVD complements a range of other policies and legislation that work together to achieve these objectives, including both supply and demand-side measures in the transport sector.
- The Directive is broadly coherent with most other relevant policies, including the Public Procurement Directives, although there are challenges with respect to air quality, and a lack of coherence with the 2011 Transport White Paper's objective of phasing out conventionally-fuelled cars. Contracting authorities face problems when they apply the CVD's monetisation methodology in publicly procuring road transport vehicles, which results in the selection of diesel vehicles, whose use can be detrimental in achieving local air quality objectives, particularly in relation to NO₂. Therefore, provisions such as the monetisation methodology, may on certain occasions contradict with EU air quality targets, as it does not lead to the purchase of the types of vehicles that are most advantageous to reducing pollutant emissions in urban areas.
- The fact that the Directive allows for multiple alternative options is not coherent with the objective of harmonising the determination of these impacts.

Sustainability

- A full repeal of the Directive would be unlikely to have significant practical impacts on the market and the current level of demand for clean vehicles. However, the wider benefits – and the broader message – provided by public procurement would be lost.
- Furthermore, in the case of the heavy duty vehicle (HDV) sector, particularly buses, waste collection vehicles and other HDVs primarily used by/in the service of public authorities, the potential impact would probably be greater as there is a lack of a wider policy framework to reduce the CO₂ emissions of these vehicles.
- A partial repeal – i.e. retaining only the monetisation methodology in its current format – would bias towards diesel vehicles, which tend to be the dominant technology in the HDV market anyway, and those technologies that (inaccurately) have zero emissions, as these are measured on the test cycle.

Recommendations

General recommendations

- **The Directive should be retained:** Despite the limited benefits of the CVD to date, there is supporting evidence identified throughout this evaluation that suggests that the Directive should be retained rather than repealed. Firstly, there continues to be a need to address the stated objectives of the CVD, including reducing CO₂ and air pollutant emissions, and increasing energy efficiency of the transport sector and competitiveness (see Section 6.2.2). It is agreed that public procurement is a tool that can be beneficial in helping to achieve these objectives (as discussed in Section 6.3.3) - encouraging investment in clean vehicles by public authorities should help to increase the market for such vehicles and thus help to deliver the economies of scale that will lead to lower production costs and lower prices. In turn, this should help to stimulate demand more generally. Additionally, it was identified that there are currently no alternative (more efficient) measures

that are able to stimulate the market for clean vehicles (see Section 6.8.2), which would further support retaining the Directive. Stakeholders consulted for this evaluation also stated their preference and reasons for retaining the Directive taking action at the EU level, as outlined in the conclusions above. While the repeal of the CVD would not **prevent** environmental considerations being taken into account in the course of the public procurement of vehicles, this would no longer **be required**. It is likely that contracting authorities would find it more difficult to set qualitative and environmental award criteria since, as due to the broad nature of Directive 2014/24/EU, there will be less guidance and reference to suitable values to use when performing calculations. In the absence of mandatory requirements to consider the environment, such considerations risk being ignored as a result of economic pressures. Hence, there is still a rationale for requiring the public procurement of vehicles to take account of environmental considerations in order to stimulate the market for clean vehicles, as the Directive aims to do. It is therefore our assessment that a repeal of the Directive would not be the best action to take, but that it should be retained.

- **The Directive needs to be amended:** The analysis conducted for this evaluation suggests that in its current form the CVD is not particularly cost-effective. However, as discussed in the point above, it is still a useful tool for stimulating the market for vehicles using cleaner technologies forming part of a broader package of supply-side and demand-side policy tools. It is evident that there is scope for improvements to be made to the Directive that would increase its effectiveness and efficiency. This could include changes to the scope of the Directive but also changes to its mechanisms, including the monetisation options. There is also an evident need to improve the level and quality of information and data available that will support future monitoring of its effectiveness and efficiency (see Specific Recommendations below for further information).

Specific recommendations

- **There needs to be more clarity as to what can be considered to be a clean vehicle:** Clarification is required on which types of vehicles might be considered to be 'clean' and what should be the aims of the Directive in this respect. This could require the introduction of specific provisions setting minimum requirements for contracting authorities (see also next point).
- **Encourage higher levels of ambition with regards to clean vehicles purchased required by the Directive:** In order to encourage higher levels of ambition, the Directive could set higher standards that more ambitious contracting authorities might meet. More specifically, if all of the alternative options for including energy and environmental considerations are retained, the following elements might be considered to ensure that the Directive delivers environmental improvements (also helping to define 'clean' vehicles):
 - Option 1: Explicitly set out the minimum technical specifications to be used, e.g.:
 - For pollutant emissions: any future Euro 7/VII standard, if these are eventually introduced, or any relevant standards arising from the light duty real driving emissions (RDE) test that is to be implemented. Voluntary emission schemes and standards should also be included as soon as they are introduced (with a clear distinction towards existing Euro 6 vehicles).
 - For CO₂ emissions: For LDVs, these could be the next target as agreed in the respective Regulations, e.g. 95 gCO₂/km for cars and 147 gCO₂/km for LCVs (to be amended as new targets are introduced in the respective Regulations); for HDVs, minimum technical specifications could be developed once the EU monitoring mechanism for HDV CO₂ emissions has been put in place.

- Option 2a: Explicitly state the minimum weighting that has to be applied to energy and environmental considerations if these are used as award criteria.
- Option 2b: Revise the monetisation methodology to address issues such as fuel prices, emissions cost factors and real world emissions and the other ambiguous elements and better align the emphasis of the methodology with the three environmental objectives of the Directive.

Clearly, the feasibility of any such approach will need to be analysed in more detail, and any changes made would need to ensure that they adequately promote the procurement of what has been more clearly defined as 'clean vehicles'.

- **Facilitate the use of the monetisation option (if this is retained):** While it can/could be considered appropriate to maintain the alternative options, it is also important to promote the use of the monetisation option as this is the only option that explicitly internalises operational costs. This requires actions to address the (perceived) complexity of the approach. Potential supporting actions to consider include:
 - Ensure that contracting authorities are equipped with a user-friendly tool for performing the calculations. The Clean Fleets Lifecycle Costing Tool (Clean Fleets 2014) is an existing spreadsheet tool capable of performing the monetisation calculations, but its effectiveness might be substantially increased if it were converted into a web-based tool and then more widely publicised (potentially even referenced in the legislation itself).
 - Use the information that is to be reported under the forthcoming monitoring mechanism for the CO₂ emissions of heavy duty vehicles to guide the procurement of more fuel efficient heavy duty vehicles. It is essential that objective, comparable information is available on the CO₂ impacts and energy efficiency of these vehicles.
 - Ensure that the information on the Clean Vehicle Portal fulfils its aim of providing comprehensive data on vehicle emissions as a one-stop-shop. As the Portal is being amended at the time of writing, it is not possible to comment on the extent to which this new version meets the needs. However, contracting authorities should be able to find emissions data for different vehicles in a comprehensive and accessible way. Maintaining information in such a centralised manner may not be an easy or cheap task, but if the monetisation methodology is to be retained, its effectiveness will be linked to the ease with which contracting authorities can find the appropriate information to input into it.
 - Further build on the Commission initiatives that have been undertaken to date, particularly the Clean Vehicle Portal and the Clean Fleets project, in order to facilitate the exchange of practices and experience, to promote greater understanding of any revised requirements of the Directive, and to facilitate cross-border joint procurement.
- **Future consideration of Well-To-Wheels (WTW) emissions:** In order to be able to compare the full environmental impacts of vehicles, there is a need to take account of WTW emissions. This issue is also relevant for other EU legislation, such as the passenger car CO₂ Regulation, the fuel efficiency label etc. It should be considered whether it is possible to introduce an approach, e.g. a WTW factor that could be applied in a common way in complementary EU legislation, where it is appropriate.
- **Extend the scope of the Directive:** The scope of the Directive could be extended by lowering the threshold values. However, the benefit to cost ratio of such a change will need to be examined in greater detail. The expansion of the scope of the Directive to all contracts procured by public authorities that have a major transport element, and possibly to private fleets, might be considered. Both of these approaches have the potential to increase the impacts by increasing the numbers

of vehicles covered by the Directive, but it would need to be ensured that the approach was efficient once the scale of the potential impacts and costs have been considered.

- **Resolve the challenges posed by the lack of, or inaccurate data:** A lack of information or a means of discriminating between vehicles on the basis of their energy consumption and emissions is a challenge. All new cars and LCVs, and all engines used in HDVs, have to meet the latest Euro emission standards (i.e. 6 and VI, respectively), and so unless a city has the resources and technical capacity to undertake its own dedicated tests, there is no room for a city to differentiate between vehicles on the basis of their pollutant emissions. For cars and LCVs, test cycle information on fuel consumption and CO₂ emissions is available for conventionally-fuelled vehicles, but this information for alternatively-fuelled vehicles is less accurate as there is a greater need to take account of lifecycle and embedded emissions in order to accurately determine which type of technology is better in this respect. Also, for those cars and LCVs for which CO₂ and fuel consumption data is available, there is the additional issue of the discrepancy between real world and test cycle emissions. For HDVs, information on CO₂ emissions and fuel use is often not available in a consistent manner for most cities (again, other than those that have the resources and capacity to do their own tests). Our understanding is that many of these issues have already been identified as important by the Commission and relevant action is being taken to address them. If this proves not to be the case, or is considered to not eventually be possible, it will be important to provide at least more guidance to contracting authorities in order to ensure that they are aware of how to apply the CVD in such cases.
- **Introduce a voluntary framework to facilitate Member State reporting:** One of the challenges with understanding the effectiveness – and therefore efficiency – of the Directive is the lack of knowledge on its impacts, and indeed costs. It is important not to introduce requirements that would incur excessive administrative costs on Member States, hence, it would be useful to introduce a framework for Member State reporting in which Member States would be encouraged to report on the impacts of the Directive in a consistent and comparable manner. This would facilitate future evaluations and inform future amendments to the Directive.
- **Explore whether there is the potential for a Commission initiative to facilitate cross-border, joint procurement:** As barriers to cross-border joint procurement remain, and the costs of vehicles with some clean technologies remain high, it would be useful to explore whether there is the potential to use financial instruments (i.e. not grants) to help overcome the high initial administrative and capital costs associated with the cross-border, joint procurement of clean vehicles. In this respect, the potential use of instruments developed by the EIB might be explored.

RÉSUMÉ ANALYTIQUE

Objectifs

Cette évaluation a posteriori couvre la Directive 2009/33/CE relative à la promotion de véhicules de transport routier propres et économes en énergie (la «Directive sur les Véhicules Propres»).

La Directive a pour objet de dynamiser le marché des véhicules propres et économes en énergie en exigeant des divers acheteurs qu'ils tiennent compte des impacts énergétiques et environnementaux pendant toute la durée de vie des véhicules lorsqu'ils achètent des véhicules de transport routier.

Directive sur les Véhicules Propres. La Directive sur les Véhicules Propres est incluse dans l'Initiative REFIT (Programme pour une Réglementation Affûtée et Performante²) de la Commission Européenne de manière à déterminer si celle-ci a atteint ses objectifs et si elle toujours adaptée aux besoins.

Méthodologie

La méthodologie a suivi les prescriptions du cadre d'évaluation standard destiné à évaluer les lois et les principales questions d'évaluation en matière de pertinence, d'efficacité, de valeur ajoutée au niveau de l'UE, de cohérence et de soutenabilité.

Parmi les principaux outils de recherche employés, on peut citer :

- La recherche documentaire et l'analyse bibliographique. Les rapports et les études se rapportant directement à la Directive 2009/33/CE, les Directives et leur évaluation dans un contexte politique plus large, les documents stratégiques européens et les travaux précédemment effectués par l'équipe de recherche. L'intégralité des ouvrages documentaires et bibliographiques font l'objet de références tout au long du rapport, ainsi qu'après les Annexes.
- Un vaste engagement des parties prenantes. Ceci inclut des parties prenantes au niveau de l'UE (11 entrevues et un atelier), des acheteurs (13 entrevues, des réponses écrites supplémentaires et 547 réponses à une étude en ligne), des fabricants (3 entrevues et des réponses écrites supplémentaires), des prestataires (65 réponses à une étude en ligne), des états-membres (fiches d'états-membres remplies et un atelier).
- Les études de cas. Des exemples illustrant l'évaluation de la méthodologie de la monétisation des coûts à l'Article 6, et des études de cas qualitatives s'inspirant d'études de cas existantes, par exemple Clean Fleets, Clean Vehicle Portal, GPP 2020, etc., contribuant à la quantification des impacts de la Directive sur les Véhicules Propres.

Parmi les principaux outils analytiques quantitatifs employés, on peut citer :

- **Une analyse comparative mettant en œuvre un cadre de référence et un scénario hypothétique.** Le cadre de référence a été utilisé pour quantifier les impacts de l'intervention sur les coûts et d'autres indicateurs-clés générés, parmi lesquels les émissions de CO₂, les émissions de polluants aériens et la rentabilité.

Les études quantitatives décrites ci-dessus ont été complétées par des analyses qualitatives réalisées sur la base de la recherche documentaire, de la participation des parties prenantes et de la collecte de données.

² Initiative REFIT de la CE – Il s'agit d'une action entreprise pour simplifier les lois de l'UE et pour réduire les coûts associés à la réglementation, contribuant ainsi à la création d'un cadre réglementaire clair, stable et prévisible soutenant la croissance et l'emploi (Commission Européenne - 2013). "Cadre Réglementaire (Regulatory Fitness : REFIT) de l'UE -- Documents directeurs" accessibles à l'adresse : http://ec.europa.eu/smart-regulation/better_regulation/key_docs_en.htm.

Les principales limites de la recherche résultaient d'un manque de disponibilité des données et du peu de temps écoulé depuis l'entrée en vigueur de la Directive, ce qui a donc affecté sa capacité à avoir un impact.

Le manque d'évidence actuelle concernant l'implémentation de la Directive et les impacts qu'on peut en attendre est due aux raisons suivantes :

- Il n'y a aucun mécanisme de contrôle en place au niveau de l'UE autre que via la production de rapports de consultants
- Il n'existe aucune obligation de rapport mise en place au niveau des états-membres
- Très peu d'états-membres ont entrepris de contrôler ou d'évaluer les impacts par eux-mêmes dans ce domaine, de sorte qu'il y a un manque d'informations concernant l'implémentation dans les états-membres
- Il y a actuellement peu d'opinions publiées ou d'exposés de principe rendus publics par les parties prenantes.

Parmi les obstacles limitant la portée des effets obtenus par la Directive, on peut citer le nombre restreint des véhicules achetés par les organismes publics (par rapport au reste du parc automobile), la durée de vie des véhicules de transport routier (habituellement de 10 à 15 ans) et la proportion de véhicules de transport routier achetés se situant en-dessous de la valeur-seuil de la Directive sur les Véhicules Propres (autrement dit, en-dehors du périmètre d'application de cette Directive, ce qui réduit d'autant le nombre de véhicules potentiellement affectés).

Principaux résultats et conclusions

Pertinence

- Les besoins que la Directive cible, à savoir la nécessité de réduire les émissions de CO₂ et de polluants des transports et d'augmenter leur rendement énergétique et leur compétitivité, sont pertinents et ils resteront probablement pertinents à l'avenir.
- Dans l'ensemble, le fait de cibler les véhicules achetés par les organismes publics est considéré comme un outil adapté pour augmenter le rendement énergétique et réduire les émissions de CO₂ et de polluants des transports routiers. Bien que le fait d'encourager les organismes publics à acheter des véhicules propres ne suffira pas à lui seul à atteindre ces objectifs, cette initiative est toutefois bénéfique. Et bien que les véhicules achetés par les organismes publics ne représentent qu'une petite part du marché des véhicules dans son ensemble, il est justifié d'utiliser la passation de marchés publics pour dynamiser le marché des véhicules propres dans le cadre d'une approche plus vaste pour atteindre les objectifs déclarés.
- En outre, dans le cas de certaines catégories spécifiques de véhicules (comme les autobus), le potentiel de dynamisation du marché des véhicules propres est encore plus grand.
- On peut soutenir (et il existe des éléments théoriques probants dans ce sens) que «l'encouragement des achats de véhicules propres par les organismes publics» a le potentiel de contribuer à augmenter la compétitivité de l'économie de l'UE dans son ensemble et plus particulièrement celle des villes, bien que cela soit difficile à prouver en pratique.
- Toutefois, outre la petite part de marché des véhicules achetés par les organismes publics, l'importance de la contribution de la Directive à augmenter le rendement énergétique et à réduire les émissions de CO₂ et de polluants provenant des transports routiers dépend par ailleurs de la justesse du ciblage, qui doit viser le «bon type» de véhicule propre. C'est là un aspect qui n'est actuellement pas clairement défini par la Directive et au sujet duquel les divers pouvoirs adjudicateurs suivent des approches très différentes.

Efficacité

- Notre estimation des impacts de la Directive sur les Véhicules Propres, sur la base de l'évidence disponible et d'un ensemble d'hypothèses importantes, suggère que ceux-ci sont plus limités qu'initialement prévu. En outre, les impacts estimés d'une réduction allant jusqu'à 5,5% des émissions de CO₂ pour les voitures particulières et jusqu'à 2,3% pour les véhicules utilitaires légers en comparaison du cadre de référence, représentent le meilleur des cas; lequel ne tient probablement pas complètement compte des impacts des autres politiques pertinentes mises en œuvre (comme la Réglementation sur le CO₂ pour les voitures particulières). Notre analyse conduit à penser que les impacts directement associés à la Directive sont plutôt limités, bien qu'il n'ait pas été possible d'obtenir des estimations plus précises.
- De plus, l'analyse suggère qu'en termes d'émissions de polluants aériens, la contribution pourrait même s'avérer négative en raison de la tendance de certaines des options (voir ci-dessous) à privilégier les véhicules à moteur diesel.
- L'une des principales raisons sous-jacentes de l'efficacité limitée de la Directive tient à l'absence de définition de ce qui constitue un «véhicule propre», et de dispositions appropriées concernant les exigences minimales (ex. valeurs-limites en ce qui concerne la consommation de carburant ou d'énergie et les émissions de CO₂ et de polluants aériens) que les pouvoirs adjudicateurs doivent respecter lorsqu'ils définissent leurs critères. En l'absence de telles exigences, il est courant que les pouvoirs adjudicateurs définissent des critères qui peuvent être remplis par la majorité, si ce n'est l'intégralité des véhicules disponibles sur le marché.
- Un autre problème important concernant l'implémentation et l'efficacité de la Directive résulte de l'apparente complexité de la méthodologie de monétisation, et de la plus grande préférence manifestée par les organismes publics pour l'utilisation des autres options exprimées dans la Directive. D'une part, la méthodologie de monétisation constitue l'approche la plus efficace en ce qui concerne l'internalisation des coûts opérationnels et son utilisation plus répandue pourrait entraîner une meilleure harmonisation des approches mises en œuvre par les divers organismes concernés ; d'autre part, sous sa forme actuelle, l'option de monétisation semble être perçue comme étant trop compliquée et trop exigeante par une grande partie desdits organismes. En outre, notre analyse semble indiquer que, sous sa forme actuelle, elle comporte certaines limitations et certaines faiblesses.
- L'absence d'une norme communautaire harmonisée pour mesurer la consommation de carburant ou les émissions de CO₂ dans le cas des véhicules utilitaires lourds, qui est la catégorie de véhicules dans laquelle les achats par les organismes publics présentent le plus grand potentiel, fait qu'il est difficile pour la plupart des pouvoirs adjudicateurs d'obtenir des données objectives et comparables sur ces véhicules. En conséquence, il est possible que les pouvoirs adjudicateurs parfois manquent une occasion de sélectionner les véhicules les plus appropriés.

Rendement

- Le rapport bénéfice-coût général estimé de la Directive est relativement faible. Le bénéfice total prévu de la politique, reflétant la réduction des émissions de CO₂ et les économies obtenues grâce à un meilleur rendement énergétique, est estimé se situer dans la plage de 42,6 à 521,1 millions d'euros, pour un coût total d'environ 34,6 à 431,0 millions d'euros. Ce faible rapport bénéfice-coût était attendu, car les impacts directs associés aux achats par des organismes publics sont très limités. À maints égards, la Directive agit en complément d'autres instruments politiques (ex. exigences d'émissions de CO₂, étiquetage des voitures, etc.) et les bénéfices d'ensemble sont difficiles à quantifier.
- Dans le même temps, les coûts administratifs associés à la Directive sont relativement limités (moins de 2,3 millions d'euros sur une base annuelle). Notre analyse suggère que ceci est principalement dû à l'usage limité de la méthodologie

de monétisation et au fait que, dans la plupart des cas, les informations et les données nécessaires sont facilement accessibles.

- Il est difficile de dire si les impacts de la Directive auraient pu être obtenus d'une manière plus efficace par le biais d'autres mesures ou initiatives, car il y avait, et il y a toujours, un argument en faveur de l'usage des règles d'achat par les organismes publics pour stimuler le marché des véhicules propres. L'analyse suggère qu'il y a certains aspects qui doivent être adressés à cet égard, parmi lesquels la nécessité de simplifier les aspects de la Directive qui sont actuellement considérés comme étant trop complexes et trop exigeants par les pouvoirs publics, comme cela est mentionné plus haut.

Valeur ajoutée au niveau de l'UE

- En se basant sur l'évaluation de l'efficacité et sur les réactions des diverses parties prenantes, on peut estimer probable que les impacts limités que l'on estime avoir été obtenus par la Directive sur les Véhicules Propres auraient tout aussi bien pu avoir été obtenus sans intervention de l'UE, c'est-à-dire sans la Directive.
- Toutefois, en dépit du manque de bénéfices clairement établis, les parties prenantes ont manifesté une préférence pour la conservation de la Directive, à condition que des améliorations lui soient apportées pour la rendre plus efficace et pour qu'elle apporte de meilleurs résultats. Les parties prenantes estiment qu'une abrogation de la Directive enverrait un mauvais message politique. De plus, elles sont généralement d'avis qu'un mécanisme permettant de stimuler les achats de véhicules propres est toujours nécessaire (car des obstacles à leur adoption subsistent toujours) et que les achats par les organismes publics sont potentiellement un bon moyen à cet égard. Finalement, les parties prenantes pensent que la Directive peut se révéler plus utile et plus pertinente sur le long terme, alors qu'un plus grand nombre de véhicules propres arrivent sur le marché.
- Certaines évidences semblent suggérer que la Directive et les initiatives qui l'accompagnent ont permis l'échange de bonnes pratiques.

Cohérence

- La Directive sur les Véhicules Propres complète dans une grande mesure les autres politiques et législations de l'UE ayant des objectifs similaires. Les objectifs ultimes des politiques et des législations de l'UE sont d'accroître la protection de l'environnement, de réduire les émissions de gaz à effet de serre et de polluants aériens, ainsi que d'atteindre une bonne sécurité énergétique. La Directive sur les Véhicules Propres s'inscrit en complément de toute une série d'autres politiques et législations qui se combinent pour atteindre ces objectifs, en incluant des mesures favorisant tant l'offre que la demande dans le secteur des transports.
- Dans son ensemble, la Directive est largement cohérente avec la plupart des autres politiques apparentées, y compris les Directives concernant la Passation des Marchés Publics, bien que certaines difficultés subsistent en ce qui concerne la qualité de l'air et le manque de cohérence dans les objectifs déclarés du Livre Blanc sur les Transports de 2011 qui vise à éliminer progressivement les véhicules utilisant des carburants conventionnels. Les pouvoirs adjudicateurs sont confrontés à des problèmes lorsqu'ils appliquent la méthodologie de monétisation de la Directive sur les Véhicules Propres aux achats de véhicules de transport routier effectués par les organismes publics, car cela peut entraîner la sélection de véhicules à moteur diesel dont l'utilisation peut être préjudiciable à la poursuite des objectifs de qualité de l'air, en particulier en ce qui concerne le NO₂. En conséquence, les dispositions comme la méthodologie de monétisation peuvent, dans certains cas, contrevenir aux objectifs de qualité de l'air, car elles ne conduisent pas à l'achat des types de véhicules qui sont les plus efficaces pour réduire les émissions de polluants dans les zones urbaines.

- Le fait que la Directive permette le choix de nombreuses autres options n'est pas conforme à l'objectif d'harmonisation de la détermination de ces impacts.

Soutenabilité

- Une abrogation totale de la Directive n'aurait probablement aucun impact significatif sur le marché et sur la demande actuelle en véhicules propres. Toutefois, les avantages plus généraux et le message à l'échelle de la société que représente la passation des marchés publics seraient perdus.
- En outre, dans le cas du secteur des véhicules utilitaires lourds, en particulier les autobus, les véhicules de ramassage des ordures et les autres véhicules lourds principalement utilisés par ou dans le cadre des services assurés par les pouvoirs publics, l'impact potentiel serait probablement plus important en raison du manque d'un cadre réglementaire plus large visant à réduire les émissions de CO₂ de ces véhicules.
- Une abrogation partielle, c'est-à-dire la seule conservation de la méthodologie de monétisation sous sa forme actuelle, privilégierait les véhicules à moteur diesel qui de toute façon représentent déjà la technologie dominante sur le marché des véhicules utilitaires lourds, ou les technologies qui indiquent (faussement) des émissions nulles lorsqu'elles sont mesurées au cours des cycles de tests.

Recommandations

Recommandations Générales

- **La Directive doit être conservée** : En dépit des bénéfices limités apportés à ce jour par la Directive sur les Véhicules Propres, certains éléments probants ont pu être identifiés au cours de cette évaluation qui conduisent à penser que cette Directive doit être conservée au lieu d'être abrogée. D'abord, il est nécessaire de continuer à s'efforcer d'atteindre les objectifs déclarés de la Directive sur les Véhicules Propres, à savoir la réduction des émissions de CO₂ et de polluants aériens, ainsi que l'augmentation du rendement énergétique et de la compétitivité dans le secteur des transports (voir la Section 6.2.2). Il est évident que la passation des marchés publics constitue un instrument qui peut s'avérer bénéfique dans la poursuite de ces objectifs (comme cela a été établi à la Section 6.3.3); l'encouragement des investissements dans les véhicules propres par les pouvoirs publics devraient contribuer à élargir le marché de ces véhicules et ainsi créer des économies d'échelle qui conduiront à des coûts de production et des prix moindres. Ceci devrait, à son tour, stimuler la demande de manière plus générale. En outre, il a été établi qu'il n'existe actuellement pas d'autres mesures (plus efficaces) pour stimuler le marché des véhicules propres (voir la Section 6.8.2), ce qui incite d'autant plus à conserver la Directive. Les parties prenantes consultées lors de la présente évaluation ont également déclaré leur préférence et leurs raisons pour conserver cette Directive, qui les ont conduit à agir en ce sens au niveau de l'UE, comme cela a été décrit dans les conclusions présentées ci-dessus. Bien que l'abrogation de la Directive sur les Véhicules Propres n'**empêcherait** en aucun cas la prise en compte des considérations environnementales lors de la passation des marchés publics pour l'achat de véhicules, celle-ci ne **serait plus obligatoire**. Il est probable que les pouvoirs adjudicateurs éprouveraient alors plus de difficultés à établir des critères qualitatifs et environnementaux pour l'attribution des marchés, car, la Directive 2014/24/UE étant par nature trop générale, cela réduirait le niveau de conseils et valeurs de référence disponibles pour les calculs. En l'absence de toute obligation impérative de tenir compte de l'environnement, il existe un risque que ces considérations soient ignorées en raison des pressions économiques. Il subsiste donc un argument justifiant que la passation des marchés publics tienne obligatoirement compte des critères environnementaux de manière à stimuler le marché des véhicules propres, ce qui est l'objectif déclaré de la Directive. Notre conclusion est donc que l'abrogation de la Directive ne serait pas la meilleure action à entreprendre, mais qu'au contraire, celle-ci doit être conservée.

- **La Directive doit être modifiée:** L'analyse réalisée dans le cadre de l'évaluation conduit à penser que la Directive sur les Véhicules Propres sous sa forme actuelle n'est pas particulièrement rentable. Toutefois, comme cela a été dit dans le paragraphe ci-dessus, elle constitue quand même un instrument utile pour stimuler le marché des véhicules utilisant des technologies plus propres dans le cadre d'un ensemble plus vaste d'instruments politiques s'adressant tant à l'offre qu'à la demande. Il est évident qu'il y a encore de gros progrès à faire pour augmenter l'efficacité et le rendement de cette Directive. Pour cela, il faudrait apporter des changements non seulement à son périmètre d'application mais aussi à ses mécanismes, parmi lesquels les options de monétisation. On peut également noter un besoin évident d'améliorer le niveau et la qualité des informations et des données disponibles qui permettront à l'avenir de contrôler son efficacité et son rendement (voir ci-dessous les Recommandations Spécifiques pour des informations plus détaillées).

Recommandations Spécifiques

- **Il est nécessaire de définir plus clairement ce que l'on appelle un «véhicule propre» :** Les types de véhicules considérés comme étant «propres», et les objectifs de la Directive à cet égard, doivent être clarifiés. Il pourrait s'avérer nécessaire d'introduire des dispositions spécifiques imposant des exigences minimales aux pouvoirs adjudicateurs (voir également le paragraphe suivant).
- **Il serait utile d'encourager l'inclusion dans la Directive de niveaux d'intérêt plus ambitieux pour l'achat de véhicules propres :** De manière à encourager des niveaux d'intérêt plus ambitieux, la Directive pourrait définir des normes plus exigeantes que les pouvoirs adjudicateurs les plus ambitieux pourraient appliquer. Plus spécifiquement, si toutes les autres options incluant des considérations énergétiques et environnementales sont conservées, les éléments suivants pourraient être considéré pour garantir que la Directive apporte réellement des améliorations environnementales (cela contribuerait également à définir ce que sont les véhicules «propres») :
 - Option 1 : Définir explicitement les spécifications techniques minimales à utiliser, par exemple :
 - Dans le cas des émissions de polluants : Toute future norme Euro7/VII, si celle-ci est finalement introduite, ou toute autre norme pertinente découlant des tests RDE (émissions dans des conditions de circulation réelle) pour véhicules légers qui doivent être implémentés. Des programmes et des normes volontaires concernant les émissions devraient également être inclus au fur et à mesure de leur introduction (en effectuant une distinction claire avec les véhicules Euro 6 existants).
 - Dans le cas des émissions de CO₂ : Les véhicules légers devraient constituer la prochaine cible, comme cela a été convenu dans les Réglementations respectives, ex. 95 gCO₂/km pour les voitures et 147 gCO₂/km pour les véhicules utilitaires légers (ces valeurs devraient être modifiées lorsque de nouveaux objectifs seront introduits dans les Réglementations respectives) ; pour les véhicules utilitaires lourds, des spécifications techniques minimales devraient être développées après que le mécanisme de contrôle des émissions de CO₂ des véhicules utilitaires lourds de l'UE a été mis en place.
 - Option 2a : Définir explicitement la pondération minimale qui doit être appliquée aux facteurs environnementaux et énergétiques si ceux-ci sont utilisés comme critères d'attribution.
 - Option 2b : Réviser la méthodologie de monétisation pour traiter les problèmes comme le prix des carburants, les facteurs de coût des émissions et les émissions dans des conditions de circulation réelle, ainsi que tous les

autres éléments ambigus, et mieux aligner l'accent de la méthodologie sur les trois objectifs environnementaux de la Directive.

À l'évidence, la faisabilité d'une telle approche devra être analysée plus en détail, et tout changement introduit devra prouver qu'il promeut de manière appropriée l'achat de ce qui aura été plus clairement défini comme étant des «véhicules propres».

- **Il faut faciliter l'usage de l'option de monétisation (si celle-ci est conservée) :** Bien qu'il soit possible d'envisager le maintien des autres options, il est également important de promouvoir l'usage de l'option de monétisation, car c'est la seule option qui internalise explicitement les coûts opérationnels. Pour cela, il faudra que des actions soient entreprises pour simplifier la complexité (perçue) de cette approche. Parmi les actions potentielles en ce sens, on peut citer ce qui suit :
 - Veiller à ce que les pouvoirs adjudicateurs soient équipés d'un instrument convivial pour effectuer les calculs. L'instrument de calcul des coûts du cycle de vie d'un parc automobile propre (Clean Fleets Lifecycle Costing Tool ou «Clean Fleets 2014») existe déjà et est capable d'effectuer les calculs de la monétisation, mais son efficacité pourrait être fortement améliorée si il était disponible sur le web afin que sa divulgation se fasse à une plus grande échelle (idéalement, il sera même mentionné dans la législation proprement dite).
 - Utiliser les informations sur les émissions de CO₂ des véhicules utilitaires lourds qui seront rapportées par le biais du mécanisme de contrôle prochainement disponible afin de recommander l'achat de véhicules utilitaires lourds dont la consommation en carburant offre un meilleur rendement. Il est essentiel que des informations objectives et comparables concernant les émissions de CO₂ et le rendement énergétique de ces véhicules soient disponibles.
 - Veiller à ce que les informations du Portail sur les Véhicules Propres soient utilisées pour satisfaire l'intégralité des besoins de données sur les émissions des véhicules en offrant un «guichet unique» à cette fin. Étant donné que le Portail est en cours de modification au moment même de la rédaction de la présente évaluation, il ne nous est pas possible d'effectuer des commentaires sur la mesure par laquelle cette nouvelle version répondra aux besoins. Toutefois, les pouvoirs adjudicateurs ont besoin d'accéder facilement à des données exhaustives sur les émissions des divers véhicules. La gestion des informations d'une manière aussi centralisée ne sera pas une tâche facile ni bon marché, mais si la méthodologie de monétisation doit être conservée, son efficacité dépendra de la facilité avec laquelle les pouvoirs adjudicateurs pourront accéder aux informations appropriées pour les y intégrer.
 - Une meilleure coordination avec les autres initiatives de la Commission entreprises à ce jour, en particulier le Portail sur les Véhicules Propres et le Projet «Clean Fleets», pour faciliter l'échange de pratiques et d'expériences, promouvoir une meilleure compréhension des modifications de la Directive et faciliter la passation commune de marchés publics transfrontaliers.
- **Une future prise en compte des émissions WTW (Well-To-Wheel: « Du puits à la roue ») :** De manière à pouvoir comparer l'ensemble des impacts environnementaux des véhicules, il est nécessaire de prendre en compte les émissions WTW. Ce problème est également pertinent pour les autres législations de l'UE, comme la Réglementation applicable aux émissions de CO₂ des voitures particulières, l'étiquetage du rendement énergétique, etc. Il est nécessaire d'envisager la possibilité d'introduire une approche, comme par exemple le facteur WTW, qui pourrait être appliquée communément dans la législation complémentaire de l'UE, lorsque cela est approprié.

- **Élargir le périmètre d'application de la Directive** : Le périmètre d'application de la Directive pourrait être élargi en abaissant les valeurs-seuils. Toutefois, le rapport bénéfice-coût d'un tel changement devra être examiné plus en détail. L'élargissement du périmètre d'application de la Directive à toutes les passations de marchés publics ayant une composante importante dans le secteur des transports et, si possible, aux parcs automobiles privés, pourrait être envisagé. Ces deux approches présentent le potentiel d'augmenter le nombre des véhicules couverts par la Directive, mais il faudra s'assurer que l'approche choisie offre le niveau d'efficacité requis après que l'échelle des impacts potentiels et des coûts a été étudiée.
- **Surmonter les problèmes posés par le manque ou l'inexactitude des données** : Un manque d'informations ou l'impossibilité de différencier les véhicules sur la base de leur consommation énergétique et de leurs émissions constitue un vrai défi. Toutes les voitures et tous les véhicules utilitaires légers, ainsi que tous les moteurs utilisés dans les véhicules utilitaires lourds, doivent respecter les normes d'émissions Euro les plus récentes (à savoir, 6 et VI, respectivement) et, à moins que les villes ne disposent des ressources et des moyens techniques pour entreprendre leurs propres tests dédiés, il ne leur est pas possible de différencier entre les véhicules sur la base de leurs émissions de polluants. Dans le cas des voitures et des véhicules utilitaires légers, des informations sur les cycles de tests portant sur la consommation en carburant et sur les émissions en CO₂ sont disponibles pour les véhicules motorisés de manière conventionnelle, mais ces informations pour les véhicules motorisés d'une autre manière sont moins précises, car il est nécessaire de prendre mieux en compte les émissions intégrées et celles du cycle de vie pour déterminer avec précision quel type de technologie est le meilleur à cet égard. Par ailleurs, dans le cas des voitures et des véhicules utilitaires légers pour lesquels les données de consommation en carburant et d'émissions de CO₂ sont disponibles, il y a le problème supplémentaire de la divergence entre les émissions mesurées dans des conditions de circulation réelle et celles mesurées lors des cycles de tests. Dans le cas des véhicules utilitaires lourds, les données de consommation en carburant et d'émissions de CO₂ ne sont souvent disponibles que de manière hétérogène pour la plupart des villes (là encore, les villes autres que celles ayant les ressources et les moyens techniques d'effectuer leurs propres tests). Nous pensons savoir qu'un grand nombre de ces problèmes ont déjà été identifiés comme importants par la Commission et que des actions appropriées sont actuellement entreprises pour les résoudre. S'il s'avérait que ce n'est pas le cas, ou s'il est finalement déterminé que ces actions ne sont pas possibles, il sera important d'émettre des recommandations plus détaillées à l'intention des pouvoirs adjudicateurs afin qu'ils sachent comment appliquer la Directive sur les Véhicules Propres dans de tels cas.
- **Introduire un cadre de référence volontaire pour faciliter la production de rapports par les états-membres** : L'un des défis associés à la compréhension de l'efficacité, et donc du rendement de la Directive, est le manque de connaissance de ses impacts et, surtout, de ses coûts. Il est important de ne pas introduire des exigences qui entraîneraient des coûts administratifs excessifs pour les états-membres; en conséquence, il pourrait être utile d'introduire un cadre de référence pour la production de rapports par les états-membres qui les encouragerait à communiquer les impacts de la Directive d'une manière qui soit constante et comparable. Ceci faciliterait les évaluations futures et apporterait les arguments nécessaires pour justifier d'éventuels changements à la Directive.
- **Explorer le potentiel d'une initiative de la Commission pour faciliter la passation commune de marchés transfrontaliers** : Alors qu'il subsiste des obstacles à la passation commune de marchés transfrontaliers et que les coûts des véhicules intégrant certaines des technologies propres restent élevés, il serait utile d'explorer la possibilité d'utiliser des instruments financiers (et non pas des subventions) pour contribuer à surmonter les coûts administratifs et en capitaux initialement élevés dans le cas de la passation commune de marchés

transfrontaliers portant sur les véhicules propres. À cet égard, l'utilisation potentielle d'instruments développés par la BEI pourrait être explorée.

1. INTRODUCTION

1.1. Purpose of the evaluation

This evaluation has been commissioned by DG MOVE and focusses on Directive 2009/33/EC on the promotion of clean and energy efficient road transport vehicles (the "Clean Vehicles Directive") (European Commission 2009).

Article 10 of the Clean Vehicles Directive (CVD) requires that the Commission prepares monitoring reports every two years. The reports are required to evaluate the effects of the Directive and the options provided for in the Directive³ (including methodology of option 2b as set out in Article 5(3) – see Section 2.1). The first (and most recent) monitoring report was prepared in 2012 (Ricardo-AEA and TEPR 2012). The future handling of the Clean Vehicles Directive has been considered in the context of the 2013 REFIT exercise (the EC's Regulatory Fitness and Performance programme⁴), so it has therefore been decided to evaluate the Directive as a whole.

This report therefore provides the Commission with an ex-post evaluation of the Clean Vehicles Directive, building upon conclusions from previous assessments, including the first monitoring report of the Directive (Ricardo-AEA and TEPR 2012).

1.2. Scope of the evaluation

The transposition deadline of the Clean Vehicles Directive was 4th December 2010, from which point Member States were required to bring into force the laws, regulations and administrative provisions necessary for compliance. Hence the evaluation will cover the period from 2010 to present (2015).

Geographically the focus of the evaluation is on the implementation of the Directive in the EU28 Member States.

1.3. Structure of this report

The report is structured as follows:

- Background to the initiative (Section 2);
- Evaluation questions (Section 3);
- Method/process used (Section 4);
- Implementation/state of play (results) (Section 5);
- Answers to the evaluation questions (Section 6);
- Conclusions (Section 7);
- Recommendations (Section 8); and
- Annexes.

³ Options presented in Article 5(3) include Option 1: Setting technical specifications for energy and environmental performance; Option 2a: Including energy and environmental impacts in the purchasing decision using award criteria; and Option 2b: Including energy and environmental impacts in the purchasing decision by monetising the impacts.

⁴ EC's REFIT – action taken to make EU law simpler and to reduce regulatory costs, thus contributing to a clear, stable and predictable regulatory framework supporting growth and jobs European Commission. (2013). "EU Regulatory Fitness (REFIT) -- Key Documents." from http://ec.europa.eu/smart-regulation/better_regulation/key_docs_en.htm.

2. BACKGROUND TO THE INITIATIVE

2.1. Description of the initiative

The Clean Vehicles Directive (European Union 2009) aims to stimulate the market for clean and energy-efficient vehicles by requiring various public bodies to take account of lifetime environmental and energy impacts when purchasing road transport vehicles.

These requirements oblige contracting authorities, contracting entities and transport operators charged with public service obligations (Article 5(1)) to take into account at least energy consumption and lifetime emissions of carbon dioxide (CO₂), nitrogen oxides (NO_x), non-methane hydrocarbons (NMHCs), particulate matter (PM) and energy consumption in purchases of road transport vehicles (Article 5(2)). To this end, the focus of the Clean Vehicles Directive was to internalise the operational lifetime environmental and energy costs in the purchase decision of procurers.

Article 5(3) of the Directive sets out the means by which paragraphs 1 and 2 of Article 5 can be fulfilled:

"(a) by setting technical specifications for energy and environmental performance in the documentation for the purchase of road transport vehicles on each of the impacts considered, as well as any additional environmental impacts; or

(b) by including energy and environmental impacts in the purchasing decision, whereby:

- In cases where a procurement procedure is applied, this shall be done by using these impacts as award criteria, and

- In cases where these impacts are monetised for inclusion in the purchasing decision, the methodology set out in Article 6 shall be used. "

Related to the last point, Article 6 of the Directive sets out the methodology by which the operational lifetime costs can be calculated when monetising the impacts.

Article 10 of the Directive requires that the Commission prepares a report every two years on the actions taken by individual Member States to promote the purchase of clean and energy-efficient road transport vehicles. The reports should also assess the effects of the Directive, especially of the options referred to in Article 5(3), and the need for further action, and include proposals as appropriate.

The Clean Vehicles Directive (CVD) is one of several pieces of EU legislation that contribute to achieving similar objectives. In the field of road transport, it works in parallel with EU Regulations on CO₂ emissions for cars⁵ (European Commission 2009) and vans⁶ (European Commission 2011), standards on tailpipe emissions of air pollutants⁷ (European Commission 2007), fuel quality requirements⁸ (European Commission 2009), a target on the share of renewable energy sources⁹ (European Commission 2009), infrastructure development for alternative fuels and energy sources¹⁰ (European Commission 2014),

⁵ Regulation (EC) No 443/2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO₂ emissions from light-duty vehicles

⁶ Regulation (EU) No 510/2011 setting emission performance standards for new light commercial vehicles as part of the Union's integrated approach to reduce CO₂ emissions from light duty vehicles.

⁷ Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and 6) and on access to vehicle repair and maintenance information

⁸ Directive 2009/30/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions (Fuel Quality Directive)

⁹ Directive 2009/28/EC on the promotion of the use of energy from renewable sources

¹⁰ Directive 2014/94 on the deployment of alternative fuels infrastructure

consumer information¹¹ (European Commission 1999) and research support. Legislation also applies with respect to noise, tyres, mobile air conditioning, lubricants and other aspects. At Member State level, the EU legislation is complemented by national legislation and initiatives.

In a broader context, the European Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan (European Commission 2008) aims to change the way we consume, produce and promote environmental and energy efficient products, including through green public procurement (GPP). The EU GPP criteria for transport were updated in 2012 to take into account the obligations set out in the CVD, which allow for setting maximum values in the technical specifications and/or awarding higher marks to vehicles that have better environmental ratings/energy consumption (European Commission 2012). The criteria cover both “core” and “comprehensive” levels - the core criteria are designed to be easy to implement with minimal verification effort and/or cost increases, while the comprehensive criteria define more advanced environmental performance and cover a wider range of issues that go beyond the requirements of the Directive. In addition, the GPP criteria also reference the methods defined under the CVD (referring to the guidance provided on the Clean Vehicle Portal) for calculating the operational lifetime costs of a vehicle.

While the CVD introduced for the first time sustainability obligations into public procurement law for the whole EU, developments have been ongoing in other areas. The most recent procurement legislation was renewed in 2014 and includes Directive 2014/24/EU on public procurement (European Union 2014) (repealing Directive 2004/18/EC); and Directive 2014/25/EU (European Union 2014) on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC.

These new Directives reiterated that public procurement is a key part of the Europe 2020 strategy for smart, sustainable and inclusive growth. At the same time, it was emphasised that there is a need to ensure the most efficient use of public funds and that procurement markets must be kept open. As such, these Directives were adopted with the goal of simplifying and relaxing rules and procedures in recognition of economic, social and political trends, together with budgetary constraints. Member States have until March 2016 to transpose the new rules into national legislation (except with regard to e-procurement, where the deadline is September 2018). The new rules allow broader criteria to be included in the evaluation of contracts, including on the basis of:

- Total lifecycle cost (including carbon footprint) – similar to the method already set out in the Clean Vehicles Directive, but recognising progress in the area of lifecycle costing;
- Production processes used, e.g. the employment of disadvantaged people or the use of environmentally-friendly materials;
- Any “abnormally low bid” (Article 69, Directive 2014/24/EU) will be rejected if it indicates a failure to observe social, labour law or environmental protection obligations;
- Contracts could be reserved for sheltered employment undertakings whose objective is to bring into the labour force disabled or otherwise disadvantaged persons (such as the long-term unemployed or members of disadvantaged minorities).

These aspects aim to give greater flexibility in procurement decisions and to take into account national/regional priorities with respect to competitiveness and political settings, as well as technological issues. A more detailed analysis of the synergies and overlaps

¹¹ Directive 1999/94/EC relating to the availability of consumer information on fuel economy and CO₂ emissions in respect of the marketing of new passenger cars

between these new public procurement Directives and the Clean Vehicles Directive will be undertaken in Evaluation Question 12 (see Section 6.13).

The Commission has considered a proposal to repeal the CVD on the basis that it is no longer necessary due to the above-mentioned developments in the horizontal public procurement rules (European Commission 2013). However, legal concerns have been raised with respect to the repercussions of a repeal of the CVD on horizontal public procurement legislation; therefore this evaluation will help to determine future actions (European Commission 2014).

2.2. Baseline

An important step in analysing the effects of the Directive is to set out the baseline against which the analysis takes place. The baseline includes quantified estimates of CO₂ and air pollutant emissions from public sector road transport vehicles, and overall expenditure in the assumed absence of the CVD. The baseline development thus assumed that other policy developments and legislation driving the uptake of clean vehicles (e.g. Euro emission standards, Car and Van CO₂ regulations) are already in place.

The baseline has been based on a vehicle fleet analysis covering four representative types of public sector vehicles (passenger cars, vans, rigid trucks and buses) over the years 2009 to 2014. Of particular interest for the evaluation is the period 2012-2014, over which the CVD has been in force¹².

As a first step we estimated the **number of vehicles annually procured** by the public sector in the EU as a constant share of annual new vehicle registrations in Europe; the latter is provided by ACEA (2015). Given substantial uncertainty on the total number of vehicle registrations from the public sector across Europe, we have developed lower and upper estimates for the annual numbers of vehicles procured by public contracting authorities.

The lower bound is based on an estimate of the number of vehicles procured via the Tenders Electronic Daily (TED) database, which is the online version of the "Supplement to the Official Journal of the EU. According to data from TED for the period 2012-2014, there was a total of 10,535 public procurement actions to purchase vehicles. Data on contract awards in TED typically do not include information on the number of vehicles procured, although by law it is necessary to include information on the monetary value of the awarded contract. In order to estimate the total number of vehicles procured by vehicle type (passenger car, van, bus, and rigid truck) via TED, we drew upon average costs per vehicle derived from our survey of procurers. The survey explicitly asked procurers for both contract values and numbers of vehicles procured, making the estimation of typical per-vehicle costs straightforward. We divided the total contract values for a particular vehicle type given in TED by the typical cost per vehicle obtained from the survey in order to estimate the average number of vehicles procured through TED per year.

However, it is possible that some contracting authorities have not listed all contract details in TED. For example, certain Member States (e.g. UK) have set up framework agreements for vehicle procurement, and use these frameworks to make many small procurement actions which do not individually require listing in TED. Therefore the estimates based on TED are only a conservative estimate of the number of vehicles procured by public contracting authorities.

Thus, an upper bound estimate was developed based on available data from Germany, the UK, France and Italy (see Table 2-1 and Figure 2-1). Detailed data from Germany have been used, together with appropriate weights to give us an EU28-wide estimate. A more detailed explanation of how these values are derived is provided in Annex 1.

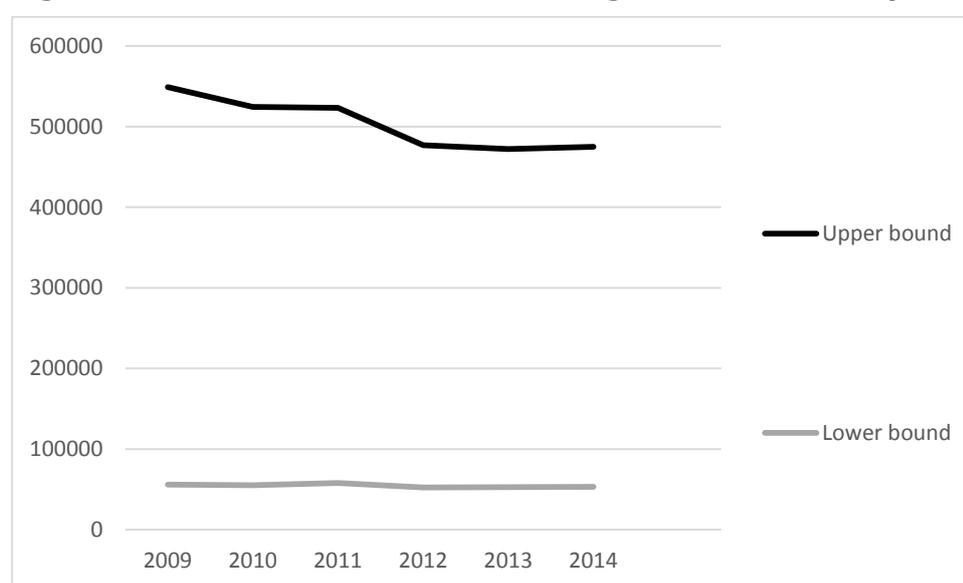
¹² Although Article 11 of the Directive stated that CVD should be transposed by 4 December 2010, the majority of Member States transposed much later during 2012 – see Section 5.1.

Table 2-1: Estimated annual number of publicly procured vehicles and their share of total annual new vehicle registrations (annual average for the period 2012-2014)

	Lower bound		Upper bound	
Passenger cars	29k	0.2%	405k	3.4%
Vans	10k	0.7%	40k	2.8%
Rigid trucks	11k	5.9%	12k	6.4%
Buses	4k	16.8%	18k	75.0%
Total	53k	0.4%	475k	3.5%

Source: Own estimates on the basis of TED and KBA (2014) and others

Figure 2-1: Estimates of total annual registrations of new public sector vehicles



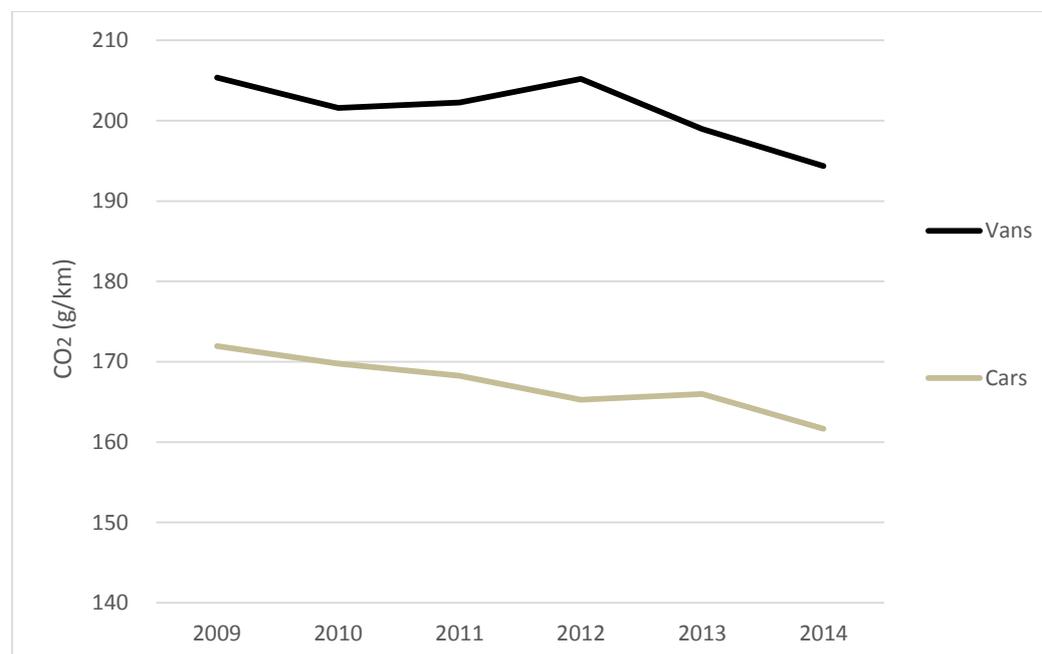
Source: Analysis by Ricardo Energy & Environment based on (ACEA 2015b)

Average lifetime mileage for cars and vans draws on average estimates developed in a recent Ricardo-AEA study for DG Climate Action (Ricardo-AEA 2014). For trucks, annual mileage was estimated at the average level assumed for municipal utility vehicles, taken from (AEA 2011). This study was also used to define average annual mileage for buses.

Based on the vehicle registrations and vehicle mileage data, the total vehicle kilometres for each type of newly registered public sector vehicle were estimated for each year of the analysis period and were multiplied by emission factors to estimate baseline emissions of the public sector fleet.

For the baseline emission factors (see Figure 2-2), it was assumed that public sector passenger cars and vans have the same CO₂ performance as the EU average car fleet. In order to estimate real-world emission factors, we used data from EEA reports and datasets on new car and van fleet average emissions as well as analysis on real world emissions (ICCT, 2014a). For rigid trucks and buses, CO₂ emissions per km were set at the average level identified in AEA (2011).

Figure 2-2: Assumed average CO₂ emission factors of public sector vehicles by year of registration



Notes: Constant emission factor assumed for trucks (485g/km) and buses (956g/km).

Source: Analysis by Ricardo Energy & Environment based on real-world emissions data from ICCT (2014a) and others

Thus, in the absence of the CVD, total baseline CO₂ emissions up to the end of 2014 from public sector vehicles procured over the 2012-2014 period in the lower bound case (based on estimated procurement through TED) were expected to be around 3 Mt CO₂ while, in the upper bound case they would be up to 15 Mt (see Table 2 2). Lifetime emissions covering the whole period during which the procured vehicles are in circulation are calculated in the range of 14 to 82.4 MT.

Table 2-2: Baseline total CO₂ emissions from public sector vehicles procured during the period 2012-2014 (estimate)

	CO ₂ emissions up to 2014 (Mt CO ₂)		Lifetime CO ₂ emissions (Mt CO ₂)	
	Lower bound	Upper bound	Lower bound	Upper bound
Passenger cars	0.5	7.7	2.5	34.7
Vans	0.4	1.5	1.1	4.8
Trucks	0.7	0.8	4.2	4.6
Buses	1.1	5.1	8.6	38.2
Total	2.8	15.1	16.4	82.4

Source: analysis by Ricardo Energy & Environment based on various sources

In the case of air pollutant emissions (NMHC, NO_x and PM) from public sector vehicles, with the exception of NO_x emissions from diesel vehicles, the baseline scenario is based on the use of the relevant minimum Euro standard limit values for cars, vans, trucks and buses applying to new vehicles at the time. In the case of NO_x emissions from diesel vehicles where real-world NO_x emissions can deviate vastly from test cycle emissions, real-world emission factors from ICCT (2014; 2015a) were used. Euro standards for trucks and buses are given as emission factors in g/kWh of engine output. A conversion from CO₂

emissions to assumed engine output (at an average efficiency of 0.35) was necessary in order to present emission factors in g/km. Table 2-3 summarises the assumed baseline pollutant emissions factors that were used.

Table 2-3: Assumed baseline pollutant emission factors from public sector vehicles

		NMHC (g/km)		NO _x (g/km)			PM (g/km)	
		Up to 2013	2014 & after	Up to 2013	2014	2015 & after	Up to 2013	2014 & after
Passenger cars	Petrol	0.068	0.068	0.060	0.060	0.060	0.005	0.005
	Diesel	-	-	0.180	0.6*	0.6*	0.005	0.005
	AFV	0.068	0.068	0.060	0.060	0.005	0.005	0.068
Vans	Diesel	-	-	0.240	1.068*	1.055*	0.005	0.005
Rigid trucks	Diesel	0.295	0.083	1.283	2.886**	0.192**	0.013	0.006
Buses	Diesel	0.581	0.164	2.528	5.688**	0.379**	0.025	0.013

Source: * real-world values, based on data from ICCT (2014)

** real-world values, based on data from ICCT (2015a)

Remaining figures based on EURO limit values from DieselNet (2015)

On the basis of the above pollutant emissions factors, Table 2-4 to Table 2-6 summarise the estimated pollutant emissions for the different categories of vehicles under the baseline scenario.

Table 2-4: Baseline total NMHC emissions from public sector vehicles procured during the period 2012-2014 (estimate)

	NMHC emissions up to end of 2014 (in tonnes)		Lifetime NMHC emissions (in tonnes)	
	Lower bound	Upper bound	Lower bound	Upper bound
Passenger cars	168	2,379	675	9,548
Vans	-	-	-	-
Trucks	1,055	1,145	3,922	4,258
Buses	1,743	7,767	8,876	39,560
Total	2,966	11,292	13,473	53,366

Source: analysis by Ricardo Energy & Environment based on various sources

Table 2-5: Baseline total NO_x emissions from public sector vehicles procured during the period 2012-2014 (estimate)

	NO _x up to end of 2014 in tonnes		Lifetime NO _x emissions (in tonnes)	
	Lower bound	Upper bound	Lower bound	Upper bound
Passenger cars	4,202	59,477	14,557	206,055
Vans	3,953	16,701	10,263	43,356

Trucks	10,159	11,029	36,613	39,747
Buses	16,802	74,885	83,139	370,535
Total	35,117	162,091	144,573	659,692

Source: Analysis by Ricardo Energy & Environment based on various sources

Table 2-6: Baseline total PM emissions from public sector vehicles procured during the period 2012-2014 (estimate)

	PM emissions up to end of 2014 (in tonnes)		Lifetime PM emissions (in tonnes)	
	Lower bound	Upper bound	Lower bound	Upper bound
Passenger cars	38	534	137	1,937
Vans	19	78	48	203
Trucks	47	51	178	194
Buses	77	343	402	1,794
Total	180	1,005	766	4,128

Source: Analysis by Ricardo Energy & Environment based on various sources

Finally, estimates of the baseline total public sector expenditure (purchase and operating costs) were estimated for the different vehicle types (see Table 2-7). These estimates have been taken from (Ricardo-AEA 2012).

Table 2-7: Baseline capital costs and operating costs

Lower bound costs (€M, 2015 prices)					
	Capital costs		Operating costs		
	2012-2014	2015-2032	2012-2014	2015-2032	Total
Passenger cars	1,677	-	1,677	1,008	2,686
Vans	468	-	468	442	910
Trucks	2,334	-	2,334	1,874	4,208
Buses	2,213	-	2,213	2,235	4,448
Total	6,692	-	1,230	5,560	6,790
Upper bound costs (€M, 2015 prices)					
	Capital costs		Operating costs		
	2012-2014	2015-2032	2012-2014	2015-2032	Total
Passenger cars	23,741	-	23,741	14,275	38,016
Vans	1,977	-	1,977	1,868	3,845
Trucks	2,534	-	2,534	2,034	4,568
Buses	9,861	-	9,861	9,963	19,824
Total	38,114	-	6,020	28,140	34,160

Note: costs provided are not discounted

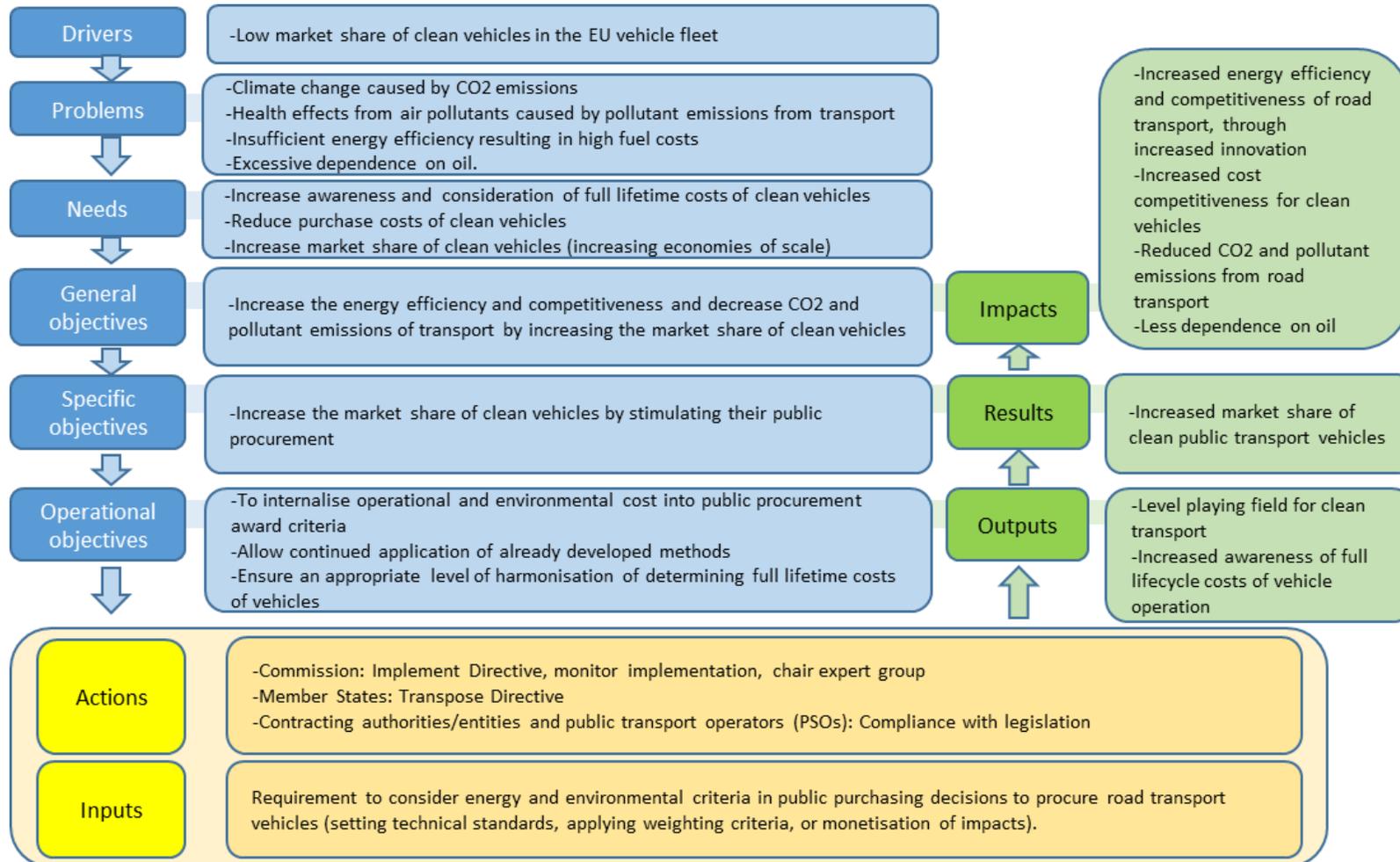
2.3. Intervention logic

The intervention logic describes the links and causal relationships between the problems and/or needs, broader policy goals, the general, specific and operational objectives that

the intervention is designed to address, and the specific actions for addressing the identified problems and/or needs (in graphical form). It also describes what the intervention is expected to achieve (outputs, results and impacts), and how the wider policy aims are linked to the specific operational objectives and the actions taken to achieve the interventions' objectives by relevant actors.

Figure 2-3 presents the intervention logic for the Clean Vehicles Directive. A discussion of the general, specific and operational objectives of the Directive follows.

Figure 2-3: Intervention Logic – Clean Vehicles Directive



The Impact Assessment for the revised proposal (European Commission 2007) set out the main environmental challenges related to transport as:

- An excessive dependence on oil;
- The problem of climate change caused by carbon dioxide (CO₂) emissions; and
- Health effects from air pollution caused by pollutant emissions from vehicles.

The objective of the proposed Directive was identified in the Impact Assessment as “*cleaner and more energy efficient vehicles in the EU*” (European Commission 2007).

2.3.1. General objectives

The general objective of the CVD is to “*increase the energy efficiency and competitiveness and decrease CO₂ and pollutant emissions of transport by increasing the market share of clean vehicles*”.

The Directive (European Commission 2009) goes into more detail and specifies that it aims to “*stimulate the market for clean and energy efficient road transport vehicles, and especially – since this would have a substantial environmental impact – to impact the market for standardised vehicles produced in larger quantities such as passenger cars, buses, coaches and trucks, by ensuring a level of demand for clean and energy-efficient road transport vehicles which is sufficiently substantial to encourage manufacturers and the industry to invest in and further develop vehicles with low energy consumption, CO₂ emissions and pollutant emissions*”.

2.3.2. Specific objectives

The specific objective of the CVD is to “*increase the market share of clean vehicles by stimulating their public procurement*”. Whereas the general objective looks to the ultimate aim of the CVD to increase the market share of clean and energy efficient vehicles (whole fleet), the specific objective is to achieve an increase in the market share of clean vehicles through stimulating their public procurement.

2.3.3. Operational objectives

There are three operational objectives of the CVD:

“*To internalise operational and environmental cost into public procurement criteria*”. It was anticipated that through mandating the inclusion of lifetime costs for energy consumption, CO₂ emissions and pollutant emissions as award criteria in the procurement of vehicles for public transport services, that the largest impact on the market could be achieved when coupled with the best cost/benefit result.

“*Allow continued application of already developed methods*” – Some Member States were already actively applying green public procurement criteria in the procurement of road transport vehicles tailored to their local needs prior to the introduction of the CVD. It was therefore important to ensure that such Member States were able to continue to apply these methods when the Directive came into force. Article 5(3) sets out three options for applying environmental criteria in the public procurement of road transport vehicles, covering setting of technical standards, applying weighting to environmental criteria and monetisation of environmental and energy impacts.

“*Ensure an appropriate level of harmonisation of determining full lifetime costs of vehicles*”. It was anticipated that by providing harmonised criteria at the Community level (foreseen through options in Article 5(3)), that the procurement of vehicles for public transport services would make a significant impact on the market.

3. EVALUATION QUESTIONS

The evaluation questions are as follows:

Relevance:	<ol style="list-style-type: none"> 1. To what extent is increasing the market share of clean vehicles an adequate mean to contribute to the overall objectives of increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport? 2. To what extent is stimulating the public procurement of clean vehicles an adequate mean to contribute to the overall objectives of increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport?
Effectiveness:	<ol style="list-style-type: none"> 3. To what extent has the mandatory inclusion of operational lifetime environmental and energy impacts in the procurement decision led to an increased market share of clean vehicles and contributed to reducing CO₂ and pollutant emissions (NO_x, NMHC and particulate matter) from the transport sector? 4. To what extent has the provision of different options to include operational lifetime environmental and energy impacts stimulated the internalization of operational costs in procurement decisions, and contributed to the harmonization in determining these costs? 5. To what extent has the Directive promoted an increased awareness among the different stakeholders of the operational lifetime environmental and energy impacts of vehicles?
Efficiency:	<ol style="list-style-type: none"> 6. To what extent has the Directive generated benefits and costs for different stakeholders (e.g. national administrations, contracting authorities, transport operators, manufacturers)? 7. Could the effects have been achieved in a more efficient way (e.g. through other or additional (legislative) measures)?
European Added Value:	<ol style="list-style-type: none"> 8. Would it have been possible to obtain similar or better results in terms of the market share of clean vehicles without EU intervention, i.e. the Clean Vehicles Directive? 9. To what extent have the Directive and the associated Commission initiatives (e.g. Clean Vehicle Portal, Clean Fleets Project) initiated and/or supported a recognised exchange of good practices between contracting authorities in different Member States?
Coherence:	<ol style="list-style-type: none"> 10. How well does this legislation interact with other EU policies with similar objectives, in particular the general transport policy framework as laid down in the 2030 framework for climate and energy policies, the 2011 Transport White Paper, the conclusions from CARS2020, pollutant emissions limits (EURO standards for light and heavy duty vehicles) and CO₂ limits for cars, and the deployment of alternative fuel infrastructure? 11. To what extent is the provision of multiple options to include operational lifetime environmental and energy impacts coherent with the objective of harmonizing the determination of these impacts? 12. To what extent are the provisions of the Clean Vehicles Directive coherent, complementary and/or redundant with the horizontal EU procurement legislation (in particular 2014/24/EU and 2014/25/EU)?
Sustainability:	<ol style="list-style-type: none"> 13. To what extent would the market develop differently should the intervention be ceased partially or completely at European level?

4. METHOD/PROCESS FOLLOWED

4.1. Method/Process

4.1.1. Data collection

The first stage of this evaluation of the Clean Vehicles Directive was to undertake an extensive data collection. The main tools that have been applied include a review of relevant literature, extensive stakeholder engagement (including online surveys, individual stakeholder contact/interviews and stakeholder workshops), and preparation of case studies. Data collection was undertaken from project inception (January 2015) to May 2015.

Literature review

The review of the literature covers reports and studies directly related to Directive 2009/33/EC, Directives and their assessment in the wider policy context, European strategy documents and work previously performed by the study team. Table 4-1 provides an overview of the most relevant literature sources. All of the literature is referenced throughout the report, as well as in the reference list at the end of this report.

Table 4-1: Main literature supporting the evaluation of Directive 2009/33

Type	Sources (list not exhaustive)
Assessments/Monitoring reports directly related to Directive 2009/33/EC:	<ul style="list-style-type: none"> Monitoring Report of the Directive 2009/33/EC on the promotion of clean and energy efficient road transport vehicles (Ricardo-AEA and TEPR 2012) The Impact Assessment accompanying the proposal for the Clean Vehicles Directive: Impact Assessment of a Proposal for a Directive on the Promotion of Energy Efficient and Low Emission Road Transport Vehicles, (PWC 2005)
Directives and their assessments in the wider policy context:	<ul style="list-style-type: none"> The evaluation reports on the impact and effectiveness of European public procurement rules, along with the supporting studies and consultation documents (European Commission 2011) Directive 2014/24/EU on public procurement (European Union 2014) Directive 2014/25/EU on procurement by entities operating in the water, energy, transport and postal services sectors (European Union 2014) Directive 2014/94/EU on the deployment of alternative fuels infrastructure (European Union 2014), Evaluation Report on Impact and Effectiveness of EU Public Procurement Legislation (European Commission 2011)
European strategy documents:	<ul style="list-style-type: none"> 2020 climate and energy package (European Commission 2009) Transport White Paper (European Commission 2011) REFIT exercise (European Commission 2013) Conclusions from CARS2020 (European Commission 2014)
Other EC reports:	<ul style="list-style-type: none"> Handbook on external costs of transport (Ricardo-AEA, DIW Econ et al. 2014)

Type	Sources (list not exhaustive)
	<ul style="list-style-type: none"> Evaluation of Regulations 443/2009 and 510/2011 on CO₂ emissions from light-duty vehicles (Ricardo-AEA and TEPR 2015)

The desk research conducted for the study revealed that there is a relevant body of literature that can help to inform some of the analysis of the evaluation questions. However, since the 2012 monitoring report, no further high level review of the Clean Vehicles Directive has been conducted. Conclusions emerging from the desk research have been supplemented by the information collected through other means (see following sections).

Engagement with Stakeholders

The study team engaged with a wide range of stakeholders, including EU-level stakeholders, procurers, manufacturers, contractors and Member States. Table 4-2 below summarises the stakeholder engagement activities undertaken as part of the data collection for the evaluation. For more information, please see corresponding annexes.

Table 4-2: Summary of stakeholder engagement activities

Type of stakeholder	Nature of engagement	Description	Further information
EU Level Stakeholders	Telephone interviews: 12 and a further 9 engaged (e.g. exchange of emails/information)	Discussing views of EU Level Stakeholders on the Directive and asking questions based on the 13 evaluation questions.	Annex 2 provides an overview of interview responses.
	Workshop – 21 attendees	Held on afternoon of 17 th April 2015 in Brussels. Overview of study to date; feedback on participants on assessment of the options referred to in Article 5(3) and assessment of the monetisation methodology; discussion regarding possible improvements to the Directive.	Agenda, full list of participants and summary of the workshop can be found in Annex 3
Procurers	Online survey: 547 responses	Questions covering information regarding the most recently signed contract to procure road transport vehicles; use of environmental criteria in assessments; setting technical standards for environmental and energy performance; using weighting/award criteria in assessments; monetising energy and environmental impacts; and use of environmental criteria prior to 2012.	Annex 4 provides a summary and analysis of survey responses
	Telephone interviews: 13	Follow-on interviews to obtain more in-depth information on procurers'	Annex 5 provides a summary and

	(6 written responses)	experiences with applying the requirements of the CVD.	analysis of interview responses
Manufacturers	Telephone interviews: 3 (1 written response)	Interviews to identify further data relating to vehicles that had been procured publicly since the start of 2012 and to determine whether any impacts of the CVD had been realised by manufacturers.	Annex 6 provides a summary and analysis of survey responses
Contractors	Online survey: 65 responses	Survey aimed at capturing data and information from contractors who have been awarded contracts for providing road transport vehicles.	Annex 7 provides a summary and analysis of survey responses
Member States	Fiches	Fiches collating and verifying information from MSs (based on those first used in the 2012 Monitoring Report (Ricardo-AEA and TEPR, 2012)) on implementation of CVD, supporting actions/ measures, application of options in Article 5(3) and other views on impacts of CVD. Inputs/updated fiches were received from 16 Member States ¹³ .	
	Workshop	Held on morning of 17 th April 2015 in Brussels Overview of the study, first findings and suggestions, and feedback from Member States.	Agenda can be found in Annex 8

Case studies

The purpose of undertaking case studies was to support a number of the tasks through providing qualitative information and illustrative examples. These include the following:

- Illustrative examples for the assessment of the methodology of the monetisation of costs in Article 6 (See Annex 9), and
- Qualitative case studies drawing upon existing case studies, e.g. Clean Fleets, Clean vehicle Portal, GPP 2020 etc. – contributing to the quantification of the impacts of CVD (See Annex 10).

4.1.2. Method for the quantification of effects

In order to assess the impacts of the Directive, it was necessary to quantify the costs and impacts associated with procurement of vehicles in the years since the Directive was transposed comparing against the counterfactual baseline scenario developed in Section 2.2 describing what would have happened in the absence of the Directive. Both the baseline counterfactual scenario and our estimates of actual outcomes under the Directive are based

¹³ Austria, Belgium, Croatia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Poland, Romania, Slovakia, Sweden and United Kingdom

on a model of the public fleet developed for this evaluation described in detail in Annex 1. The fleet model makes use of data from various sources that are used to calculate the various inputs and outputs.

A key issue in the development of the model was the absence of comprehensive data on the number of vehicles procured by public authorities across the EU-28. Even national datasets detailing all vehicles procured by contracting authorities in a single Member State are not available. We made use of available data describing annual public procurement in Germany, France and the UK by certain subsets of the public sector, as well as recent estimates of the size of (parts of) the public fleet in those countries. These three countries (Germany, France and the UK) represent a large proportion of the total EU28 vehicle market on their own¹⁴. Making use of this data, it has been possible to produce estimates of the proportion of new vehicles that are bought by contracting authorities across the EU. The available data also allowed us to provide estimates of the number vehicles procured within the main vehicle segments covered by the Directive and considered in the impact assessment (passenger cars, vans, rigid trucks and buses).¹⁵

However, we recognise that there is potential for substantial variation in the relative importance of public procurement in the Member States for which we have no data. Therefore, upper and lower estimates of the proportion of new vehicles bought by contracting authorities have been produced, which are informed in part by the degree of cross-national variation between France, Germany and the UK.

A second issue is that very little data is available on the types of vehicles procured by public authorities, or their lifetime use. Thus, our estimates of the impacts associated with public authorities buying and operating these vehicles have been based on assumptions that they resemble the *average* vehicle of the same type purchased by anyone in the EU (where "type" means passenger car, van, truck, or bus). We used various prior studies of average vehicle purchase costs, mileages, and emissions to populate the baseline in this way. Where available, we have substituted these generic assumptions with more specific information on public sector vehicles. For example, we employ evidence that the lifetime mileage of publically-owned trucks is much lower than the lifetime mileage of a typical HDV.

Finally, a key difficulty with estimating the *effects* of the Directive on the market share of clean vehicles and fleet average emissions was the absence of detailed data on the actual procurement patterns of organisations covered by the Directive. Thus, estimating the difference between the baseline and the outturn scenario fundamentally requires a method for determining what types of vehicles contracting authorities would have procured *in the absence* of the Directive. For this part of the analysis, we based our estimates of the effects of the Directive on the analysis of the results of the survey of procurers, in particular procurers' responses to our questions about the criteria they used for procuring vehicles, and the information they provided on the makes and models of vehicles they procured under the Directive.

For example, the analysis of the procurers' survey responses indicated that, at maximum, the impact of the Directive was for 1% of contracting authorities to impose EURO 6/VI or at a time when only EURO 5/V was obligatory. Furthermore, on average this happened just six months before EURO 6/VI became obligatory and, therefore, the number of vehicle procurements affected was very small. We therefore quantified air pollutant impacts in the

¹⁴ In 2014, they accounted for nearly 60% of new passenger car registrations in the EU 28 (ICCT, 2014)

¹⁵ German registration data indicated that public authorities purchase a negligible number of tractor-trailers, and therefore in the ensuing analysis we refer to numbers of *rigid* trucks bought by the public sector, and (where appropriate) compare these with *rigid* truck sales in the wider market. Similarly, as coach travel in the EU is almost entirely privatised, we refer to procurement of buses and compare this with total bus sales, not buses and coaches.

model by assuming that 1% of vehicles conform to the limit values of EURO 6/VI six months earlier (relative to the baseline) rather than conforming the limit values of EURO 5.

In other cases, when such input was not available (e.g. CO₂ emissions reduction), we used available data to compare CO₂ performance of the specific makes and models of vehicles procurers told us they had procured under the Directive, and compared this with the typical performance of all vehicles that had been bought in Europe at the same time. We assumed that the absolute maximum improvement in CO₂ performance that can be attributed to the Directive is equivalent to this the typical CO₂ difference between public sector vehicles and other vehicles since the Directive was transposed, controlling for mass.

Energy cost savings were estimated by a commensurate reduction in litres of fuel consumed, and multiplied this by prices of fuel without taxes in the EU. Details of the parameters used to perform this calculation are provided in Annex 1.

To monetise the CO₂ and pollutant emissions impacts estimated in the model, the total mass of each of these pollutants is multiplied by emissions cost factors taken from the EU's handbook on external costs of transport (Ricardo-AEA, DIW Econ et al. 2014). Changes in emissions costs attributable to the Directive are therefore directly proportional to the changes in total masses of emissions due to the Directive. The details of the parameters used to monetise pollutant benefits are provided in Annex 1.

Finally, in order to estimate administrative and compliance costs of procurers and suppliers we drew on available information provided from the survey respondents concerning the costs associated with the Directive and available data on the number of contracts and bids. While a formal Standard Cost Model methodology was not possible to follow, an approach based on the logic of the SCM was applied. Data on the additional purchase prices of cleaner vehicles were also used to calculate compliance costs for contracting authorities.

Using the approach described above, the impacts of the Directive (i.e. on administrative costs, CO₂ and pollutant emissions reduction, energy cost savings, and purchase costs) were monetised to support the cost-benefit analysis. The specific assumptions used in this analysis (e.g. discount rates and the period of time included) are indicated under the headings of the specific evaluation questions on efficiency (Section 6.7).

4.1.3. Answering evaluation questions

In order to answer the evaluation questions as set out in Section 3, relevant information from the review of the literature, engagement with stakeholders, case studies and quantification of impacts was drawn upon, and further analysis undertake where necessary. The specific approach used is also described at the start of each evaluation question (see Section 6).

4.2. Limitations – robustness of findings

The main limitation that has affected the robustness of findings of this evaluation is the lack of existing evidence in relation to the implementation of the Directive and its associated impacts. This is due to a number of issues, including that:

- There is no EU level monitoring mechanism in place other than the production of consultancy reports;
- There are no reporting requirements in place for Member States;
- Few Member States have undertaken any monitoring or evaluation of effects on their own in this respect, and so there is a lack of information on MS implementation; and
- There is little in the way of published views/position papers from stakeholders currently available.

As a result of the lack of existing evidence available, one of main data sources for this study has therefore been stakeholder engagement, including an online survey with procurers and contractors, and interviews with EU-level stakeholders, procurers, and manufacturers. The high reliance on stakeholder responses in this study comprised a risk. We thus monitored the progress in the stakeholder consultation closely. To ensure that we received response rates as high as possible, we translated the surveys and the emails into six case study languages, used personalised greetings, sent out two reminders and asked our contacts at city networks to distribute the links as well. For the procurers' survey these measures led to a response rate of 19% for the prioritised Member States (12% for the rest of the EU), for the contractors' survey we had a response rate of 3.8%. As we were able to use contacts obtained from the TED database through automated processes we were able to send out the survey to a large and EU-wide representative sample of procurement authorities. This in combination with the good response rates led to a sufficient amount of data to be used for a robust analysis.

Comprehensive information/data on each of the tasks and evaluation questions could not be covered in the online survey as it had to be kept concise in order to avoid stakeholder fatigue. These gaps in the data collection through online surveys had to be addressed with additional individual interviews, stakeholder workshops and data collection. Using a wide range of different tools to carry out this evaluation has ensured that sufficient data was collected to allow a sound analysis, whilst acknowledging the limitations outlined below.

The timing of the study is an important factor influencing the quality of the data available for the study. Even though the Directive was due to be transposed by 4 December 2010, the transposition of the Directive into national law was delayed. Only in June 2013 had all EU-27 Member States transposed the Directive with Croatia following in January 2014. This means that all EU-27 Member States have now had a couple of years of experience with the Clean Vehicles Directive; however, the amount of data available on actual outcomes of this Directive is limited. Apart from the 2012 Monitoring Report (Ricardo-AEA and TEPR, 2012), no newer reports directly relating to the observed effects of the Directive are available. The risk of drawing invalid conclusions due to this lack of literature data is mitigated by an extensive data collection conducted by the project team for this study. The Impact Assessment (European Commission 2007) took a ten-year time horizon in its assessment of the impacts of the proposed Directive at the time. Therefore it should be acknowledged that it will take time for the Directive to influence the market, and to date less than five years have passed since its required transposition deadline (which was also not met in the majority of cases).

A further limitation of this research is the issue of causality. When analysing the changes in numbers for clean vehicle procurement, factors other than the Clean Vehicles Directive have to be taken into account. Many other factors such as policies and incentive schemes (e.g. CO₂-based taxation measures and grants for ultra-low emission vehicles, etc.) and other EU legislation (e.g. Passenger Car CO₂ Labelling Directive or Regulations 443/2009 and 510/2011 on CO₂ emissions from light-duty vehicles) have an influence on the changes in market uptake of clean road vehicles by public contracting authorities. Such issues around causality are very common problems when dealing with ex-post evaluations of this nature. In this study this has been addressed as far as is possible through qualitative research based on our stakeholder engagement activities.

A recurring issue that arose in many areas of the evaluation, including engagement with stakeholders and answering the evaluation questions, was the lack of clarity surrounding what is interpreted to be a 'clean vehicle'. This is considered in more detail in Section 6.2.

There are also a number of issues that are likely to limit the extent to which impacts will have been realised by the Directive, including:

- Limited number of vehicles procured publicly – As discussed in Section 2.2 (baseline) it is estimated that the share of the public sector vehicles in total new vehicle registrations could be between 0.4% and 3.5% (lower and upper bounds).

The direct impacts of the Directive are therefore likely to be limited to, at maximum, this proportion of vehicles (see also next two points). However, one of the aims of the Directive was to stimulate procurement of clean and energy efficient vehicles more widely (i.e. beyond public procurement).

- The proportion of vehicles procured publically that are subject to the CVD is limited further as the Directive only covers a certain proportion of the vehicles publicly procured – those that are above the EU public procurement thresholds or the respective national thresholds.
- Lifetime of road transport vehicles – The lifetime of road transport vehicles is typically 10-15 years. Although public authorities may not operate vehicles for their entire lifetime, this length of time (along with relatively small proportion of total vehicle market procured by public authorities) means that it is very unlikely that significant impacts of the Directive would have been experienced by the vehicle market in the past four years.

Specific limitations related to the data required to undertake the quantification work necessary for this evaluation were discussed in more detail in Section 2.2 (Baseline) and Section 4.1.2 (method for the quantification of effects).

5. IMPLEMENTATION STATE OF PLAY (RESULTS)

5.1. Implementation of Directive 2009/33

Transposition of the Directive into National Implementing Measures (NIMs) - Article 11 of the Directive states that "Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 4 December 2010".

Only three Member States transposed the Directive into National Implementing Measures (NIMs) by the deadline of 4th December 2010 – the Czech Republic, Denmark and Portugal. After a range of European Commission actions (including the opening of several infringement cases), the remaining 24 Member States (at the time) transposed by the June 2013. In July 2013 Croatia became the 28th EU Member State, and subsequently transposed the CVD into national legislation in January 2014.

Type of legislation - The majority of Member States (18 MSs) introduced new legislation when transposing the Directive, whereas the remaining Member States made amendments to existing procurement legislation to incorporate the new requirements.

Thresholds – Application of CVD - The Directive states that the requirements of the CVD should apply to contracts over a certain threshold (i.e. where contracting authorities or contracting entities are under an obligation to apply procurement procedures set out in Directives 2004/17/EC and 2004/18/EC – Article 3). At time of writing, this threshold is €134,000 for central government authorities and €207,000 for sub-central contracting authorities. For operators performing public service obligations (PSOs), the threshold is to be chosen by Member States, but cannot exceed the threshold values set out in Directives 2004/17/EC and 2004/18/EC.

However, Member States are also able to set thresholds lower than those outlined above, whereas in other cases procurers may choose to apply the requirements of the CVD to all contracts (i.e. those below an agreed threshold), even in the absence of a formal requirement. This means that the requirements of the CVD may be applicable to a greater proportion (or all) of the publicly procured vehicle fleet.

Implementation of Article 5(3) - Article 5(3) of the Directive states that the following options should be used:

"(a) by setting technical specifications for energy and environmental performance in the documentation for the purchase of road transport vehicles on each of the impacts considered, as well as any additional environmental impacts; or

(b) by including energy and environmental impacts in the purchasing decision, whereby:

- In cases where a procurement procedure is applied, this shall be done by using these impacts as award criteria, and

- In cases where these impacts are monetised for inclusion in the purchasing decision, the methodology set out in Article 6 shall be used. "

Of the 28 EU Member States, 25 of them allow all three options in their national implementing legislation (see Table 5-1).

Table 5-1: Application of Article 5(3) in EU Member States

Action taken by MS on Article 5(3)	Member States
Allow all of the options	25 Member States: Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, France, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, United Kingdom
Allow only Option 1 (i.e. setting technical specifications)	Estonia
Allow only option 2b (i.e. where energy and environmental impacts are monetised)	Slovenia
Options 1 and 2a (i.e. setting technical specifications and where energy and environmental impacts are used as award criteria)	Czech Republic

It was identified for the Monitoring Report (and reconfirmed by the research undertaken for the evaluation) that the main reasons behind the decision to keep all three options by the majority of the Member States included:

- Enabling greater flexibility for the purchasing authority;
- Giving purchasing authorities the ability to use the options best suited to their procurement needs / the ability to select options according to their individual circumstances; and
- Best reflects existing sustainable procurement policy within the Member State.

Three Member States took the decision to limit the number of options available to procurers in some way. The reasons behind limiting the options available were examined in more detail. Slovenia took the decision to allow only Option 2b (where energy and environmental impacts are monetised). Slovenia considered that technical specifications would have to be amended regularly, therefore causing additional work for the ministry in charge of updating technical standards and other green public procurement criteria in the Decree, and leading to potential difficulties for the contracting authorities and uncertainty of the suppliers due to frequent amendments to legislation. As formula for the monetisation methodology are provided (Annexes to the Directive), they felt there would be no need to update the legislation (compared with technical standard approach, which they anticipated would have to be updated in future years). Also, by selecting the option that mandates the use of operational lifetime costs, the ministry rationalised that contracting authorities would become familiar with the lifecycle costing approach and would therefore hopefully use similar methodologies and formula in procurement of other goods, services and works.

The Czech Republic allows option 1 (setting technical specifications) transposed into national legislation) and 2a (award criteria) (was an option in existing legislation – Czech Public Procurement Act). These options were selected as they were seen to be the least demanding way of transposing the Directive. Estonia only allows Option 1 (setting technical standards). Their reasons for doing so were not provided¹⁶.

¹⁶ Neither the Czech Republic nor Estonia responded to engagement attempts.

Supporting measures - In terms of supporting measures implemented by the Member States, few additional measures directly aimed at the promotion of clean and energy efficient road transport vehicles had been implemented.

Many EU Member States have implemented measures that aim to support the objectives of the CVD, stimulating the uptake and use of clean and energy efficient vehicles (either measures existing prior to the introduction of the CVD or they have been introduced after its implementation). Many of these measures, while including organisations that are targeted by the Directive itself, are aimed at consumers and vehicle operators in general, including the private sector. The 2012 Monitoring report for CVD (Ricardo-AEA and TEPR 2012) and Annex 8 (Member State fiches) provides a detailed overview of supporting measures that have been implemented in EU Member States. These cover:

- Programmes of support/fiscal incentives for the purchase of vehicles;
- Programmes of support/fiscal incentives for the development of infrastructure;
- Local access restrictions;
- Local demand management instruments; and
- National, regional or local vehicle taxation.

Whilst the types of supporting measures mentioned above will contribute towards stimulating the uptake and use of clean and energy efficient vehicles and achieving the aims of the CVD (increased energy efficiency, CO₂ emission and air pollutant emission reductions from road transport sector), it is unlikely that they have been implemented as a direct result of the Directive with the aim of supporting its implementation. They also tend not to target vehicles procured by the public sector.

However, in our engagement with stakeholders examples were identified where selected Member States had implemented measures that are aimed directly at the public procurement of road transport vehicles within their Member State, thus supporting (explicitly or implicitly) the implementation of the CVD. Table 5-2 summarises the responses that were received from Member States when asked about national supporting actions have been implemented in their country that aim to promote the purchase of clean and energy efficient vehicles by public authorities or public transport operators.

Table 5-2: Examples of measures that support the objectives of the CVD

Member state	Details
Croatia	The Environmental Protection and Energy Efficiency Fund regularly co-finances the purchase of energy-efficient vehicles. During the last two years the Fund has co-financed the purchase of 30 buses for public passenger transport powered by compressed natural gas in the city of Rijeka and 16 such buses in the city of Zagreb. Currently, in the implementation phase is the project of City of Koprivnica which includes car sharing system for the employees of the City and City-owned companies, and the purchase of two mini buses for public passenger transport powered by electricity. Such projects are co-financed in the amount of 40% of eligible investment costs.
Germany	Federal Ministries have agreed that at least 10 % of all newly purchased vehicles by authorities and bodies of the federal administration must have only low emissions (50 g CO ₂ /km or lower).
Latvia	1) Tender "The reduction of greenhouse gas emission in transport sector" (projects financed by Climate Change Financial Instrument).

	<p>The objective of the tender is the reduction of greenhouse gas emission by means of ensuring adjustment of vehicles for the use of energy produced from renewable energy resources, including:</p> <ol style="list-style-type: none">1. supporting adjustment of vehicles for the use of fuel produced from renewable energy resources instead of fuel of fossil origin;2. supporting provision of accessibility of fuel produced from renewable energy resources, by installing filling stations for fuel produced from renewable energy resources for project needs, only together with the activity referred to in Sub-paragraph 1, and financing for this activity shall not exceed 20% of the total financing of the financial instrument requested in the project application. <p>2) The order no.12 issued by the Cabinet of Ministers in October 2, 2012 on order on purchase or lease of service vehicles for central government institutions that determines the ceiling amounts of carbon dioxide emissions allowed per year in such tenders.</p>
UK	<p>The guidance document produced by the UK includes a section on weightings. It is recognised that the Directive does not specify levels of weighting that should be awarded to the environmental criteria of vehicle performance relative to non-environmental criteria.</p> <p>The Low Carbon Vehicle Public Procurement Programme (LCVPPP) was set up in 2007 by the UK Department for Transport to stimulate the market for lower carbon vehicles through procurement. It developed and then part funded (£1.7m) the purchase of 500 low carbon vans by public sector fleets. Transport Scotland has also funded a procurement scheme to enable vehicle users to access grant assistance to buy low carbon vehicles. Similar schemes in Scotland have included the Electric Vehicle Procurement Support Scheme, where funding enabled local authorities and their partners to bridge the gap between the cost of petrol or diesel powered vehicles and their electric powered equivalents, as well as to install charging points on public sector owned land to support the vehicles.</p> <p>The Department for Transport's Green Bus Fund was set up to support the introduction of low carbon vehicles by bus companies and local authorities. Around £85m has supported the roll out of 1250 new low carbon buses that will have a positive impact on the environment.¹⁷</p> <p>A new Low Emission Bus Fund will provide additional £30 million to enable local authorities and bus operators to replace existing vehicles with greener, cutting-edge alternatives to help clean up air quality has been announced for 2015/16.</p> <p>The Department for Transport's Clean Vehicle Technology Fund provides grants of up to £0.5m to local and transport authorities for upgrading vehicles to reduce emissions in areas of poor air quality in England. The total fund available for this scheme is £5 million. To date it has supported over a 1000 vehicles cut their pollutant emissions.</p> <p>The Ultra-Low Emission Vehicle Readiness project will fund the replacement of over 100 plug-in cars and vans in the government vehicle fleet as part of a commitment to green transport. The £5 million investment will also fund take-up by the wider public sector – including</p>

¹⁷ <https://www.gov.uk/government/collections/background-to-the-green-bus-fund> in EndNote

councils, police forces and the NHS – of plug-in vehicles and pay for charge-points to be installed to allow the vehicles to be charged at work.

5.2. Current situation

As mentioned earlier, Article 10 of the Directive requires that the Commission prepares a report every two years on the actions taken by individual Member States to promote the purchase of clean and energy-efficient road transport vehicles. The reports should also assess the effects of the Directive, especially of the options referred to in Article 5(3), and the need for further action, and include proposals as appropriate. The first monitoring report was published in October 2012 (Ricardo-AEA and TEPR 2012). However, there is no requirement within the Directive for Member States to monitor or report on the effects of the intervention. After extensive research, it can be confirmed that very little data is monitored or reported on at the national level with regards to public procurement of road transport vehicles.

The 2012 Monitoring Report attempted to assess the impacts of the CVD to date. Stakeholders at the time (mid-2012) agreed that the CVD had had little impact on the market for clean vehicles, and no stakeholders were able to provide any evidence for direct impact on the market. This was due to a number of reasons, including that the CVD had only been in force for a short period of time, with implementation in a number of Member States being delayed until 2012 (Ricardo-AEA and TEPR 2012).

The Monitoring Report noted that it may not be possible to notice discernible impacts even after a longer period of time, due to the relatively low numbers of vehicles being purchased by public authorities in some Member States. It was anticipated that in other Member States where purchases by public authorities make up a larger proportion of total sales, noticeable effects might be expected in future years. However, the report identified that a number of cities/Member States are already taking action to procure clean and energy efficient vehicles prior to the implementation of the CVD, so an increased uptake of cleaner vehicles by public authorities might have been expected regardless of how they implemented the Directive (Ricardo-AEA and TEPR 2012).

Other issues were also identified in the Monitoring Report which contributed to the difficulty in identifying the impacts of the intervention:

- Current situation in the vehicle market meant that it was harder than normal to identify the impacts, with many public authorities cutting back on the numbers of vehicles bought due to the on-going public spending cuts.
- The monitoring report was undertaken only two years following the transposition of the Directive – therefore making it very unlikely that a significant impact would have been identified at this stage.
- As mentioned earlier, the majority of the Member States did not transpose the Directive into national legislation by the deadline, with the last Member States transposing in 2012 – therefore far less than two years to realise any impacts.
- Road vehicles typically have a lifetime of 10 to 15 years, and although public authorities may not operate vehicles for their entire lifetime, this, along with the relatively small proportion of the total vehicle market procured by public authorities, means that it would be very unlikely that even in the best scenario that an impact from the Directive would have been experienced by the vehicle market in only two years.
- The lack of CO₂ data for HDVs at the time was identified as a barrier to applying the Directive to such vehicles. It was anticipated that this would change in 2013 when the HDV engines would be tested according to the Worldwide Harmonised Heavy-

Duty transient Cycle (measuring air pollutant emissions, CO₂ emissions and fuel consumption). However, to date this hasn't happened (Ricardo-AEA and TEPR 2012).

To our knowledge, none of the EU Member States have undertaken an evaluation of the impacts of the implementation of CVD (transposed legislation) in their respective countries. The UK indicated that an evaluation of the impacts of its NIM would be completed by the end of 2016 (as a result of a statutory requirements to undertake such an evaluation for all new legislation after 5 years of implementation). Additionally, Slovakia stated that they had undertaken an evaluation of the public procurement more generally (not specifically on legislation relating to the Clean Vehicles Directive) where emphasis has been put on the impact on the environment (which is most likely the case for a number of other Member States). As part of this evaluation, Slovakian contracting authorities were asked to state the proportion of contracts that did/not use environmental criteria when procuring road transport vehicles (cars, trucks, public transport services, vehicles and waste collection services).

Due to the lack of requirements for Member States to monitor and report on the impacts of the CVD, and lack of national public procurement data related to clean vehicles more generally, this evaluation (2015) therefore essentially aims to establish the current situation in qualitative and quantitative terms. This will be achieved through addressing the 13 evaluation questions covering relevance, effectiveness, efficiency, EU added value, coherence, and sustainability (see Section 6).

5.3. Unexpected results

A few unexpected results related to the implementation of the Directive have been identified and are discussed in more detail below.

The Directive was designed to ensure flexibility for procurers when selecting and applying options presented in Article 5(3). However, our analysis has revealed that the options are not achieving the desired results due to the way they are being applied (discussed in more detail in answers to the evaluation questions, Section 6):

- Option 1 – Setting technical standards - Procurers have tended to state minimum standards e.g. Euro 6, which is already the latest standard for new vehicles. The application of the CVD in this respect has no impact on the vehicle they are purchasing, as it would have been purchased anyway. If there aren't any new/forthcoming standards, then the Directive becomes meaningless. Procurers also do not always set standards for all three of the required aspects (fuel consumption, CO₂ and pollutant emissions), due to misinterpretation of the Directive.
- Option 2a – Award criteria – Again, procurers are using the flexibility in the Directive when using award criteria, most often place only a small weight on environmental criteria which leads to these criteria having very little effect on the procurement decision.
- It was reported by stakeholders that the use of the monetisation methodology (Option 2b) tends to lead to a preference in diesel vehicles. Case studies undertaken for the purposes of this evaluation confirmed that this was the case (see Annex 9 and further discussion in the answers to the evaluation questions).

It was reported by a manufacturer that they developed their own test cycles for special service vehicles (which were previously lacking) at cost of €20,000. It was claimed that this was as a direct result of the introduction of the CVD and the lack of relevant data required to apply its options. However, this may be an isolated case, and possibly as a result of other drivers.

5.4. Issues

There are a number of issues that have been identified that are likely to be of relevance when assessing the impacts of the Directive. These emerging issues are important in the context of the evaluation of the Directive and are summarised below. They are discussed in more detail in the context of the appropriate evaluation questions (Section 6).

Increasing divergence between real-world CO₂ emissions and those measured on the NEDC - Evidence exists of this increased divergence and, whilst data collection methods will differ, the discrepancy over time in all cases appears to be increasing at similar rates (ICCT 2014) – see Figure 5-1. Other sources, including Fonaras et al (2012) and Ntziachristos et al (2014) have also reported similar discrepancies. As a result of these discrepancies, drivers are not receiving the anticipated benefits (e.g. CO₂ emissions listed on the label required by Directive 1999/94), as only a proportion of the emission reductions that have been achieved on the test cycle are being delivered in the real-world. The main factors contributing to these discrepancies includes the NEDC test cycle not being representative of real-world driving; manufacturers increasingly using flexibilities within the test cycle; and increased application and use of energy using devices in cars that are used in the real-world, but which are not operational when measuring emissions on the test cycle (ICCT 2013, T&E 2013). This divergence also has implications for the impacts of the Clean Vehicles Directive, as any identified CO₂ emissions reduction benefit as a result of procuring clean vehicles is therefore likely to be less in the real-world than it would appear to be if the test cycle figures were accurate.

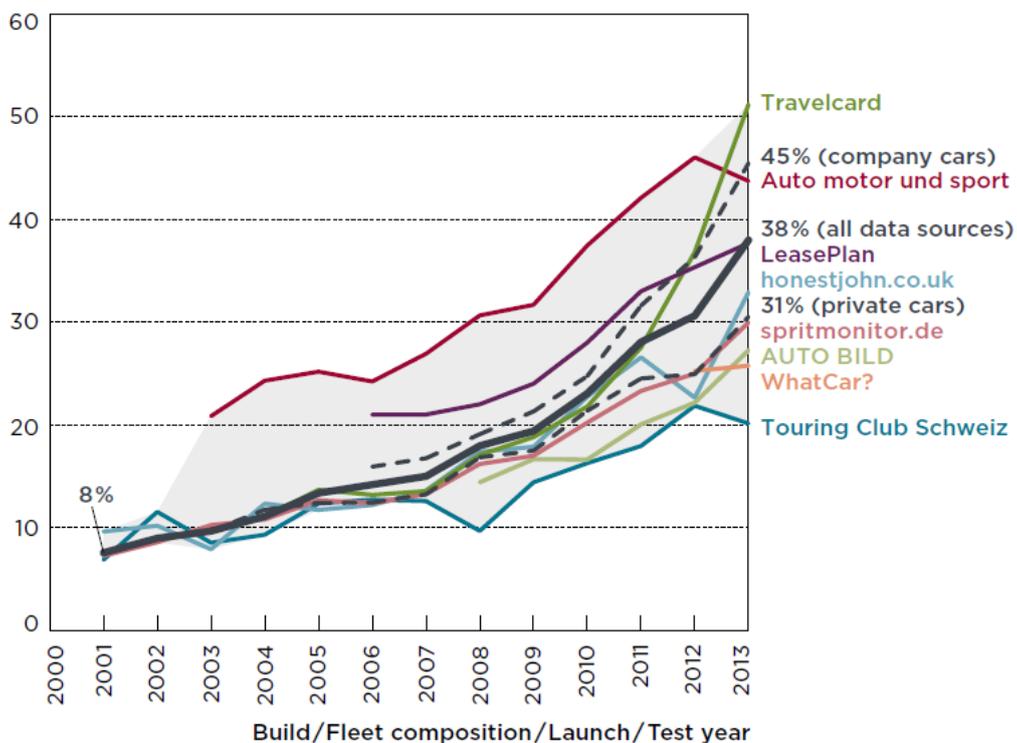


Figure 5-1: Divergence between real-world fuel economy/CO₂ emissions and test cycle fuel economy/CO₂ emissions for passenger cars (ICCT 2014)

Well-to-tank CO₂ emissions – For some of the clean vehicles that the CVD is trying to promote procurement of (those vehicles using alternative powertrains), well-to-tank CO₂ emissions associated with the production of electricity (and hydrogen) can be considered a significant proportion of total lifecycle emissions (Ricardo-AEA 2013). Therefore, some of the emission reductions that have been achieved according to the specific CO₂ emissions as measured on the test cycle will have been replaced by increased emissions elsewhere

(e.g. electric vehicles are measured to have zero CO₂ emissions on the test cycle, but their true 'in use' emissions should also include CO₂ emitted as part of the CO₂ production of the electricity). Therefore any emissions reduction benefit identified as resulting from the implementation of the CVD is likely to be less in the real-world when well-to-tank CO₂ emissions are taken into account.

Economic Crisis – The economic crisis of the late 2000s/early 2010s which affected economic activity in Europe will almost certainly have affected levels of procurement by public authorities/entities and those procuring on their behalf. The CVD was being introduced as public authorities were minimising public procurement. Therefore the number of road transport vehicles being publically procured and that are subject to the requirements of the Directive is likely to be far lower than would have been originally envisaged. This is likely to have had an influence on the potential impacts that could have been gained to date if the level of public procurement of road transport vehicles had been higher and not limited by the economic crisis.

Availability of CO₂ data for HDVs - According to Article 6(2) of the Directive information on fuel consumption, CO₂ and air pollutant emissions should, in the first instance, come from the results of the standardised Community test procedures used for type approval. For those vehicles for which there are no such official tests, the data should come from "widely recognised test procedures," the results of tests for the contracting authority, or information supplied by manufacturers. However, for heavy duty vehicles, there is not, at present, any harmonised community standard for measuring fuel consumption or CO₂ emissions, and it is prohibitively difficult for most contracting authorities to obtain objective, comparable data on these vehicles from other sources, for the following reasons:

- Fuel consumption data from manufacturers will not be measured on a like-for-like basis.
- Although there is evidence that a small number of contracting authorities have created their own bespoke test procedures in order to make comparisons between vehicles, the resources required from contracting authorities (and from suppliers) to orchestrate these tests will not be available to the vast majority of contracting authorities.
- Other contracting authorities suggested they could make comparisons between heavy duty vehicles using other information that is (sometimes) already in existence, such as performance over the SORT2 test cycle, or DIN norms. However, this information is not universally available and the only contracting authorities claiming to make use of it appeared to have an unusually high level of technical understanding which most contracting authorities probably lack.

However, it should be noted that in the absence of a common EU-level approach for estimating the CO₂ emissions of buses, the UITP's Standardised On-Road Test (SORT) cycles have been used, which could potentially be used in the future as a basis for developing CO₂ measurements.

6. ANSWERS TO THE EVALUATION QUESTIONS

6.1. Introduction

This section provides answers to each of the 13 evaluation questions and constitutes the main part of the Evaluation Report. The responses to the evaluation questions draw upon the work carried out in the data collection and analysis stage and additional research where necessary.

6.2. **Relevance: To what extent is increasing the market share of clean vehicles an adequate means to contribute to the overall objectives of increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport? (Q1)**

6.2.1. Approach to answering the evaluation question

Prior to answering this question, it is first necessary to explore what the question is actually asking in more detail.

First, it is necessary to consider what is meant by the term 'clean vehicle' in the context of the question. At the simplest level, a clean vehicle is one with lower environmental impacts, so it is clear that increasing the market share of such vehicles will contribute to the objectives of reducing emissions and increasing energy efficiency¹⁸. However, in order to move beyond this simple and not very interesting or insightful answer, it is necessary to consider in more detail which types of vehicles contribute to such objectives. This is explored in Section 6.2.2. It is also worth noting that uncertainty over what was meant by the term 'clean vehicle' was mentioned by some EU level stakeholders as a reason for them having difficulty in answering the related interview question (see Annex 4).

Second, the question is not clear as to what is meant by the "competitiveness ... of transport". In the course of the engagement with EU level stakeholders, a number of different interpretations of this question were proposed (see Annex 4). From the Impact Assessment accompanying the revised proposal for the Directive, it is clear that the "competitiveness" to which the Directive would contribute is that of the EU automotive sector (European Commission 2007). However, stakeholders also interpreted the question as referring to the competitiveness of EU industry more generally and to the competitiveness of clean vehicles in the market place. This issue is discussed further in Section 6.2.3.

Third, a number of stakeholders queried what was meant by the use of the word 'adequate' in the question; these stakeholders instead answered the question by replacing the word 'adequate' either with the word 'sufficient' or 'beneficial' (see Annex 2). In order to ensure that this evaluation question is answered appropriately, both of these interpretations are discussed below (see Section 6.2.5), while some additional considerations with respect to this issue are set out in Section 6.2.4.

In order to fully evaluate relevance, it is also necessary to consider the extent to which the objectives, i.e. those stated in the question of "increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport" are relevant to the wider needs that led to the publication of the proposal for the Directive and whether

¹⁸ It is worth noting that neither of the two proposals from the Commission for the Directive needed to define a 'clean vehicle'. The original proposal focussed only on vehicles weighing above 3.5 tonnes and referred to a pre-existing performance standard, i.e. that of Enhanced Environmentally Friendly Vehicles (EEVs), as defined in Directive 2005/55 (European Commission, 2005a). The revised proposal focused on the mandatory consideration of operational lifetime costs (European Commission, 2007c).

these will continue to be relevant. While this is not explicitly required to answer the questions, it is important to undertake such analysis to understand the wider relevance of the Directive, which is needed in order to inform conclusions about the extent to which it still has a role to play.

In other words, the extent to which the following needs are pertinent, and will remain pertinent, will be assessed:

- Need to decrease CO₂ emissions of transport;
- Need to increase the energy efficiency of transport;
- Need to decrease pollutants emissions of transport; and
- Need to increase the competitiveness of transport.

The pertinence of these needs is explored in Section 6.2.2.

6.2.2. Evaluation of the extent to which it is, and will continue to be, important to increase the energy efficiency and competitiveness of transport and to reduce its CO₂ and pollutant emissions

In order to evaluate the extent to which there is, and will continue to be, a **need to reduce transport's CO₂ emissions**, it is first worth underlining that there remains a need to reduce greenhouse gas emissions (GHGs) more generally, including CO₂ which is by far the most common GHG emitted by the transport sector. In its most recent assessment of the evidence, the Intergovernmental Panel on Climate Change (IPCC) concluded that there was a need for "substantial and sustained reductions of greenhouse gas emissions" as the evidence was more conclusive than ever that the global climate is warming as a result of increased concentrations of GHGs in the atmosphere that are the result of human activity (IPCC 2013). The EU has already committed itself to delivering significant reductions in its GHG emissions. The Commission's 2011 Low Carbon Roadmap set the framework for the development of EU policy action to meet an 80 to 95% reduction in GHG emissions by 2050 compared to 1990 levels. The Roadmap concluded that cost-effective reductions of GHG emissions of between 54% and 67% by 2050 compared to 1990 could be delivered by the transport sector (European Commission 2011, European Commission 2011). Hence, in order to meet long-term economy-wide CO₂ reduction targets, there is a need to reduce transport's CO₂ emissions.

In order to evaluate whether there is, and will continue to be, a **need to improve the energy efficiency of transport**, it is necessary to identify what the required GHG reductions above imply for transport in terms of improvements in vehicle efficiency. The Commission's 2011 Transport White Paper explored the implications of delivering such GHG emissions reductions, as it took as its starting point the need to reduce transport's GHG emissions by 60%, i.e. the midpoint in the range identified by the Roadmap (European Commission 2011). The policy option that the Impact Assessment accompanying the White Paper identified as its preferred option included action to reduce the CO₂ emissions of all transport vehicles. This assumed that the average CO₂ emissions from new cars would be only 20 g/km by 2050, compared to the target of 95 g/km in 2020, while the equivalent figure for LCVs would be 55g/km compared to the 2020 target of 135 g/km. For heavy duty vehicles a 40% improvement in energy efficiency was assumed by 2050 (European Commission 2011). Other studies have also concluded that there is a need to deliver such reductions from vehicles in order to meet the CO₂ reduction levels assumed by the White Paper. A report for the European Commission's DG Climate Action concluded that reducing transport's CO₂ emissions by 60% by 2050 compared to 1990 levels required reductions in lifecycle CO₂ emissions of 80% for cars, buses and vans, and of between 60 and 75% for heavy goods vehicles in parallel to action to improve vehicle efficiency in other modes of transport (e.g. rail, air and water transport), improvements in operational efficiency and the decarbonisation of fuels and energy sources (Ricardo-AEA, TEPR et al. 2012).

For vehicles that use fossil fuels, reducing the CO₂ emissions of road transport will necessarily require improving the fuel efficiency, and therefore the energy efficiency, of vehicles, as the CO₂ emitted is closely linked to the energy consumed. For vehicles that use electricity and hydrogen, this link is not as direct, as in-use CO₂ emissions for these energy sources are zero (see Section 5.4). Hence, the energy efficiency of such vehicles could be relatively poor, but their in-use emissions would be unaffected. However, given the levels of investment that are required to decarbonise the electricity sector in particular (European Commission 2011), it would seem prudent to ensure that the energy consumed in transport as a result of its electrification is consumed as efficiently as possible. Hence, it can be concluded that there is a continuing need to improve the energy efficiency of the transport sector for all fuel types.

EEA (2014), which drew on the latest evidence concerning health and air quality from the World Health Organisation (WHO), underlines that there is still a **need to reduce pollutant emissions**, generally, and those from transport in particular. The report highlighted that transport was the largest emitter of the oxides of nitrogen (NO_x) and a significant emitter of large and fine particulate matter (PM₁₀ and PM_{2.5}, respectively). It was estimated that between 21% and 30% of the urban population of the EU-28 are exposed to concentrations of PM₁₀ above EU air quality limit values, while the equivalent figures are 10% to 14% for PM_{2.5} and 8% to 13% for NO_x. WHO has air quality guidelines (AQG) for the same pollutants that indicate the levels at which it believes health risks would be reduced to a minimum on the basis of the latest scientific evidence (WHO 2013). For some pollutants, these AQGs are tighter than the existing EU limit values. EEA (2014) demonstrates that over 91% of the EU's urban population is exposed to levels of PM_{2.5} that exceed the respective WHO AQG, while the equivalent figure for PM₁₀ is 64%¹⁹. The role of road transport in these exceedances is clear as the daily limit value for NO_x was exceeded at 37% of 'traffic' monitoring sites²⁰, while the equivalent figures for PM₁₀ and PM_{2.5} were 22% and 4%, respectively. Of the transport measures suggested that would contribute to reducing the adverse of transport on air quality, a shift to the use of cleaner vehicles was mentioned.

The **need to increase the competitiveness of transport** was a theme of the 2011 Transport White Paper, including the role of transport in enhancing the competitiveness of the wider economy (European Commission 2011). The need to strengthen the competitiveness of the EU automotive sector is emphasised by the multi-stakeholder CARS 2020 process (European Commission 2012). An earlier report from the CARS 2020 process also highlighted that the competitiveness of the EU automotive industry can only be assured if it delivers sustainable and advanced products (European Commission 2012).

Hence, it can be concluded that there remains a need to decrease transport's CO₂ and pollutant emissions, and to increase its energy efficiency and competitiveness.

6.2.3. The potential contribution of 'clean vehicles' to increasing the energy efficiency and decreasing the CO₂ and pollutant emissions of transport

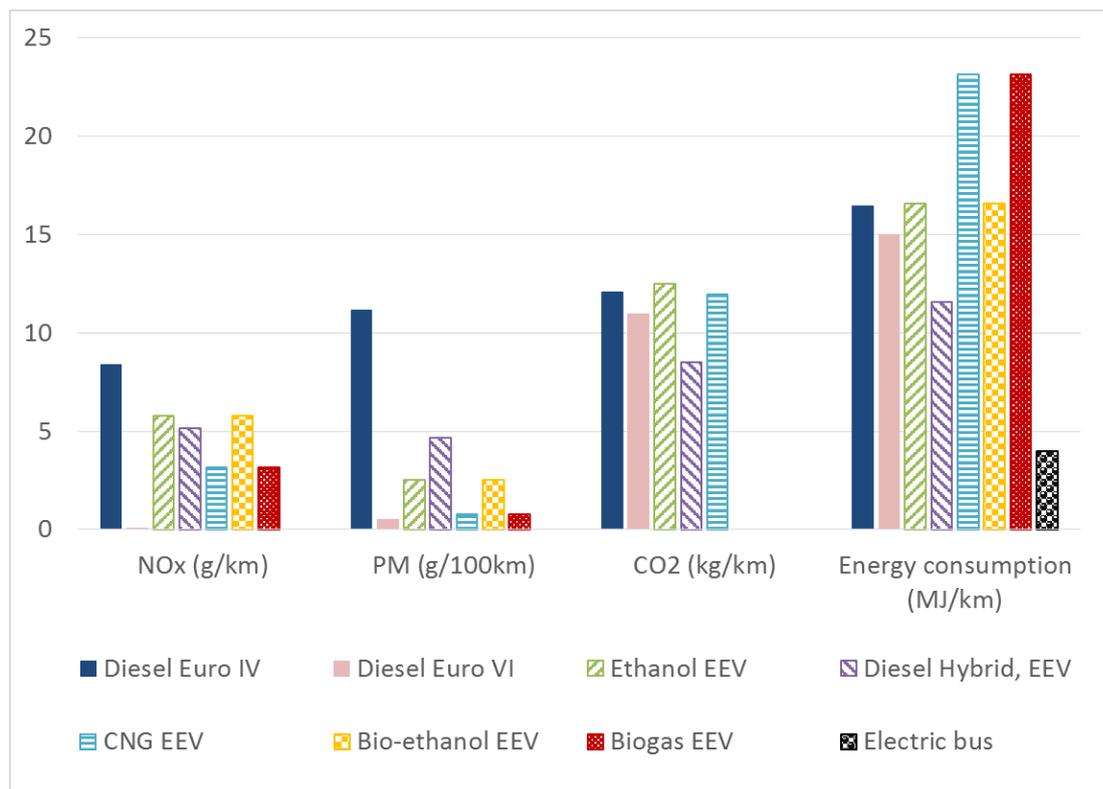
As was discussed above, the term 'clean vehicle' is generally taken to mean a vehicle that has less environmental impact. Hence, at the simplest level, having more vehicles with less environmental impact should improve the energy efficiency of transport and decrease its CO₂ and pollutant emissions. However, for the purpose of this evaluation, it is useful to identify which types of vehicle might be considered to be contributing to the specified objectives, and which therefore might be considered to be 'clean' in the context of the question.

¹⁹ The proportion of the EU urban population exposed to NO_x levels above the respective WHO AQG is the same as that for the respective EU emission limit value.

²⁰ 'Traffic-related' monitoring sites are one of four types of fixed air quality sampling points in Europe, the others being urban/suburban background, rural background and industrial (EEA, 2014).

For the purpose of evaluating the first two 'effectiveness questions' (see Sections 6.2 and 6.4.1), information on the environmental performance of comparable vehicles has been gathered in order to identify the impacts of the methodology to monetise environmental and operational costs. This draws on the case studies set out in Annex 9. On the basis of the data used in these case studies, the contributions of different vehicle technologies to the objectives being considered in this section can be identified. As can be seen from Figure 6-1 and the graphs presented in Annex 12, the most appropriate vehicle technology for a public authority would differ depending on whether its main concern is air pollution or energy efficiency/CO₂ emissions. This choice is also dependent on vehicle type as Euro VI standards for buses deliver the expected reductions in NO_x emissions when in use, whereas this is not the case for Euro 6 standards for cars. Additionally, as the graphs only focus on in-use emissions, electric vehicles are presented as having zero CO₂ and pollutant emissions (as would hydrogen vehicles), but this ignores the impact of upstream emissions. If the total lifecycle emissions of both electricity and hydrogen are taken into account, the benefits of these technologies over those of other vehicle technologies diminish with respect to CO₂ (as was demonstrated in Section 5.4). Similar issues exist for biofuel vehicles. Hence, different vehicles might be considered to be 'cleaner' from different perspectives.

Figure 6-1: Emissions of NO_x, CO₂ and the energy consumption of different types of bus



Source: VTT (2013)

The implications of this discussion are further complicated by the extent to which improved Euro standards deliver emissions reductions in practice. In theory Euro 6 standards for diesel cars and LCVs reduce the NO_x limit value by more than half compared to Euro 5 (i.e. from 180 mg/km to 80 mg/km) for these vehicles. These limit values are measured on the test cycle (see Section 5.4). Real world tests have suggested that in practice NO_x emissions can be six times as high as the limit value, which means that their real world emissions are comparable to those of Euro 5 and even Euro 4 vehicles (TNO and TU Graz 2013).

Such differences were noted by EU-level stakeholders in their responses to the interview question that corresponded to this evaluation question (see Annex 2). These stakeholders were generally positive that increasing the market share of clean vehicles would help to improve transport's energy efficiency and to reduce its CO₂ and pollutant emissions, but many qualified their response with comments indicating that it depends on the types of vehicle that were being considered.

Hence, increasing the market share of some vehicles has the potential to contribute to the delivery of one or another of the objectives considered in this section, as for a particular objective, certain technologies are potentially more beneficial than others. For fossil fuels, there are benefits from diesel vehicles in terms of CO₂ emissions and energy efficiency, while petrol and to a larger extent gas vehicles generally have lower NO_x emissions than diesel vehicles, although even here Euro VI buses can have fewer NO_x emissions than gas buses (see Annex 9). When only considering in-use emissions, electric and hydrogen vehicles emit significantly fewer CO₂ and pollutant emissions, but once the lifecycle emissions are also considered, the benefits over other vehicles diminish. A further consideration is that for the technologies that are comparatively less well used, such as gas, or relatively new on the mass market, such as electricity and hydrogen, improvements could be quicker, and be potentially more significant in terms of emissions and efficiency, than developments in the more established technologies, such as petrol and diesel.

6.2.4. 'Clean vehicles' and the competitiveness of transport

As noted in Section 6.2, there is a lack of clarity about what the question means in relation to 'competitiveness'. At the high level, competitiveness is clearly important, but practically it is difficult to assess the extent to which specific actions contribute to increasing it. The recent evaluation of the passenger car and LCV CO₂ Regulations, which clearly aim to increase the market share of clean vehicles, was not able to conclude the extent to which those Regulations had had an impact on the competitiveness of the EU automotive sector. It did note that stakeholders, both those spoken to for the purpose of that evaluation as well as those who responded to other surveys, viewed the Regulations as being beneficial for the competitiveness of the automotive industry. In the short-term, there were more negative responses, as a result of the costs needed for the development of cleaner technologies and the current low demand for such technologies now that they are being put onto the market. In the longer-term the Regulations were generally considered to be beneficial for competitiveness as they force the development of new technologies (Ricardo-AEA and TEPR 2015). This latter point echoes a statement from the CARS 2020 process noted above about the importance of developing advanced, sustainable products for the competitiveness of the automotive industry (see Section 6.2.2).

In Ricardo-AEA and TEPR (2015) the 'competitiveness' that was the concern of the evaluation was explicitly that of the automotive industry. As noted by stakeholders in the course of the engagement undertaken for this evaluation, it is not clear to whose competitiveness the question being considered here refers (see Annex 2). It was also noted by a stakeholder that the EU automotive sector was already competitive and did not need additional measures to assist it in this respect. This statement has echoes in the most recent CARS 2020 report, which talks about taking competitiveness into account when developing legislation and ensuring that legislation does not adversely affect competitiveness. This report also notes that the promotion of investment in technologies for clean and energy efficiency vehicles is important to the competitiveness of the EU automotive sector and that its leadership globally in this respect is being challenged (European Commission 2014). In other parts of the world, there are various pieces of legislation similar to the passenger car and van CO₂ Regulations that require the automotive industry to develop and market more efficient vehicles (Ricardo-AEA and TEPR 2015), which no doubt contributes to the challenge to the EU industry's leadership in this respect.

A potential link between the increased use of clean vehicles and other potential interpretations of 'competitiveness' can also be identified. For example, if the use of clean vehicles can, or have the potential to, reduce the transport costs incurred by industry when the total costs of ownership are considered, this would contribute to the competitiveness of industries in which transport costs are significant. If cities were to increase the use of clean vehicles whilst reducing the use of conventional vehicles, air quality should improve, which in turn improves the quality of life for those living and working in the city, which can in turn help attract more investment and thus contribute to a city's competitiveness.

Hence, while it is difficult to quantify changes to 'competitiveness', it is clear that stakeholders link the development of sustainable, advanced vehicles to the competitiveness of the automotive sector, while the use of such vehicles has the potential to affect other types of competitiveness.

6.2.5. Adequate versus beneficial policies

As noted in Section 6.2, expecting the CVD to be sufficient (i.e. 'adequate') to increase the market share of clean vehicles is an ambitious expectation. Indeed, the Commission's proposal that led to the adoption of the CVD highlighted that promoting the use of low carbon vehicles in public procurement would reinforce the various elements of the Commission's passenger car CO₂ strategy (i.e. passenger car CO₂ Regulation, the CO₂/fuel efficiency labelling Directive and CO₂-based fiscal measures), while the faster introduction of "cleaner vehicles" would help public authorities meet their obligations under the air quality Directives²¹. Hence, at its inception, the CVD was seen as part of a package or complementary measures. The complementary role of public procurement, if not of the Directive specifically, was also highlighted in the Commission's 2011 Transport White Paper (European Commission 2011). Hence, in relation to whether the CVD is 'adequate' or 'beneficial', the assessment of the latter would appear to be more appropriate.

6.2.6. Conclusion on the adequacy of increasing the market share of clean vehicles as a means of contributing to increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport

The previous sections set out some of the issues and potential interpretations that are important to enable this evaluation question to be answered.

At the conceptual level, if a clean vehicle is taken to be one that has less environmental impact (in terms of its CO₂ and pollutant emissions and energy use), it is clear that increasing the market share of such vehicles has the potential to contribute to the objectives of increasing transport's energy efficiency and of reducing its CO₂ and pollutant emissions. However, as was discussed in Section 6.2.2, different vehicle technologies contribute to different objectives in different ways, which complicates the answer to the question. Without defining what is meant by the term 'clean vehicle', the answer to the question as to whether increasing the market share of clean vehicles is **beneficial** to increasing energy efficiency and reducing emissions would appear to be: "It depends". However, it was clear from the discussion in Section 6.2.2 that there are vehicles that might be considered to be less polluting and more energy efficient than others. Hence, if the market share of the 'right type' of clean vehicle was increased, it would contribute to increasing the energy efficiency and to reducing the CO₂ and pollutant emissions from transport. The lack of clarity as to what can be considered to be a 'clean vehicle' is also relevant in response to other questions; these strands are brought together in Section 8.

The discussion in Section 6.2.3 suggests that stakeholders generally see a link between the development of cleaner vehicles and competitiveness, although there is a question as to the direction of the causality. While the development of sustainable, advanced vehicles is important to the competitiveness of the EU automotive sector, it is this development

²¹ Annex 14 outlines these (and other) EU policies and instruments.

that leads to the increased market share of clean vehicles, rather than the other way around as implied by the question. Hence, an increased share of clean vehicles could be taken to be a sign of the competitiveness of the automotive sector, rather than an increased market share increasing its competitiveness. On the other hand, an increased market share of clean vehicles has the potential to be **beneficial** on the competitiveness of the EU economy more generally, if the total costs of transport are reduced from the use of more efficient vehicles, and on cities, as these improve their environments and so become more attractive places to invest.

Hence, the conclusion is that while increasing the market share of clean vehicles is not an adequate means of contributing to the stated objectives, it can be beneficial as long as the market shares of the appropriate "clean vehicles" are increased.

6.3. Relevance: To what extent is stimulating the public procurement of clean vehicles an adequate mean to contribute to the overall objectives of increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport? (Q2)

6.3.1. Approach to answering the evaluation question

In this section we examine more specifically the extent that "stimulating the public procurement of clean vehicles" – the main mechanism through which the Directive is expected to contribute to increasing the market share of clean vehicles – represents an adequate means of contributing to increasing the energy efficiency and competitiveness of transport and to reducing its CO₂ and pollutant emissions. We also explore two additional elements that will assist with the understanding of the potential role of public procurement in delivering the stated objectives. Section 6.3.2 explores the relationship between public procurement and increasing the market share of clean vehicles, while section 6.3.3 examines the role of public procurement in terms of meeting environmental and economic objectives.

6.3.2. Public procurement and increasing the market share of clean vehicles

In general terms, public procurement appears to have only a limited direct role in increasing the market share of clean vehicles. Analysis of available vehicle registrations suggest that for most types of vehicle, the proportion of new vehicles procured by the public sector is relatively small compared to the size of the respective new vehicle markets. The exception to this is buses, of which a significant proportion – perhaps even a majority – are still procured by the public sector. There are a wide range of vehicles included under the definition of 'rigid truck', some of which will be almost exclusively used, if not by public authorities, then in services procured by them, e.g. household waste collection vehicles (see Table 6-1).

Table 6-1: Estimated number and share of annual registrations of selected new vehicles that are procured by the public sector between 2012 and 2015

Vehicle type	Cars	Vans	Rigid trucks (does not include tractor-trailers)	Buses (does not include coaches)
Lower estimate (based on TED data)	29k	10k	11k	4k
Higher estimate :	405k	40k	12k	18k

Source: Estimates made for this report (see Section 2.2/Annex 1). Note: see section 6.4 for discussion of the difference between the lower and upper estimates.

In conclusion, in terms of the potential direct impact on the market for clean vehicles, public procurement has a relatively small role to play, particularly for passenger cars and LCVs. It has a greater direct impact in other vehicles categories, predominantly in the case of buses (excluding coaches) and, to a lesser extent, rigid trucks, where publicly procured vehicles represent a more important part of the market. For buses, the public sector has a potentially significant role to play, and so public procurement is potentially a lot more relevant than for other vehicles.

6.3.3. The role of public procurement in meeting environmental and economic objectives

While the direct contribution of public procurement to increasing the clean vehicle market might be small, there are other reasons for employing public procurement to increase the market share of clean vehicles. Such procurement, which might be labelled as green public procurement (GPP) or sustainable public procurement, has the potential to contribute to improving the environment and to improving the quality of life of citizens (not least as a result of environmental improvements). In adopting GPP practices, public authorities can also contribute to raising awareness about environmental issues amongst their citizens and can also take leadership by acting as an example to private consumers and businesses. Additionally, there is the potential to save money in the longer-term, as the higher upfront costs of many green products are more than covered by the cost savings generated in the course of their use, due to the better energy efficiency of such products, for example. The adoption of GPP practices at sufficient scale can also send signals to industry that there is a market for greener products if these are produced and therefore can help to stimulate industry to innovate (European Commission 2008).

Some of these considerations were evident in the Commission's proposal that led to the adoption of the CVD. It was noted that there was significant scope for improving the energy efficiency of road transport vehicles and for reducing their CO₂ and pollutant emissions, but that the widespread introduction of the relevant technologies was hampered by their high purchase prices and a subsequent lack of consumer demand for such vehicles. Furthermore it was noted that manufacturers were unlikely to develop clean and energy efficient vehicles in response to local or national measures and so action at the European level was justified. The role of public procurement in stimulating the market for clean vehicles was particularly emphasised. Encouraging investment in such vehicles by public authorities should help to increase the market for such vehicles and thus help to deliver the economies of scale that will lead to lower production costs and lower prices. In turn, this should help to stimulate demand more generally (European Commission 2007). The role of the public procurement of clean vehicles in contributing to the delivery of the objectives of environmental and energy policy, its demonstration of leadership and its assistance with the creation of a market for clean vehicles have been noted elsewhere (Clean Fleets 2014).

Stakeholders' views on the role of public procurement in meeting the stated objectives were generally positive and in line with the responses relating to the first evaluation question. Several underlined that public procurement was a useful tool and that it was part of a more comprehensive approach to delivering the stated objectives. However, it was interesting to note that when asked to identify the most useful measures for stimulating the demand for clean and energy efficient vehicles, public procurement was not generally considered to be the most useful measure, which was at least partially due to stakeholders' perceptions that the Directive has had little impact (see Annex 2).

6.3.4. Conclusion on the adequacy of stimulating the public procurement of clean vehicles as a means of contributing to increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport

The direct effects of public procurement with respect to increasing transport's energy efficiency, decreasing its CO₂ and pollutant emissions, and contributing to increasing competitiveness are only limited due to the small share of publically procured vehicles in the total vehicle market. However, the public procurement of clean products has also wider benefits in terms of increasing the overall market share of clean vehicles. Increasing the overall market share of clean vehicles is recognised as relevant by stakeholders in contributing to the stated objectives, than is evident simply from the direct effects of publically procured vehicles on emissions and energy consumption. Consequently, while stimulating public procurement cannot be considered to be an adequate (i.e. sufficient) means of contributing to the stated objectives, it can be clearly be beneficial with similar caveats as for the previous question.

6.4. Effectiveness: To what extent has the mandatory inclusion of operational lifetime environmental and energy impacts in the procurement decision led to an increased market share of clean vehicles and contributed to reducing CO₂ and pollutant emissions (NO_x, NMHC and particulate matter) from the transport sector? (Q3)

6.4.1. Approach to answering the evaluation question

This evaluation question examines the presence and the level of impact on the market of clean vehicles that could be associated with the Directive. It also attempts to quantify the level of reductions in CO₂ and air pollutant emissions that can be associated with the implementation of the Directive in comparison to the baseline (presented in section 2.2).

We combined quantitative and qualitative data collected as part of the fieldwork (surveys, interviews) with other secondary sources of information to develop a model that helps estimate the impacts of the policy. Any underlying assumptions made are explained.

Finally, Section 6.4.4 compares the results of the evaluation with the findings of the 2007 Impact assessment (European Commission 2007a) and explains the underlying reasons for the important differences in the findings of the two studies.

6.4.2. Analysis of the impact of the CVD on the market share of clean vehicles, on CO₂ emissions and on air pollutant emissions

The mandatory inclusion of operational lifetime environmental and energy impacts in the public procurement decisions should contribute to clean vehicles securing a significantly greater share of the market. According to the intervention logic this should take place as a result of the increasing share of clean vehicles in public procurement, as well as due to the effects of this on wider consumer trends. The increase in the share of clean vehicles should eventually result in a certain level of improvement in overall transport energy efficiency and CO₂ and pollutant emissions from the transport sector.

However, the inputs from the survey of procurers and other sources suggest that important parts of the expected mechanisms, and the respective results have not materialised. The underlying reasons driving this finding are:

- The number of vehicles procured by contracting authorities is small relative to the total number of vehicles procured in the wider market and the Directive only covers a certain proportion of the vehicles publicly procured (those that are above the EU public procurement thresholds or the respective national thresholds).
- Only a small share of contracting authorities have used the monetisation methodology (Option 2b). Most contracting authorities chose the technical standards option, setting minimum technical standards for vehicles (Option 1) *which the large majority of vehicles in the market already meet. Furthermore*, contracting authorities using award criteria (Option 2a) most often place only a small weight on environmental criteria relative to other considerations (such as price) in the procurement decision.
- In many cases, the procurers who have set stringent standards for energy efficiency and emissions performance evidently would have set similar standards without the Directive.
- No (or very limited) CO₂ emissions benefits are realised for heavy-duty vehicles as a result of the Directive, because the necessary comparable data on the CO₂ performance of these vehicles is too difficult for contracting authorities to obtain in the absence of commonly used standardised test procedures for measuring the CO₂ performance of these types of vehicles.

These points are explained in detail in the following paragraphs.

Volume of publicly procured vehicles

As already analysed in detail in section 2.2 (summarised in Table 6-2), the maximum estimated number of new vehicles purchased by public contracting authorities is 0.475 million per year (upper estimate), representing 3.5% of the total new passenger cars, vans, rigid trucks and buses purchased each year. As can be seen, in the case of buses public procurement may account for a much greater share (up to 75%) of the total vehicles bought.

Table 6-2: Estimates of vehicles publicly procured on an annual basis

Vehicle type	Vehicles purchased under Directive		Share of total vehicles purchased	
	Lower estimate ('000)	Upper estimate ('000)	Lower estimate	Upper estimate
Passenger cars	29k	405k	0.2%	3.4%
Vans	10k	40k	0.7%	2.8%
Rigid trucks	11k	12k	5.9%	6.4%
Buses	4k	18k	16.8%	75.0%
Total	53k	475k	0.4%	3.5%

Source: Ricardo Energy & Environment analysis of national public sector vehicle registration/fleet data, and ACEA total vehicle registration statistics.

Further to that point, it should also be noted that not all vehicles procured fall within the scope of the CVD- the number of contracts falling below the threshold value varies depending on the country, and in some cases all contracts are subject to the CVD. Thus, while it is expected that some contracts below the threshold may have followed the CVD requirements, it is also clear that not all public procurement of vehicles is covered by the CVD.²²

Overall, even under the least conservative assumption about the number of vehicles that may have been affected by the Directive, it is apparent that for passenger cars, vans, and rigid trucks, the effect that the Directive can have on overall vehicle purchases in the EU is small (in nominal terms and relative to the total size of wider market). For buses, although the nominal number procured by contracting authorities is small, this number constitutes a very significant proportion of the wider market (in our analysis, potentially as high as 75% of all buses bought).

Effects on procurement decisions

The analysis of the available data also indicate that the **majority of contracting authorities are still purchasing conventionally fuelled vehicles**. Our survey and interviews with procurers suggest that the average improvement due to the Directive in vehicles' CO₂ performance has been modest, and a very small proportion of vehicles bought by public authorities have been better in terms of pollutant emissions than they otherwise would have been. Specifically, alternatively fuelled vehicles or hybrid powertrains do not tend to be offered by suppliers even when ambitious environmental criteria are specified, unless the tender specifically requests these technologies. Table 6-3 presents the share of different types of vehicles and powertrains procured by authorities that responded to the contracting authorities survey. As can be seen, 87% of the authorities

Table 6-3: Share of different types of vehicle fuel/powertrain types procured from public authorities (% of contracting authorities responding)

Conventional fuel/powertrain	Electric	Hybrid	LPG/CNG	Insufficient info
87%	1%	1%	2%	9%

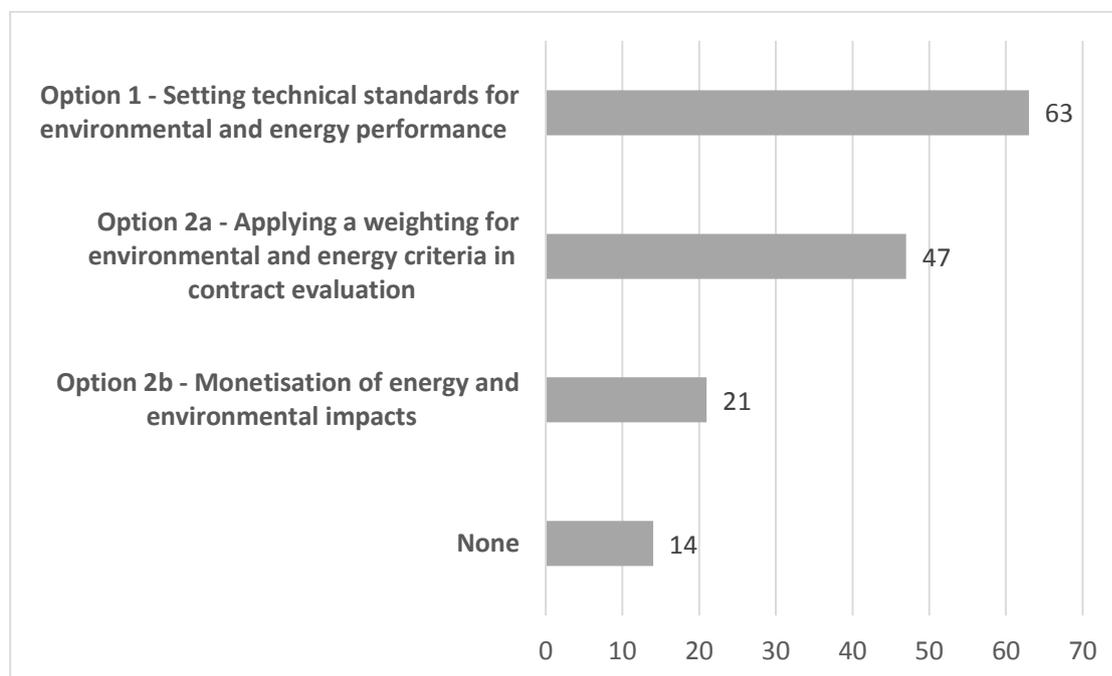
Source: *Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment*

Furthermore, in the case of cars and vans, the specification of environmental criteria may prompt suppliers to offer cleaner 'eco-variants' of conventional models (e.g. with start-stop, downsized engine, etc.) in their bids. However, in our interviews procurers have reported that even suppliers with 'eco-variants' in their model range have sometimes chosen not to include these in their bids. Procurers also emphasised that the number of bids received is often low in the first place. It is therefore not necessarily the case that the cleanest vehicles available on the market will actually enter the competition. Consequently, energy and environmental criteria do not appear to have become significantly more influential as a result of the Directive.

In addition to that, only 13.4% of the respondents to the procurer's survey indicated that they made use of the monetisation option (Option 2b) in their last contract to procure road transport vehicles. More than 40% stated they used Option 1 (technical standards) and 30% Option 2a (award criteria).

²² Depending on the national implementing measures, contracts below thresholds may or may not legally require the application of the CVD's rules. Furthermore, even if the national implementing measures do not *legally prescribe* application of the CVD rules to small contracts, contracting authorities may apply them anyway. Such "gold-plating" in public procurement has been observed in other sectors.

Figure 6-2: Environmental evaluation options applied to the public procurement contracts (out of 156 contracting authorities responding)



Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

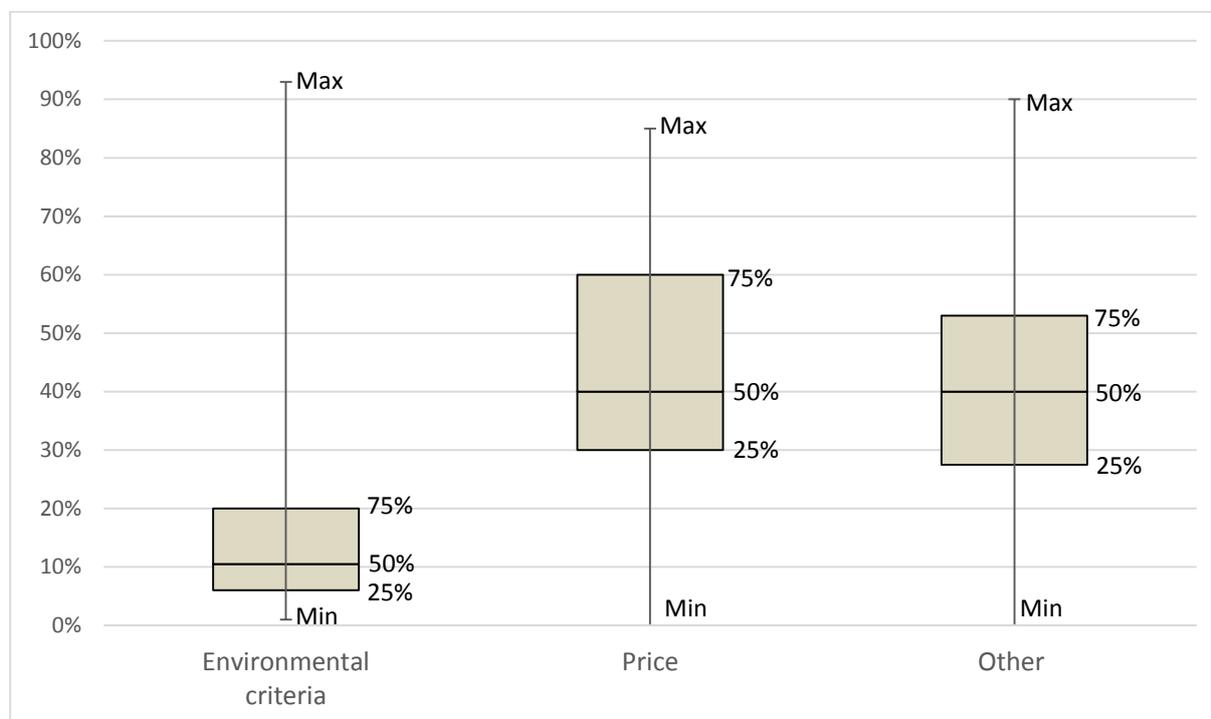
Results of the stakeholder survey and feedback from stakeholders gained through interviews have indicated that the technical standards option (Option 1) has had very little effect on procurement decisions. The overwhelming majority who set a minimum standard for pollutant emissions indicated that they demanded a certain EURO standard. In most cases EURO 5/V was set as the performance requirement, when these standards were already obligatory requirements for light duty and heavy duty vehicles respectively. Procurers only demanded a higher EURO standard (i.e. Euro 6/VI) than was legally required for new vehicles for just 1% of vehicles procured using the technical standards option. Furthermore, these procurers demanded the higher EURO standard just six months before it became obligatory for all vehicles²³.

In addition, in the case of award criteria (Option 2a), environmental criteria (often including fuel/energy consumption) were given less than 20% weight in the large majority (75%) of the procurement cases. Price is usually given a greater weight (higher than 40% weighting in 50% of the cases examined) while other criteria (such as warranty period, provision of technical support, quality of design) are also most often more important than environmental considerations.

Figure 6-3: Distribution of the percentage weighting given by contracting authorities to environmental and other criteria when weighting/award criteria

²³ Some respondents to the procurer survey claimed to have set minimum standards for CO₂ emissions or fuel efficiency, but on the whole too few responded with sufficient information for us to be able to estimate the typical minimum standard used. Therefore, our assessment of the effect of the technical standards option on CO₂ and fuel efficiency is based on the information respondents' provided about the vehicles they decided to purchase.

are being used in vehicle procurement (analysis based on 47 responses from contracting authorities)



Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

The conclusion concerning the limited role of the CVD in terms of the demand for clean vehicles is also supported by the responses of vehicle suppliers. Even though the number of responses is rather small, it does provide an indication of the limited role of the CVD in the sales of clean vehicles.

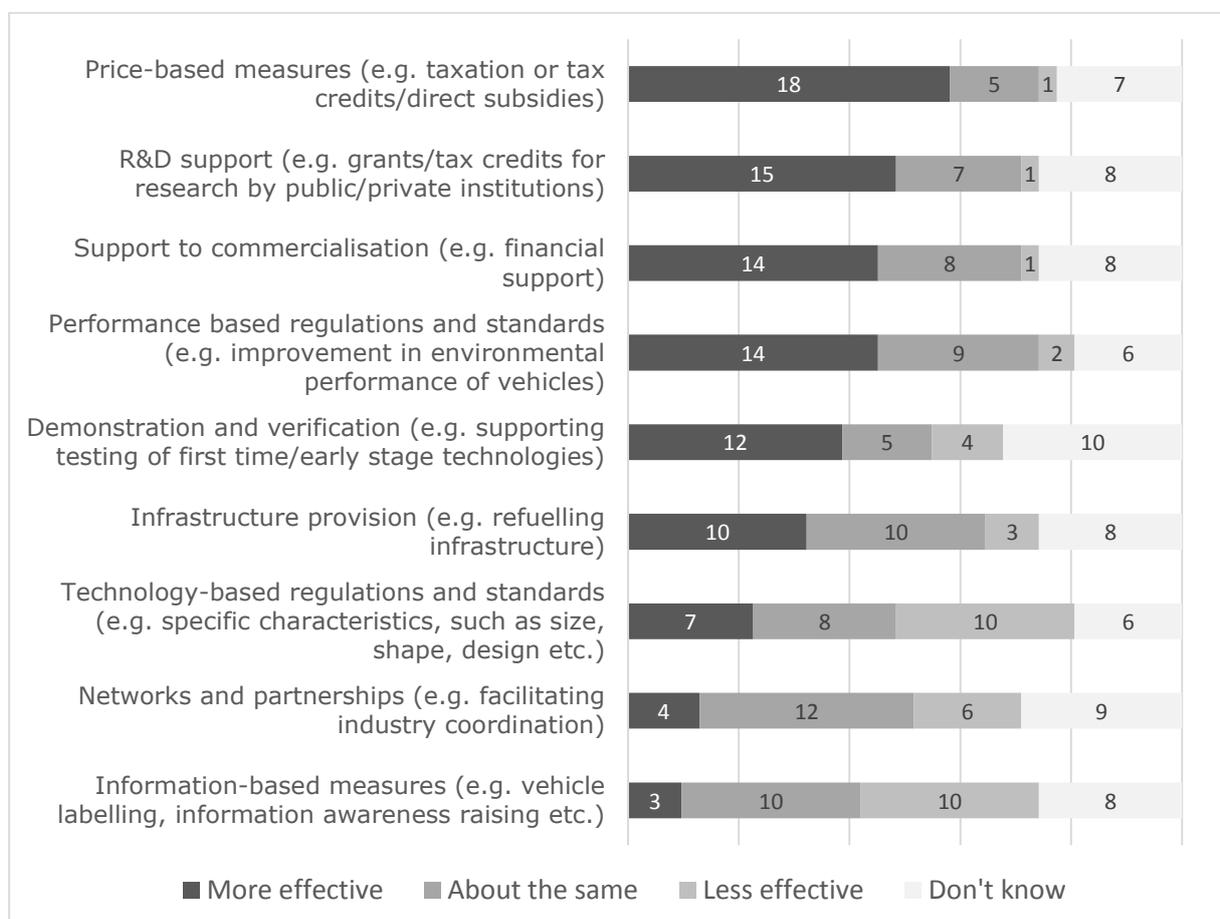
Table 6-4: Has the Clean Vehicles Directive had an impact on your sales/deliveries of clean vehicles? (out of 36 contractors responding)

Types of Vehicles	Not at all	A little	A moderate amount	A great deal	Don't know or NA
Passenger cars	6	3	2	0	12
Buses or coaches	5	3	2	0	15
Light (<3.5t) commercial vehicles	6	5	3	1	9
Heavy goods vehicles (trucks other than waste collection vehicles)	4	5	1	2	13
Special service vehicles - Waste collection trucks and services	11	4	6	3	10
Special emergency service vehicles – e.g. ambulances, fire engines etc.	5	4	2	0	12

Source: Online Survey of Contractors– March-April 2015, Ricardo Energy & Environment

Furthermore, to the extent that public procurement has shifted towards cleaner vehicles over time, the Directive is not the main driver of this shift. The procurers' survey indicates that large number of procurers used environmental criteria even before the introduction of the Directive. A large part of the observed improvements in vehicles performance over time reflects general market trends and the effects of relevant regulation (CO₂ Regulations for light duty vehicles, EURO emissions standards) and financial instruments (tax credits/subsidies). Based on responses received to the contractors' survey (including manufacturers of vehicles and contractors selling or leasing road vehicles), such tools are more effective in terms of promoting the sales of clean vehicles (see Figure 6-4).

Figure 6-4: How effective are each of the following alternative policies/measures in achieving the Directive's aim to 'increase the market share of clean vehicles' compared to the CVD? (out of 31 contractors responding)



Source: Online Survey of Contractors– March-April 2015, Ricardo Energy & Environment

Having said that, there are cases reported where procurement contracts of significant size do have an impact on the regional or national markets. For example, our interviews with some local authorities (e.g. Madrid, Berlin, Warsaw) indicated that they have procured electric or CNG vehicles for the provision of urban transport services, waste collection or other public services. However, the interviews with such stakeholders suggest that the CVD does not represent the driving force behind such purchasing decisions. Typically, these are part of the green strategies of the authorities involved and, in some cases, they are also linked to targeted financial support programmes by national authorities, that subsidise the additional costs for the purchase of such vehicles.

6.4.3. Estimation of the impact of the CVD

On the basis of data collected and input from the survey with procurers, we were able to estimate the maximum level of improvements in public sector fleet emissions due to the introduction of the Directive.

For CO₂ emissions, the analysis is based on a cross-sectional comparison of the CO₂ performance of vehicles purchased by public authorities under the Directive, and the typical CO₂ performance of similarly-sized vehicles purchased in the wider market at the same time. This cross-sectional comparison serves as a means of controlling for the effect of the car and van CO₂ regulations, which will have improved the CO₂ emissions performance of both publically- and privately-procured vehicles. We found that public sector respondents' vehicles were 12% more efficient in terms of CO₂ than the wider market average, and respondents' choice of vans was on average 5% more efficient (see also Annex 1). Important assumptions have been made to produce these estimates and therefore it is appropriate to present the results of this analysis with some caveats. These include:

- As we have already pointed out, a number of contracting authorities (around 46%) have already included environmental criteria in procurement decisions prior to the introduction of the CVD, and for these procurers the Directive will have had a limited effect on the performance of vehicles procured. Indeed, some indicated that the criteria they were applying before the Directive were at least as strict as those applied after the Directive was transposed. We have adjusted our estimate of the CO₂ and air pollutant benefits of the Directive to take this into account. This leads to an estimated 5.5% average CO₂ reduction for vehicles and 2.3% for vans.
- However, we have not been able to determine to what extent procurers who say they are currently taking energy and environmental performance into account to a greater extent than they did prior to the Directive would have done so in the absence of the Directive, due to other factors. Conceivably, all the abated emissions quantified may be due to factors other than the Directive such as a general effort by contracting authorities to tackle road transport CO₂ and pollutant emissions more effectively, as a consequence of their own voluntary effort to improve or as a result of policies and incentives developed by national and local government.
- Leaving aside the issue of the extent to which better CO₂ performance of contracting authorities' vehicles (relative to private sector vehicles) should be attributed to the CVD, there is still a large amount of uncertainty over the extent of the difference. Our survey provides us with limited numbers of vehicles in each segment to compare with the average in the wider market.

For pollutant emissions, our estimate is based on an analysis of the responses of contracting authorities who set technical standards and the use of real-world emissions data (rather than type approval data). For those using pollutant emissions as award criteria or using the monetisation option (Option 2b), there was no relevant information provided by these respondents that could allow to quantify the impact on pollutant emissions (even though responses provide us with information on the weight given to pollutant emissions criteria, they include no substantive information on what the criteria were). As a result we have assumed the air pollutant impacts among these groups will be similar to those among the group based on technical standards. The impact among those setting technical standards is very low and attributable to a very small proportion of procurers choosing to require EURO 6 or EURO VI prior to those standards becoming obligatory. It is reasonable to assume that the other two options have also had a low impact on air pollutants, because (1) the monetisation methodology gives very little weight to pollutants in total monetised costs, and (2) respondents indicating that they had used air pollutant performance as award criteria typically gave this a very low weight relative to price and fuel consumption.

The figures in **Table 6-5** present the estimated environmental impacts related to the CVD on the basis of the upper and lower level scenarios for the number of vehicles affected by the CVD and with reference to the period 2012-2014 that the CVD has been effectively in

force. The analysis includes estimates of the impacts on air pollutants and CO₂ emissions up until 2032 of vehicles bought between 2012 and 2014. 2032 is the year in which all vehicles purchased by the end of 2014 under the policy will have been scrapped. The table provides also the estimated % change in comparison to the baseline estimates.

In relation to the air pollutant impacts shown in table 6-5, these are the consequence of a small number of procurers adopting EURO 6/VI standards at time when only EURO 5/V was obligatory and mandatory use of EURO 6/VI for new vehicles was still 6 months away. Therefore air pollutant impacts are only non-zero where (1) there are differences in the real world emissions associated with EURO 5/V and EURO 6/VI, and (2) there was a transition to EURO 6 at some point before mid-2015. For example, table 6-5 indicates that there was no impact on NO_x emissions of passenger cars. This is because NO_x emissions limits for petrol passenger cars are the same under EURO 5 and EURO 6, and for diesel passenger cars, although EURO 6 is associated with lower real-world emissions of NO_x than EURO 5, EURO 6 does not become obligatory until September 2015, and so any procurers imposing EURO 6 half a year before the standard becomes mandatory will have done so in March 2015, i.e. after the 2012-2014 window for procurement decisions which our analysis evaluates.

These estimates should be considered as a best-case scenario and, on the basis of the caveats given above, probably overstate the actual emissions impact of the CVD. Unfortunately, there are no data available that would allow for a more accurate estimate of the contribution, controlling for all other factors in play.

Table 6-5: Estimated environmental impacts from the implementation of the CVD (effects of the policy being in place from 2012-2014 in comparison to the baseline)

Change in emissions due to the CVD	Passenger cars	Vans	Rigid trucks	Buses	All vehicles
CO ₂ (thousand tonnes)	-135 to -1917	-26 to -109	No effect	No effect	-161 to -2027
- % of change to baseline	-5.5%	-2.3%	-	-	-0.6% to -1.7%
NMHC (tonnes)	No effect	No effect	-3 to -4	-6 to -29	-10 to -32
- % of change to baseline	-	-	> -0.01%	> -0.01%	> -0.01%
NO _x (tonnes)	No effect	-1 to -2	-41 to -45	-82 to -364	-127 to -455
- % of change to baseline	-	> -0.01%	> -0.01%	> -0.01%	> -0.01%
PM (tonnes)	No effect	No effect	-0.10 to -0.11	0 to -1	0 to -1
- % of change to baseline	-	-	> -0.01%	> -0.01%	> -0.01%
Total CO₂ cost savings (million €)	8.2 to 116.7	1.7 to 7.0	No effect	No effect	9.9 to 123.8
Total air pollutant cost savings (million €)	0.0 to 0.4	0.01 to 0.02	0.40 to 0.43	0.74 to 3.28	1.2 to 4.1

Source: Own elaboration on the basis of data collected

Note: Costs are presented in 2015 prices. A 4% discount rate is applied to costs after 2014.

In the case of heavy-duty vehicles, our analysis suggests that the contribution of the CVD to CO₂ or fuel efficiency improvements is zero. In the absence of standard test cycles, procurers indicate that they struggle to find data they can use to compare the fuel efficiency of vehicles. Only a few procurers have gone through the process of specifying their own

tests in order to get the relevant data. Such procurers will have had to go to great lengths to collect the relevant data and are therefore likely to be precisely the procurers who would have imposed stringent fuel-efficiency or technology-based standards in the absence of the Directive. This would be the case with the city of London authorities, for example, who have set technology-based standards (i.e. all new buses must be hybrids) and run their own tests on the fuel efficiency of buses. They have stated that the Directive has no additional impact on their use of environmental criteria²⁴.

Dieselisation

The figures in Table 6-4 do not include any effects of possible extra dieselisation (shift from petrol to diesel vehicles) resulting from the Directive. Additional dieselisation is a possible consequence of the inadvertent bias in the monetisation methodology towards diesel vehicles (the analysis supporting this assessment is provided in Annex 9). Therefore an ancillary analysis was conducted to investigate the possible extent of dieselisation resulting from the Directive, and its effects on pollutant emissions.

Analysis of the procurer survey indicated a maximum 5.5% improvement in the CO₂ emissions of passenger cars and a 2.3% improvement in the CO₂ emissions of vans could be associated with the CVD. It is uncertain to what extent this improvement in CO₂ emissions may have been driven by dieselisation. In the dieselisation scenario, we assume a certain proportion of the CO₂ improvement estimated from the procurer survey is driven by dieselisation, based on further analysis of the survey. Therefore the approach is to hold the estimated CO₂ benefit (from the non-dieselisation scenario) constant, but assume that it comes 'at a price' of increased air pollution (associated with extra purchases of diesel vehicles). In other words, our estimate of the difference between vehicle procured under the CVD and vehicles procured without the CVD does not change, as this is based directly on the procurer survey results, but our assumption as what *explains* the CO₂ difference (i.e. dieselisation versus efficiency improvements without dieselisation) is different in the dieselisation scenario.

Further analysis of the procurer survey confirms that use of the monetisation methodology tends to be associated with procurement of diesel passenger cars rather than petrol passenger cars to a greater extent than the other two options in the Directive: the share of diesel passenger cars is 13% higher for the monetisation option than the weighted combination of the other two options. 13% of procurers use the monetisation option, implying the extent of dieselisation is 13% of 13%, or a two percentage point increase in diesel's share of publically procured passenger cars. (For other types of vehicles, i.e. vans and heavy duty vehicles, there is no dieselisation effect of the Directive as the vast majority of these vehicles (more than 99%) are already powered by diesel).

We were also able to determine from the analysis of the procurers survey that the typical difference in CO₂ emissions for a diesel car procured under the Directive and a similarly-sized petrol car procured under the directive is 14% (i.e. diesel cars typically emit 14% less CO₂ per km). This analysis is based on cars in the B and C segments, as other segments had either too few diesel or too few petrol cars to allow for a meaningful comparison of averages. Multiplying the estimated increase in diesel's share (2%) by the typical difference between diesel and petrol passenger cars (14%) yields a total change in CO₂ emissions of 0.2%. Therefore, in the dieselisation scenario a 0.2% reduction in CO₂ emissions is associated with dieselisation, and the remaining 5.3% of the total 5.5% reduction is not.

Dieselisation will have an adverse effect on air pollutant emissions, which we have estimated through use of REMOVE data on typical CO₂ and pollutant emissions of passenger cars in the EU. The REMOVE model includes real-world (rather than test cycle) emissions of typical passenger cars of different fuel types. By comparing the fleet-average CO₂ and pollutant emissions profiles of diesel and petrol passenger cars, elasticities of pollutant emissions with respect to CO₂ emissions in the context of dieselisation were

²⁴http://www.clean-fleets.eu/fileadmin/New_Bus_for_London_Case_Study_for_Clean_Fleets_-_final.pdf

estimated. Elasticities of NMHC emissions, PM emissions, and NO_x emissions with respect to CO₂ emissions were then used in combination with the assumption of a 0.2% dieselisation-related reduction in CO₂ to estimate the effect of CVD-related dieselisation on air pollution.

The result in the case of the dieselisation scenario is that the modest air pollutant benefits associated with early adoption of EURO standards are wiped out (see Table 6-6). Instead, due to the dieselisation of passenger cars, the overall impact of the Directive on air pollutant emissions is adverse (increase in NO_x and PM).

Table 6-6 Estimated environmental impacts from the implementation of the CVD (effects of the policy being in place from 2012-2014 in comparison to the baseline) – dieselisation scenario

Change in emissions due to the CVD	Passenger cars	Vans	Rigid trucks	Buses	All vehicles
CO ₂ (thousand tonnes)	-135 to -1917	-26 to -109	No effect	No effect	-161 to -2027
- % of change to baseline	-5.5%	-2.3%	-	-	-0.6% to -1.7%
NMHC (tonnes)	-6 to -91	No effect	-3 to -4	-6 to -29	-16 to -123
- % of change to baseline	> -0.01%	-	> -0.01%	> -0.01%	> -0.01%
NO _x (tonnes)	+131 to +1853	-1 to -2	-41 to -45	-82 to -364	+7 to +1442
- % of change to baseline	< 0.01%	> -0.01%	> -0.01%	> -0.01%	< 0.01%
PM (tonnes)	29 to 412	No effect	-0.10 to -0.11	0 to -1	29 to 411
- % of change to baseline	< 0.01%	-	> -0.01%	> -0.01%	< 0.01%
Total CO₂ cost savings (million €)	8.2 to 116.7	1.7 to 7.0	No effect	No effect	9.9 to 123.8
Total air pollutant cost savings (million €)	-2.2 to -31.4	0.01 to 0.02	0.40 to 0.43	0.74 to 3.28	-1.1 to -27.7

Source: Own elaboration on the basis of data collected

Note: Costs are presented in 2015 prices. A 4% discount rate is applied after 2014.

6.4.4. Conclusions and comparison with the estimates of the impact assessment

Overall, the findings of the analysis suggest that the Directive has had a very modest effect on reducing CO₂ emissions and increasing the market share of energy-efficient and environmentally friendly vehicles. The positive impact on air pollutant emissions is also extremely limited and may have actually been completely offset by dieselisation.

We have estimated the impacts of the Directive having legal force on new procurements from the start of 2012 to the end of 2014 (2012 is chosen rather than 2009, as most Member States did not transpose the legislation until 2012) (see Table 6-7). While a fraction of the impacts of the Directive on energy costs, air pollutants and CO₂ emissions will have been realised by the end of 2014, the majority of the impacts of the procurement decision made over 2012-2014 will actually be realised after 2014. Therefore, our analysis also includes estimates of the impacts on air pollutants and CO₂ emissions up until 2032

of vehicles bought between 2012 and 2014. 2032 is the year in which all vehicles purchased by the end of 2014 under the policy will have been scrapped.

Table 6-7:- Estimated market and environmental impacts of the CVD

	Policy impact during 2012-2014	Policy impact during 2015-2032	Total estimated impacts ²⁵
"Clean" vehicles procured by contracting authorities/year	2,000 to 23,000 zero-emission cars and vans (equivalent to 0.2% to 2.9% of the EU market for alternatively-fuelled vehicles, or 0.01% to 0.05% of the total EU market for cars and vans) <i>or</i> 55,000 – 705,000 fuel-efficient conventionally-fuelled cars and vans (equivalent to 0.1% to 1.8% of the total EU market for cars and vans) - Close to zero clean rigid trucks and buses		
CO ₂ emissions (thousand tonnes)	-38 to -459	-123 to -1567	-161 to -2027
NMHC emissions (tonnes)	-1 to -4	-8 to -28	-10 to -32
NO _x emissions (tonnes)	-18 to -57	-105 to -354	-123 to -411
PM (tonnes)	0 to 0	0 to -1	0 to -1

Source: Own elaboration on the basis of data analysis

Note: the final column of this table matches the figures in the final column of Table 6-5.

Comparison with the IA results

Our estimates of the impact of the CVD are also significantly reduced in comparison to the initial estimates provided in the 2007 impact assessment (European Commission, 2007) in relation to most of impacts. In Table 6-8 the key estimated impacts of the implementation of the CVD linked to the two scenarios examined in the impact assessment and the evaluation are summarised. Given the different time periods considered in the two studies and the different approach used in estimating the impacts, the figures presented refer to the impacts for a single year in order to ensure comparability. In the case of the impact assessment we used the detailed figures available for 2012 while for this ex-post evaluation we present the average for the three year period 2012-2014. As a result, the figures presented are different from those presented in **Table 6-5**.

Table 6-8 - Comparison of estimated impacts of the CVD implementation against the 2007 Impact assessment estimates (figures refer to a single year: 2012 for the impact assessment, average of the 2012-2014 period for the evaluation)

Estimated impacts of CVD for a single year	IA Scenario 1	IA Scenario 2	Ex-post evaluation
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²⁵ The figures in this column correspond to the total impacts presented in Table 6-5.

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

	Mandatory internalisation of operational costs	Optional early adoption of EURO standards	
"Clean" vehicles procured by contracting authorities/year	52,000 hybrid diesel HDVs 220,000 gas LDVs	none	0 HDVs, 600 - 8,000 zero-emission LDVs or 18,000 - 234,000 "eco variant" LDVs
CO ₂ emissions (thousand tonnes)	-19,000	zero	-54 to -676
NMHC emissions (tonnes)	Not estimated	Not estimated	-3 to -11
NO _x emissions (tonnes)	-131,000	44,000	-42 to -152
PM emissions (tonnes)	-3,000	40	-0.1 to -0.3

Source: Own elaboration on the basis of data analysis and (European Commission 2007a)

The significant differences in results anticipated by the Impact Assessment and the results estimated for the Evaluation are mainly a result of differences in assumptions about the policy that would be (has been) implemented. More specifically:

- Among the policy options considered in the Impact Assessment was legislation to require all contracting authorities to use a type of monetisation methodology for every single vehicle procurement action (IA scenario 1). Another policy option considered in the impact assessment (IA scenario 2) was for the Commission to "encourage" early adoption of EURO standards. Neither of these policy options reflect the actual final provisions of the Directive that was eventually adopted, although each bears a limited resemblance to a certain aspect of the Directive and its practical implementation. The differences between the impact assessment policy options and the actual policy adopted are explained in greater detail below.
- In relation to the adoption of clean vehicles, the IA scenario 1 estimates reflect a scenario in which monetisation of external costs is made mandatory. As a result, all publically procured vehicles resemble the best-performing vehicles in the market in terms of internalised external costs. According to the impact assessment this would have meant an additional 52,000 hybrid trucks and buses each year and an additional 220,000 gas cars and vans each year entering the market. In our analysis, based on the input from the surveys and interviews, we estimate that the actual contribution of the CVD has been much more limited, and consistent with an additional 600 to 8,000 zero-emissions light duty vehicles per year or an additional 18,000 to 234,000 "eco variant" conventionally fuelled vehicles (each with an average 10% improvement in fuel efficiency relative to their related standard model). This is because the set of options in the Directive for taking energy and environmental criteria into account are substantially less demanding than the requirements assumed in IA scenario 1. Rather than being made mandatory, internalisation of external costs through use of the monetisation methodology has been made optional, and few procurers have chosen to do it. Our analysis of the procurer survey indicates that most procurers have used the other policy options, and given little weight to environmental criteria in their procurement decisions (among those procurers using environmental performance as award criteria, on average, procurers gave four times as much weight to price considerations as fuel efficiency or CO₂ performance).
- It is also important to note that the maximum figure of an additional 234,000 eco-variants almost certainly overstates the real effect of the CVD on the market as it

is a maximum figure, based on the combination of two optimistic assumptions. The first assumption is that the entirety of the estimated 5.5% CO₂ efficiency improvement for cars (2.3% for vans) is attributable to the CVD rather than contracting authorities improving their environmental standards over time on their own initiative. The second assumption is that the entirety of the 5.5% improvement for cars (2.3% for vans) comes from additional purchases of eco-models, i.e. the effect is spread very evenly over procurement decisions.

- In terms of CO₂ emissions reduction, the instructive comparison is between IA scenario 1 and the actual impacts. In IA scenario 1, the aforementioned shift to hybrid and gas vehicles results in substantial well-to-wheel emissions reductions (up to 46% in the case of passenger cars, against relatively moderate changes in purchase costs). Our analysis of the data from the procurers' survey indicates that the Directive has not driven any widespread shift in powertrain technology, and any improvements in CO₂ and fuel efficiency have been modest at best, due to the fact that procurers have largely opted not to use monetisation, given little weight to CO₂/fuel efficiency in procurement decisions, and as a result purchased vehicles that are only slightly more fuel efficient than typical models on the market. On the basis of our analysis of the makes and models of vehicles respondents to the procurer survey say they bought, we estimate that, at most there is a 5.5% reduction in tank to -to-wheels CO₂ emissions of passenger cars associated with the Directive.
- In relation to pollutant emissions, the two impact assessment scenarios predicted pollutant emissions changes for different reasons. In the IA scenario 1, monetisation creates a large-scale shift to alternative fuels and powertrains (with 100% of vehicles switching to CNG or hybrid electric vehicles) resulting in large improvements in the level of air pollutant emissions. According to IA scenario 2, procurers would be given a "recommendation" to adopt higher-than-obligatory EURO standards early, with 50% of procurers choosing to do this, resulting in a significant reduction in NO_x emissions. Our analysis indicates that the actual positive impact of the Directive on pollutant emissions has been much more modest, and associated just with early adoption of EURO standards by a very small minority of procurers (not with any substantive technological shift). Our survey indicates that only 1% of procurers adopted higher-than-obligatory EURO standards early, versus the 50% assumption IA scenario 2. Therefore, the actual air pollutant impacts resemble a much weakened form of IA scenario 1.

In addition, some of the other assumptions made in the Impact Assessment also needed to be changed, to reflect better or more recent data:

- There are differences in the numbers of vehicles procured by contracting authorities, particularly in relation to vans and heavy-duty vehicles. The original impact assessment's estimates of public procurement relied on data from the Italian government which is now over 10 years old. The data underlying our own estimates comes from several countries, and is considerably more up-to-date, including figures recorded after the onset of the economic crisis, which is likely to have dampened public procurement significantly. Another development which is likely to have reduced the numbers of commercial vehicles procured by public authorities is the privatisation of public services.
- On the other hand, the evaluation has also used lower lifetime mileage assumptions than the impact assessment, which tends to deflate the benefits. Most significantly, this evaluation assumes a total lifetime mileage for heavy duty vehicles of 375,000 km, which, according to a DG CLIMA report on greenhouse gas emission of heavy-duty vehicles (AEA 2011), is an appropriate assumption for heavy duty vehicles performing a municipal utility role. The Impact Assessment's assumption of 1,000,000 km would be more appropriate to commercial trucks used for long-distance transport, not vehicles owned by contracting authorities. This difference

in lifetime mileage means that the Impact Assessment is likely to have significantly overestimated the emissions and energy consumption benefits of Directive.

6.5. Effectiveness: To what extent has the provision of different options to include operational lifetime environmental and energy impacts stimulated the internalisation of operational costs in procurement decisions, and contributed to the harmonisation in determining these costs? (Q4)

6.5.1. Approach to answering the evaluation question

This evaluation question examines the extent to which alternative options in the Directive to include operational lifetime environmental and energy impacts has stimulated (or not) the internalisation of operational costs in procurement decisions. It also assesses how the presence of the alternative options contributed to the harmonisation in determining these costs.

The analysis has been based on:

- Input from the survey responses and the interviews with stakeholders (procurers and suppliers of vehicles involved in public procurement bids); and
- Available data from relevant secondary sources.

6.5.2. Role of the provision of alternative options

One of the expected contributions of the Directive was that it would promote the internalisation of operational costs in procurement decisions. More explicitly, the mandatory inclusion of lifetime costs for energy consumption, CO₂ emissions, and pollutant emissions as award criteria in the procurement of vehicles for public transport services was expected to have the biggest impact on the market and the best cost/benefit result. Furthermore, a great impact on the market was expected if harmonised criteria are applied at Community level.

The monetisation method set out in Article 6 of the Directive requires contracting authorities to calculate operational lifetime costs of energy consumption, CO₂ emissions, and air pollutant emissions associated with operating a vehicle. Once calculated, these external costs are then internalised in the purchase decision.

The introduction of alternative options was intended to enable authorities and operators that have already developed methods tailored to meeting local needs and conditions to continue applying these methods. However, the use of alternative options – technical standards (Option 1) and award criteria (Option 2a) – do not, at least explicitly, require authorities to consider the respective operational costs in the setting of the relevant requirements and, as a result, do not ensure the internalisation of operational costs. Only the monetisation option (Option 2b) explicitly requires operational cost impacts to be fully taken into account in procurement decisions.

In practice, among the contracting authorities, only a small share have made use of the monetisation option up to this point in time. Two Member States (Czech Republic and Estonia) decided not to include the monetisation option in their National Implementing Measures while, even among the Member States where the monetisation option is available, contracting authorities tend not to make use of Option 2b. As was discussed in 6.4.2, only 13.4% of the respondents to the procurers' survey indicated that they used the monetisation option (Option 2b) in their last contract to procure road transport vehicles. More than 40% stated that they use Option 1 (technical standards) and 30% use Option 2 (award criteria) (see Figure 6-2 in Section 6.4.2). The Polish government found that no contracting authorities it investigated had used Option 2b while an international network of cities (ICLEI) reported that are aware of only two examples of it ever being used.

The use of the alternative options means that operational costs are only indirectly integrated in the procurement decision process. Relevant fuel/energy consumption-related criteria are still considered as part of Options 1 or 2a. Among the contracting authorities that made use of technical standards, fuel/energy consumption standards were used in around 40% of procurement cases. In the case of award criteria, fuel/energy consumption criteria were considered in 80% of cases.

Asked to explain the reasons for not using the monetisation option, contracting authorities indicated that they perceived it to be too complicated and particularly demanding in terms of the information required. It was indicated that vehicle performance, environmental impacts, and the internalisation of external costs are also technical topics some procurers may have very limited knowledge of. It is also seen by some as being “theoretical” or “academic”.

Furthermore, among the small proportion of stakeholders who felt that they understand the methodology in detail, it is often viewed as being flawed. Among the 38 contractors that responded to this specific survey question, 34% believed that the monetisation method and associated parameters set out in the Directive are not appropriate for a good evaluation of the energy and environmental impacts, whereas 18% believed otherwise (47% did not express an opinion). The Member State representatives for Belgium and Italy agreed in principle that the methodology was appropriate for internalising operational costs. However, they also pointed out that the methodology is rather complex requiring a set of mathematical calculations and a certain level of understanding on rather technical topics of vehicle performance, environmental impacts, and the internalisation of external costs. Many other stakeholders agreed that these issues were significant. One international network of city governments stated that if the methodology is to be retained, it needs to be substantially revised. Similar comments came from vehicle suppliers that stated that the monetisation option tends to require additional information that is not always easily available.

Further to that point, our analysis and feedback from stakeholders suggest that by itself the monetisation option and associated methodology does not always guarantee the accurate internalisation of operational costs. More specifically:

- The methodology does not accurately capture differences in the energy costs of vehicles powered by fuels other than diesel or petrol. It, therefore, internalises energy costs inaccurately.
- The methodology’s emissions factors are outdated and inconsistent with current EU guidance, such as that contained in the 2014 update to the handbook on external costs of transport (Ricardo-AEA, TRT et al. 2014).
- The methodology treats electric vehicles as being CO₂-neutral. However, if the electricity powering these vehicles is generated from coal, the CO₂ emissions of these vehicles would, in fact, be comparable to diesel vehicles.

Furthermore, when looking into specific examples of comparisons between potentially competing vehicles using the monetisation methodology (see Annex 9), we identified some weaknesses of the methodology:

- When comparing various types of buses using different fuels and powertrains, one key finding was that energy efficiency considerations dominate the calculations, resulting in diesel technology being favoured over other technologies. Rather than offsetting the higher initial (purchase) costs of other cleaner vehicles (such as CNG-powered buses), the use of the monetisation methodology can make them appear less competitive.
- When comparing the operational costs of fully-electric vehicles against other powertrains, the operational costs of fully-electric cars are considerably lower than cars equipped with other technologies and hence electric vehicle technology is assisted by the fact that no emissions are attributed to it.

Finally, beyond the specifics of the monetisation option, the survey responses and feedback from interviews suggest that many contracting authorities had been using environmental criteria in their procurement decisions prior to the adoption of the CVD. Among the contracting authorities surveyed, more than 42% of procurers had been using environmental criteria in their procurement decisions and only 23% stated that they did not²⁶.

6.5.3. Role in promoting harmonisation in determining operation costs

Considering the **harmonisation in determining operational costs**, the Directive includes specific guidance on how the monetisation of lifetime costs should be carried out. However, the limited use of the monetisation option in procurement represents an important barrier.

Furthermore, even among those authorities that make use of the monetisation option, one third (33.3%) indicated that they made use of the methodology set out by national legislation while 28% used the methodology set out in the CVD without changes. There was also one case where the methodology developed by a local organisation was applied. This provides evidence that, even among those that make use of the monetisation methodology, a certain level of variation applies. However, it is possible that although authorities indicated that they used different methodologies, they may not be aware if the methodology used (i.e. national legislation) is in fact directly transposed from the Directive.

Information on fuel consumption, CO₂ and air pollutant emissions should, in the first instance, come from the results of the standardised Community test procedures used for type approval (Article 6(2)). For those vehicles for which there are no such official tests, the data should come from "widely recognised test procedures," the results of tests for the contracting authority, or information supplied by manufacturers. However, for heavy duty vehicles, there is not, at present, any harmonised community standard for measuring fuel consumption or CO₂ emissions, and it is prohibitively difficult for most contracting authorities to obtain objective, comparable data on these vehicles from other sources (see Section 5.4 for a full description of this issue).

Therefore, it is likely that the vast majority of contracting authorities have not been able to make accurate comparisons of the performance of heavy duty vehicles in terms of fuel consumption and CO₂ emissions.

The small number of contracting authorities who currently do make CO₂ and fuel consumption comparisons between heavy duty vehicles, and then include these in the procurement decision, are likely to have done so without the Directive. This is because it requires such a significant effort to overcome the problems mentioned above and the only contracting authorities making this effort do so because they are strongly inclined to consider energy and environmental impacts anyway, regardless of the Directive.

Furthermore, as we have seen evidence of a patchwork of different approaches to overcoming the lack of data, in our assessment there is currently no harmonisation in the way the emissions of heavy duty vehicles are taken into account.

Discussions with various procurement authorities suggest that the existing support and guidance initiatives (CVP/CFP) have not played any role in promoting better understanding of the monetisation option. The majority stated that they were not aware of their existence.

6.5.4. Conclusion

Concluding, our analysis suggests that the provision of alternative options has led to a limited use of the monetisation option that explicitly aimed at internalising the operational costs. Our analysis also suggests that there are important problems with the practical

²⁶ A rather high percentage of respondents (35%) stated "Don't know or not applicable".

implementation of the methodology. It is both particularly demanding and complicated but it is also not always effective in fully and properly capturing the operational costs associated with various types of vehicles. Furthermore, there is limited evidence in terms of promoting the harmonisation of costs.

6.6. Effectiveness: To what extent has the Directive promoted an increased awareness among the different stakeholders of the operational lifetime environmental and energy impacts of vehicles? (Q5)

6.6.1. Approach to answering the evaluation question

This question aims to determine the effectiveness of the CVD in terms of raising/increasing awareness among different stakeholders of the operational lifetime environmental and energy impacts of vehicles. Procurers are required to apply one of the three options set out in Article 5(3) of the Directive which aim to address these impacts, including via the use of technical standards (Option 1), award criteria (Option 2a) and monetisation of impacts (Option 2b). The 'stakeholders' were taken to mean primarily the procurers who are required to apply one of these options when procuring vehicles. However, other stakeholders such as contractors and manufacturers have also been considered.

In the main, qualitative analysis has been undertaken to answer this question, relying on:

- Responses to the procurers' survey/interviews;
- Interviews with EU-level stakeholders; and
- Additional data and information from other supporting Commission initiatives.

6.6.2. Promoting an increased awareness

In order to determine whether the Directive has promoted an increased awareness among the different stakeholders, we considered the level of application of the Directive where procurers will be required to apply one of its options to consider operational lifetime energy and environmental impacts.

Of the 547 respondents of the **procurers'** survey, 45% stated that they had procured road transport vehicles since the start of 2012 (in contracts where the requirements of the CVD were applicable), whereas 42% had not. It could therefore be assumed that through the application of the requirements of the Directive by these procurers, an increased awareness of the operational lifetime environmental and energy impacts of vehicles could have been promoted amongst that group, i.e. 45%. However, as has been identified already in sections 6.2 and 6.4.1, 42% of procurers who responded to the survey were already applying environmental criteria prior to the introduction of the CVD (this refers to all respondents, including those who had and had not procured road transport vehicles subject to the requirements of CVD since 2012). Of the respondents who stated that they had procured vehicles since 2012, 52% stated that they applied the environmental criteria prior to 2012 and 19% stated that they did not (out of 108 respondents).

This implies that procurers who had applied some form of environmental criteria prior to the CVD already had some knowledge regarding operational lifetime environmental and energy impacts (although not all – depending on the types of criteria applied). It is therefore difficult to determine the proportion of procurers who may have had their awareness of these impacts increased as a direct result of the Directive, rather than the wider use of environmental criteria in procurement activity.

In interviews with procurers, it was reported that in some cases where environmental criteria were used prior to the introduction of the CVD, little has changed in terms of the procurement processes applied. The options presented in Article 5(3) were considered to be suitably flexible in that criteria remained the same or similar. This supports the

argument above that the CVD therefore has little or no impact on increasing awareness of the operational lifetime environmental and energy impacts of vehicles amongst this group of procurers (i.e. those who applied environmental criteria prior to the introduction of the CVD).

However, it could be argued that the Directive has promoted an increased awareness of the group of procurers who did not apply environmental criteria prior to 2012 (19%) but who have since procured vehicles applying the requirements of the CVD, which would require the mandatory consideration of these impacts in the procurement decision. In these cases, it is possible that procurers were introduced to the concept of operational lifetime energy and environmental impacts for the first time as a result of being required to consider them by the Directive.

In interviews with **EU-Level stakeholders**, one respondent noted that there was a big difference in attitudes to the CVD in different countries. In those countries that had already implemented green public procurement for vehicles, such as in Sweden, there is a sense that the Directive is holding them back. This is due to the fact that they are already using measures aimed at stimulating the uptake and use of clean vehicles (both local and national level), and the Directive isn't requiring them to do more. However, in the newer Member States, the view is generally more positive as the Directive has forced policy makers to think about green procurement in the context of vehicles. This suggests that geography is likely to be an issue when it is considered whether there has been increased awareness of the operational lifetime energy and environmental impacts of transport, supporting the views of procurers outlined above.

Annex 10 outlines an assessment of Commission initiatives that are aimed at the promotion of the Directive. Both the Clean Vehicle Portal and Clean Fleets project were developed specifically to complement the Directive. In 2013, a 'user-needs assessment' (TTR 2013) was undertaken as part of the Clean Fleets project²⁷. As part of this assessment, respondents were asked about their awareness of the CVD. Only 50% of respondents (41 of 82 respondents) stated that they were aware of the CVD's requirements. However, the report noted that as the Directive had been transposed into national legislation, a greater proportion of respondents are more likely to be aware of the Directive's requirements in this way (i.e. via the National Implementing Measures). The Clean Fleets project website has also been visited by over 26,000 unique visitors²⁸, again implying some increased awareness amongst procurers.

The Clean Vehicle Portal aimed to support the CVD whilst raising awareness and supporting the implementation of the CVD. The Portal includes information on the CVD, which has been accessed frequently throughout the lifetime of the portal (between 900 and 1,400 times per year between 2011 and 2015 – see Annex 10). National and European workshops have also been facilitated by the Clean Fleets project. The majority of attendees at both types of workshop stated that the workshops had helped them to better apply the CVD either 'closely' or 'very closely' (see Annex 10), suggesting that there has been an increase in the knowledge of event attendees in terms of how to apply the Directive.

In the interviews and surveys with manufacturers and contractors there was little to suggest that the Directive had promoted awareness of the operational lifetime and energy impacts.

²⁷ Clean Fleets Project (2012-present) – aims to provide direct support and build capacity for the implementation of higher standards of energy and environmental performance in road transport vehicles.

²⁸ Figures provided by ICLEI.

6.6.3. Conclusions

It is possible that in a limited number of cases the Directive has promoted an awareness of the operational lifetime energy and environmental impacts amongst procurers. However, it is likely to be limited to those who:

- Have applied the requirements of the Directive when procuring road transport vehicles since its' introduction; **and**
- Did not previously apply any environmental criteria in the procurement process (or applied simple environmental criteria which did not fully take into account operational lifetime energy and environmental impacts).

It has also been identified that the Clean Vehicle Portal is likely to have raised awareness of the Directive through interested parties accessing information via the online portal.

6.7. Efficiency: To what extent has the Directive generated benefits and costs for different stakeholders (e.g. national administrations, contracting authorities, transport operators, manufacturers)? (Q6)

6.7.1. Approach to answering the evaluation question

This evaluation question examines the costs and benefits generated by the Directive for different stakeholders aiming to assess whether:

- The administrative costs to industry and procurers are proportional to the benefits;
- Procuring authorities realised cost-savings as a result of taking lifetime operational costs into account, and these are not wiped out by any additional administrative costs; and
- The total economic costs of transport in terms of CO₂ and pollutant emissions have been reduced and whether these reductions have not been wiped out by increased costs to industry or administrative costs to government and industry.

In our analysis we identified and, when possible, we attempted to quantify the administrative and compliance costs associated with the implementation of the CVD for procurers and suppliers of vehicles. Our analysis has been based on:

- Analysis of the survey responses
- interviews with affected stakeholders (procurers and suppliers of vehicles involved in public procurement bids)
- available data from relevant secondary sources

6.7.2. Costs associated with the CVD

In our assessment of the costs linked to the implementation of the Directive, both substantive compliance costs and various types of administrative costs were considered. More specifically the following types were considered:

Compliance costs:

- Compliance costs for contracting authorities and transport operators related to possible increased prices for the procurement of new vehicles but also, additional investment that may be required to support the operation of such vehicles (e.g. methane filling stations/electric vehicle charging points). These are expected, in principle, to be offset by operational cost savings due to reduced fuel consumption, reductions in emissions and improvements to air quality, thus leading to net benefits over the vehicles' life cycles.

- Compliance costs for the suppliers of vehicles that may need to develop new technologies in order to be able to meet the new procurement criteria set by the contracting authorities.

Administrative costs:

- Monitoring and enforcement costs for national authorities responsible for the implementation of the Directive, including inspections and another type of information collection.
- Administrative costs for the contracting authorities that need to take into account the requirements of the Directive in the procurement procedures and ensure compliance with its provisions.
- Administrative costs for the contractors that will need to adapt to the new procurement procedures, provide the additional information requested and, possibly, perform tests to demonstrate that the vehicles meet the set requirements.

Unfortunately, data for some of the costs indicated above was not readily available and the respondents to the procurers survey were often unable to provide specific cost estimates. In the majority of cases they only provided qualitative feedback on the presence and magnitude of the various types of costs. In the sections that follow we bring together the evidence collected from various sources and attempt, whenever possible, to provide estimates of the identified costs.

6.7.2.1. Compliance costs

Our analysis suggests that, on average, contracting authorities have experienced only a small increase in the purchasing costs of vehicles.

- Our analysis of the CO₂ emissions reductions achieved for passenger cars and vans (5.5% improvement in fleet average emissions for passenger cars, 2.3% improvement for vans) indicates that this will only have required a 1.7% additional capital investment in passenger cars and 1.0% additional investment in vans.
- For air pollutant emissions, the maximum impact is also small and associated with a very small proportion of contracting authorities buying vehicles with higher EURO standards than were obligatory at the time.

With respect to costs of improving CO₂ performance the information provided by contracting authorities is not sufficient to determine which vehicle models might have been procured without the Directive, or whether the Directive has had a material effect on the fuels and powertrains chosen by contracting authorities. As a result, we have taken the approach of “back-solving” the additional capital costs required in order to achieve the estimated improvement of CO₂ performance.

With respect to costs of improving air pollutant emissions, the procurer survey results suggest that at maximum, the impact of the Directive was for 1% of contracting authorities to impose EURO 6/VI or at a time when only EURO 5/V was obligatory. Furthermore, on average this happened just six months before EURO 6/VI became obligatory and, therefore, the number of vehicle procurements affected was very small. We have taken the approach of multiplying the number of “extra” EURO 6/VI vehicles procured by the cost differential between EURO 6/VI and EURO 5/V vehicles.

Costs of purchase of cleaner vehicles

As a rule, more energy-efficient vehicles cost more to purchase than less energy-efficient vehicles of a similar size, and very energy-efficiency vehicles are very expensive.

In certain cases, contracting authorities reported paying up to three times higher purchase prices for CNG or electric vehicles (see Table 6-9:) Examples of green procurement bids extracted from the Clean Fleets project website suggest that moving to cleaner vehicle types (electric/CNG) has typically led to significantly higher purchase prices, without taking into account the additional costs for charging infrastructure. However, as already indicated

such purchase decisions are often part of a broader environmental/energy efficiency strategy of the relevant authorities or organisation. In some occasions they were also partly-funded by relevant national or regional energy efficiency support programmes, typically through the provision of subsidies. Furthermore, our interviews with procurers revealed that over one third of interviewees (37.5% - 6 out of 16 interviewees) stated that environmental criteria had no material impact on their purchase costs, whereas only slightly less (5 out of 16) stated that there was a slight increase in costs.

Table 6-9: Selected examples of green vehicles procurement and related purchase prices

Procurement authority (Country)	Vehicle type	Type of powertrain procured	Purchase price difference
Municipal authority of Ghent (BE)	Passenger cars	Electric and CNG vehicles	Three times higher for electric vehicles in comparison to previous purchases ²⁹ ; Additional EUR 5,000 for CNG vehicles
City of Vienna transport operator -Wienna Linien (AT)	Microbuses	Electric buses	Two times higher than comparable diesel buses & charging infrastructure
Reading transport operator (UK)	Buses	CNG	20% higher than conventional diesel bus
City of Stockholm covering 296 organisations (SE)	Passenger cars and transport vehicles	Electric	Two times higher than comparable petrol driven vehicles

Source: <http://www.clean-fleets.eu>

However, it is also the case that contracting authorities could have realised modest CO₂ benefits through procurement of more efficient vehicles using conventional fuels and powertrains.

Taking into account the above picture, we estimated the overall capital (purchase) costs for the contracting authorities. To estimate the cost increase associated with improvements in CO₂ emissions, we used available data on the price and CO₂ performance differences between standard and more-fuel-efficient variants of particular models of vehicle. Table 6-10 includes examples of specific vehicle models and respective eco-variants.

Table 6-10 : Purchase cost difference and CO₂ performance improvement for eco-variants of various types of vehicles

Vehicle segment	Standard vehicle model	Eco variant	% increase in purchase cost	% improvement in CO ₂ performance	Elasticity of purchase cost with respect to CO ₂ performance
Passenger cars	Opel Corsa 1.4 Color Edition	Opel Corsa 1.0 Ecotec Turbo ecoFLEX Start/Stop Color Edition	11%	16%	0.67

²⁹ We should note that the indicated price difference seems high, given what we know about the market pricing for electric vans.

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

Vehicle segment	Standard vehicle model	Eco variant	% increase in purchase cost	% improvement in CO ₂ performance	Elasticity of purchase cost with respect to CO ₂ performance
	Volkswagen Club Up	Volkswagen Club Up Bluemotion Technology	3%	10%	0.33
	Ford Fiesta 1.0 SYNC Edition	Ford Fiesta 1.0 Ecoboost Start-Stop SYNC Edition	3%	6%	0.50
	Ford Focus 1.6 TI-VCT Trend	Ford Focus 1.0 Ecoboost 99G Start-Stop-System Trend	8%	27%	0.31
	Ford Focus 1.6 TI-VCT Trend	Ford Focus 1.0 Ecoboost Start-Stop-System Trend	6%	23%	0.28
	VW Golf 1.6 TDI Bluemotion Comfortline	VW Golf 1.6 TDI Bluemotion Technology Comfortline	3%	10%	0.27
Vans	VW Crafter 30 BITDI	VW Crafter 30 BITDI BMT	2%	8%	0.21
	Mercedes 210 BLUETEC Sprinter 906.611	Mercedes 210 BLUETEC Sprinter 906.611 BLUEEFFICIE NCY	4%	5%	0.80
	Ford Transit Custom 290 L1H2 LKW VA BASIS	Ford Transit Custom 290 L2H1 LKW VA ECONETIC	3%	7%	0.45

Source: Ricardo Energy & Environment analysis of CO₂ figures and pre-tax purchase prices quoted on <http://www.autozeitung.de/>

Taking the median elasticities (in order to remove the effects of outliers), we estimate that for each 1% reduction in car CO₂, purchase prices increase by 0.31%, and for each 1% reduction in van CO₂, purchase prices increase by 0.45%.

There is no standard value for the cost of a 1% improvement in CO₂. As the table above indicates, a 1% CO₂ improvement might be achieved relatively cheaply or relatively more expensively depending on which models are being substituted. The range of elasticities of the purchase price to CO₂ performance would be even larger (i.e. include even higher premia for CO₂ reductions) if we considered switches from conventionally-fuelled vehicles to alternatively-fuelled vehicles. But as contracting authorities are generally under pressure to minimise capital costs, it is reasonable to assume that the cost increases they incur are closer to the low end of the range of possible values³⁰.

³⁰ We have not used the absolute *minimum* elasticity in each vehicle class because authorities will often be faced with a limited set of eco-model options, and therefore the median eco-model elasticity is more appropriate

Combining our elasticities of purchase cost to CO₂ improvements with our assumed average CO₂ improvements of 5.5% for cars and 2.3% for vans, we estimate an average increase in car purchase costs of 1.7% and an average increase in van purchase costs of 1.0%. For passenger cars, this has meant additional capital costs in the range of €28.3M to €401.2M over 2012-2014 (€9.4M to €133.7M per annum). In the case of vans, it has meant additional capital costs of €4.9 million – €20.7 million over the period 2012-2014 (€1.6 million – €6.9 million per annum).

In order to estimate the cost increase associated with early adoption of EURO standards, we made use of previous studies' estimates of the additional cost to OEMs per vehicle of producing EURO 6/VI versus EURO 5/V vehicles. These estimates are provided in Table 6-11.

Table 6-11 : Additional costs of producing EURO 6/VI versus EURO 5/V vehicles

Vehicle type	Additional €s per vehicle of EURO 6 / VI
Passenger cars – petrol	70
Passenger cars – diesel	600
Vans – petrol	70
Vans - diesel	800
Heavy duty vehicles - diesel	4,000

Sources: Heavy duty vehicle from (European Commission 2007a), light duty petrol vehicles from (European Commission 2006b), light duty diesel vehicles from (ICCT 2012)

Note: Costs are presented in 2015 price base, to one significant figure.

Although these figures are based on the best publically available data, they suffer from two limitations. Firstly, the EURO VI figure for heavy duty vehicles and the EURO 6 figure for light duty petrol vehicles is based on an ex-ante assessment rather than ex-post measurement. Secondly, all of these figures are based on declared information (mostly from manufacturers) on the costs of components and are therefore not necessarily reflective of the price increases ultimately paid by consumers. These figures ultimately imply additional capital expenditure by contracting authorities of €0.52 - €1.42 million on rigid trucks and buses over 2012-2014 inclusive, and additional capital expenditure by contracting authorities on cars and vans of €0.1 million - €0.9 million over the same period.

Turning to the **compliance costs for suppliers of vehicles**, a rather significant 29% (11 out of 38) of the respondents to the suppliers' survey referred to additional manufacturing costs arising as a result of the CVD. However, most of them did not provide specific information on the type of costs associated. Only two of them referred to specific product design activities intended to improve efficiency that could be directly linked to the CVD.

At the same time, the respondents to the suppliers' survey indicated that public procurement criteria do not represent a key driver in their decision to invest in clean and/or energy efficient vehicles, even though they are still considered relevant. Other parameters, including the Euro emission standards or fuel/energy costs, do have a more important role.

In the case of heavy duty vehicles, one manufacturer stated that developments such as the CVD had prompted it to introduce a hybrid powertrain option to their truck fleet. However, in general, the feedback provided suggests that such decisions are strategic decisions and should not be considered as a direct result of the CVD. Overall we consider that, since the CVD does not impose specific requirements and most procurers tend to use standard criteria, it is reasonable to conclude that the compliance costs for suppliers of vehicles directly linked with the Directive are very close to zero.

6.7.2.2. Administrative costs

In terms of the costs of **monitoring and enforcement for Member States**, there are currently no specific requirements or obligations. As such, the respective

monitoring/enforcement costs can be considered as zero (or close to zero). For the Commission services, there is an obligation to prepare biannual monitoring reports.

Turning to the **administrative costs for contracting authorities**, a possible determinant of the time and resources required is the procurement option used by the contracting authorities. Comments from some stakeholders suggest that the monetisation Option (2b) is more time consuming although, the interviews with 16 procurers suggest that in practice, there are no significant differences in terms of administrative time per contract (see Annex 5). Furthermore, as already indicated, less than 13% of authorities have used the monetisation method in a procurement contract since the start of 2012. Most often authorities have opted for the less demanding approach of setting minimum standards (Option 1 - 40% of respondents) or considering environmental impacts as award criteria (Option 2a - 30% of respondents). In both cases, besides the possible one-off/adaptation costs to establish the new procedures (or update the criteria), the level of effort required is limited.

The administrative costs may also vary depending on the type of vehicle procured and the presence, or not, of standard criteria (e.g. EURO V/VI) that can be used by contracting authorities. In the case of trucks and special purpose vehicles, such criteria do not exist and authorities often establish their criteria, taking into account the requirements of the CVD. In such case, the additional time required may be higher. Specific examples were provided of authorities that went through an initial pre-trial period with the testing of existing vehicles on the market before determining the purchase criteria. However, these are rather few cases of large cities across the EU with sizeable fleets.

In an earlier attempt to estimate the total costs, a study by the Department of Transport (DfT) in the UK³¹ in 2011 estimated that authorities could need up to 10% additional staff time for the first five years and 5% thereafter, as a result of the need to consider the requirements and for applying one of the possible methods of taking environmental impacts into account. These included 5% additional staff time one-off costs for establishing the new procedures during an initial adaptation period, and 5% additional staff time for implementing the procedures. That brought the total costs for the UK authorities to around £0.3 million on an annual basis (around EUR 0.4 million in current prices).

Our own survey and interviews (16 written responses in total) with contracting authorities across the EU suggest that the additional staff time required per contract is in the range of 0 to 4 hours per contract^[1] - with a most common value around 3 hours - due to the need for more detailed contract specifications and the need for more intensive/frequent discussions with suppliers to get all data required. On the basis of the estimated total number of public procurement contract per year in the range of 2,000 - 17,000^[1], and an average hourly labour cost in the public administration of around 20.5 Euros^[2], the administrative costs associated with the CVD are estimated in the range of €0.1m - €1.1m per year (€0.4m-€3.2m for the period 2012-2014).

In terms of the **administrative costs for manufacturers/suppliers of vehicles**, specific estimates on the additional time and resources required were not made available. The qualitative input provided suggest a mixed picture. 12 of the 38 respondents to the survey (31%) indicated they incurred costs related to obtaining information, including costs of test procedures on non-type-approved vehicles to establish their emissions impacts. One respondent referred to a one-off expenditure of EUR 20,000 for measure the fuel consumption of 20 waste collection vehicles in the context of a specific procurement

³¹ DfT impact assessment

^[1] Calculated on the basis of our estimated total number of vehicles procured, divided by the average number of vehicles procured in each contract (27) according to the input from the procurer survey.

^[2] Total hourly labour costs in public administration, Eurostat, 2014 – Labour cost survey

contract for a German city. Thus, in the case of special purpose vehicles, the absence of defined fuel economy/emission test cycles means that suppliers may face relatively significant administrative costs in order to be involved in procurement bids. Another supplier referred to the need for data collection or staff training to familiarise themselves with the new requirements but did not provide any cost estimates.

However, whenever authorities used the minimum standards or award criteria approach (which according to the procurers' survey represents more than 85% of the cases), the required information is easily available and the additional administrative costs are very close to zero. The monetisation approach is more demanding – since additional information is required to support the relevant calculations – and vehicle suppliers often have to spend additional time to collect this information and fill in the relevant forms.

Overall, in the absence of other data sources we consider it reasonable to assume that the typical additional time spent to provide the information required does not exceed 1 hour per individual bid. On that basis, given the total number of contracts (2,000-17,000), an estimated 4 bids per contract³² and an average hourly labour costs of €17³³, we can provide a rough estimate of total costs for all suppliers involved in the range of €0.1 - €1.2 million on an annual basis (€0.4-€3.6 million over the period 2012-2014).

6.7.3. Benefits associated with the CVD

The main possible benefits expected from the introduction of the CVD include:

- Reductions in CO₂ and air pollutant emissions (benefits to society);
- Reduction in operating costs (mainly in the form of energy /fuel savings) for the procurement authorities and transport operators; and
- Benefits to suppliers and manufacturers of vehicles.

As there are many more publically procured cars than vans and as the CO₂ improvement for this segment has been greater, passenger cars account for a majority of these benefits.

On the basis of the data available we have estimated a maximum level of 5.5% improvement in the energy efficiency and CO₂ performance of passenger cars and a maximum 2.3% improvement in the energy efficiency and CO₂ performance of vans. Such figures are largely in line with the feedback from the interviews with procurers, most of which pointed to no material changes in running costs. As already indicated, in the case of heavy-duty vehicles, the CO₂ and energy cost impacts are most probably closer to zero, due to lack of necessary data for most contracting authorities to be able to make effective comparisons between these vehicles.

We have quantified the energy cost savings benefits by calculating the litres of fuel saved in cases where these improvements imply, and then multiplying by the EU average pre-tax costs of (petrol and diesel) fuel. Monetised CO₂ benefits can then be calculated by multiplying the tonnes of CO₂ saved by a CO₂ emissions cost factor taken from the EU's 2014 handbook on external costs of transport (Ricardo-AEA, TRT et al. 2014). The magnitude of the CO₂ emissions benefits is roughly 25% of the magnitude of the energy cost benefits.

Pollutant emissions benefits have been realised as a result of the Directive encouraging the early adoption of EURO standards among a very small proportion (1%) of procurers. On the other hand, in the case of a possible contribution to increased dieselisation examined in Section 6.4 there are possible adverse effects, leading to a total increase of

³² We assume 4 bids per contract on the basis of a general study of public procurement in Europe by PWC (PWC, 2011). While this study did not isolate procurement of road transport vehicles in particular, it found that procurement actions for machinery or manufactured goods typically elicited 3-5 offers, with the mean value for manufactured goods being 4 bids.

³³ Total hourly labour costs for the business economy, Eurostat, 2014 – Labour cost survey

pollutant emissions and respective increase in costs. The per-vehicle benefits of this early adoption of EURO standards are much higher for buses and rigid trucks, as they have higher lifetime mileages and higher per-km air pollutant emissions than light duty vehicles.

In terms of the benefits to manufacturers, to the extent that procurers have incurred a slight increase in purchase costs per vehicle the CVD could have had a slight positive effect on manufacturer revenue from the public sector. However, manufacturers also face increased costs when manufacturing vehicles with lower CO₂ emissions and air pollutant emissions, and it is not clear whether the additional costs will have outweighed additional revenues, or vice versa. (IW Köln 2013) claim that due to competitive pressures, on average manufacturers are only passing through additional costs from fuel saving technologies to a limited extent. It is thus conceivable that despite higher revenues, manufacturers' margins remain unaffected or are even reduced. Our central estimate is that, overall, the benefits to manufacturers are close to zero.

Table 6-12 summarises our estimates of the costs and benefits associated with the implementation of the CVD for the period 2012-2014. They include the administrative and compliance costs for authorities and suppliers of vehicles and the benefits – in terms of reduction of operational costs for authorities and the total costs of transport in terms of CO₂ and pollutant emissions. We also present the figures in the case of the alternative dieselisation scenario presented earlier where the expected increase in pollutant emissions leads also to cost increases.

Table 6-12 – Estimated costs and benefits of the implementation of the CVD³⁴ during the period 2012-2014

	Passenger cars	Vans	Rigid trucks	Buses	All vehicles
Total vehicles bought under the policy (thousands)	86 to 1215	29 to 121	32 to 35	12 to 53	158 to 1424
Costs (in million €)					
(1) Administrative costs for authorities	0.2 to 2.8 *	0.1 to 0.3 *	0.07 to 0.08 *	0.03 to 0.12 *	0.4 to 3.2
(2) Compliance costs for authorities (additional capital expenditure)	28.4 to 402.1	4.9 to 20.7	0.27 to 0.30	0.25 to 1.12	33.8 to 424.2
(3) Administrative costs for suppliers	0.2 to 3.1 *	0.1 to 0.3 *	0.08 to 0.09 *	0.03 to 0.13 *	0.4 to 3.6
(4) Compliance costs for suppliers	Est. close to zero	Est. close to zero	Est. close to zero	Est. close to zero	Est. close to zero
(5) Total costs (1)+(2)+(3)+(4)	28.8 to 408.0	5.1 to 21.3	0.4 to 0.5	0.3 to 1.4	34.6 to 431.0
Benefits (in million €)					
(6) Operating costs savings	26.2 to 370.7	5.3 to 22.5	Est. close to zero	Est. close to zero	31.5 to 393.2
(7) CO ₂ emissions costs savings	8.2 to 116.7	1.7 to 7.0	Est. close to zero	Est. close to zero	9.9 to 123.8
(8a) Pollutant emissions costs savings (no dieselisation)	No effect	0.01 to 0.02	0.40 to 0.43	0.74 to 3.28	1.2 to 3.7
(8b) Pollutant emissions costs savings (with dieselisation)	-2.2 to -31.8	0.01 to 0.02	0.40 to 0.43	0.74 to 3.28	-1.1 to -28.1
(9a) Total benefits (6)+(7)+(8a)	34.4 to 487.8	7.0 to 29.5	0.40 to 0.43	0.74 to 3.28	42.6 to 521.0
(9b) Total benefits with dieselisation	32.2 to 456.0	7.0 to 29.5	0.40 to 0.43	0.74 to 3.28	40.4 to 489.2
Net benefit (9)-(5)	5.6 to 79.6	1.9 to 8.2	-0.02 to -0.03	0.4 to 1.9	8.0 to 89.6
Net benefit (with dieselisation)	3.4 to 47.7	1.9 to 8.2	-0.02 to -0.03	0.4 to 1.9	5.7 to 57.8
Benefit : cost ratio (9)/(5)	1.2	1.4	0.9	2.4	1.2
Benefit : cost ratio (with dieselisation)	1.1	1.4	0.9	2.4	1.1

Source: Own elaboration on the basis of data analysis

* Calculated from total assuming administrative costs are proportional to the number of vehicles bought

³⁴ All costs and benefits are subject to a 4% discount rate after 2015. Costs and benefits are assessed from the date the policy took effect (assumed to be 2012, when most Member States transposed the legislation) until all vehicles purchased under the policy to end of 2015 are scrapped (in the early 2030s).

6.7.4. Conclusions on the efficiency of the CVD

On the basis of the above analysis, the overall level of efficiency of the CVD is rather low, with the possible exception of the bus segment where the expected savings from pollutant emissions are rather sizeable. In the case of rigid trucks, our estimates suggest that the costs are greater than the benefits.

In terms of the administrative costs to industry and contracting authorities, these are estimated to have been rather moderate (no more than € 6.8 in the case of upper bound scenario for the period 2012-2014; 2.3 million on an annual basis) and proportional to the estimated operating and overall benefits.

The introduction of the dieselisation scenario – while it leads to costs from an increase in the total pollutant emissions – does not significantly affect the overall level of efficiency that remains generally positive.

Focusing on the public authorities, operating costs savings do not appear to cover the increased capital expenditure associated with cleaner vehicles. Since only a small share of public procurement contracts use the monetisation option, the operating cost savings associated with the CVD are limited. However, due to its perceived complexity and additional information requirements, the adoption of the monetisation at a broader scale could lead to increased administrative costs that could possibly offset some of the additional cost savings. However, these figures should be treated with caution given the uncertainty and the difficulty to directly link both the costs and the benefits with the CVD.

In relation to suppliers and manufacturers, both the costs and benefits directly arising from the implementation of the CVD are estimated to be limited. The estimated administrative costs per contract are very small and compliance costs also appear to be limited, since the requirements set by authorities refer to vehicles that are already available in the market. Costs for meeting these standards are related to other pieces of legislation (CO₂ Regulation, EURO Emission Standards, Car Labelling Directive etc.). Any benefits, if at all, appear to be marginal.

We do need to note that, given the absence of detailed data and the important assumptions made in order to estimate costs and benefits, all quantitative assessment and comparisons must be treated as indicative and with a certain level of caution. Nonetheless, the qualitative input available from various stakeholders clearly supports the general conclusion that both the benefits and the costs associated with the CVD are small.

6.8. Efficiency: Could the effects have been achieved in a more efficient way (e.g. through other or additional (legislative) measures)? (Q7)

6.8.1. Approach to answering the evaluation question

Whereas the previous question on efficiency aimed to identify the costs and benefits of the CVD for different stakeholders, the aim of this question is to evaluate whether the effects of the Directive could have been achieved more efficiently. This covers both of the following:

- Whether the same effects could have been achieved with fewer costs; and
- Whether there could have been more effects with the same level of costs.

The approach that was taken with respect to answering this evaluation question was largely qualitative and drew on evidence with respect to other legislative and non-legislative measures covered elsewhere in the report. In this respect the following were important:

- Other policies in place at the EU and national levels, as evaluated for question 10 on coherence (see Section 6.11).

- Member States' supporting actions, as discussed in Section 5 and presented in Annex 8.
- The assessment of the complementary actions (see Annex 10).
- Responses of EU level stakeholders (Annex 2).

The review of this information is presented in Section 6.8.2. Additionally, within the evaluation, a number of specific additional actions were explored, i.e.:

- The potential to expand the scope of the Directive, or to introduce another initiative, to stimulate clean vehicle procurement by private fleets.
- The potential to introduce monitoring and reporting requirements for Member States relating to the Directive.
- The potential for joint procurement, particularly cross-border joint procurement, as a result of its theoretical potential to reduce costs.

These potential additional elements are discussed in Section 6.8.3.

6.8.2. Review of other or additional legislative initiatives

The first part of the exploration of whether the same effects might have been achieved with fewer costs assesses the extent to which similar impacts, in terms of increasing the market share for clean vehicles, could have been achieved with other measures. As is clear from the evaluation of coherence in Section 6.11, the CVD is one of many different pieces of legislation that aim to contribute to achieving similar objectives in relation to improving air quality and to reducing CO₂ emissions and energy use. However, it would be wrong on this basis to conclude that the CVD was not needed, as the evaluation of coherence concluded that the CVD was largely coherent with, and so broadly complementary to, the other legislation in place (see Section 6.11).

For cars, there are a number of demand-side instruments, including the CVD, which work with the supply-side passenger car CO₂ Regulation. Of these, the fuel efficiency labelling Directive and national taxation measures directly target potential purchasers of new cars. However, purchase costs of such vehicles remain high, as the taxation measures are usually not sufficient to make new vehicle technologies competitive with existing mass market technologies. In order to address this, strong fiscal measures, e.g. incentives or taxes (either at the Member State or the EU level), are often introduced to make new technologies competitive. However, such measures are either financially expensive or politically difficult, and so are usually not applied to the levels and extent necessary to make new technologies competitive. Hence, requiring the public procurement of clean vehicles, as the CVD is intended to do, is an alternative, more politically-feasible and less costly means of increasing the market for new technologies in cars and thus reducing production costs and prices. For heavy duty vehicles, the CVD is potentially more important in stimulating the demand for cleaner vehicle technologies, as there is currently no EU-level, supply-side legislation to require the development of such vehicles.

It should also be noted in this respect that the public procurement of 'greener' products is considered to have wider benefits than simply increasing the market share of such products. Green public procurement is considered to be an appropriate policy measure where there are barriers to the wider uptake of greener products, as discussed in Section 6.3.2. Given the potential benefits of the use of clean vehicles from the perspective of the environment, but also as a result of their potentially lower total cost of ownership (as discussed in Sections 6.2.2 and 6.2.3), coupled with their low uptake, there are wider benefits that are difficult to quantify that arise from stimulating the public procurement of clean vehicles.

An alternative to EU or Member State legislation might have been to implement an initiative at the European level, such as those discussed in Annex 3, instead of the Directive. However, it is clear from the discussion in that Annex, and also that of Section 6.10, that while such initiatives can support the implementation of the Directive, they are unlikely to have as wide a reach as a legislative measure. Hence, it is unlikely that a Commission initiative could have achieved the effects of the Directive with fewer costs.

The EU-level stakeholders that were interviewed for this evaluation had few views on whether the Directive could have been implemented more efficiently. However, it was suggested that a Directive that had a real obligation, i.e. a Directive that did not allow for business-as-usual in many cases, or one that was designed in a simpler manner, could have been more effective, and thus efficient (see Annex 2). The inclusion of a simpler approach in the Directive was a recommendation of the Clean Fleets project, which produced its final recommendations at about the same time as this evaluation was being concluded. The project proposed that a standardised definition of a clean vehicle be introduced, with a defined minimum level of performance. It was argued that this would (Clean Fleets 2015):

- Make it clear that meaningful environmental improvement was achieved;
- Be easy to use;
- Provide a focus for the market beyond the public sector (as the public sector has a relatively small share of the many vehicle markets; see Table 6-3 in Section 6.4);
- Be easy to communicate, thus addressing the perceived complexity of the current Directive (see Section 6.4.1).

The recommendations noted that such definitions must be ambitious, in order that real immediate improvement is achieved, and progressively tightened over time, in order to remain relevant and to act as a market driver. It was also recommended that, in order to ensure that the Directive stimulated the uptake of technologies other than fuel-efficient diesel vehicles, that an 'advanced clean vehicle' should be defined and that a target for the minimum proportion of such 'advanced clean vehicles' should be set for public fleets by a fixed date.

6.8.3. Review of potential additional initiatives covered within the evaluation

The first potential addition to the Directive that was addressed directly within the evaluation was the potential to **expand the scope of the Directive, or to introduce an additional initiative, to the procurement of vehicles by private fleets**. This was explored with stakeholders within the evaluation. Several stakeholders argued that it would be a potentially useful approach to extend the Directive to some private fleets, as many of these were large and so extending the Directive to these would increase the number of vehicles covered. It was also noted that such fleets had a responsibility to reduce the environmental impacts of their operations. However, it was recognised by many stakeholders that there were practical challenges to expanding the Directive to private fleets, not least as such fleets were different to public fleets and so any relevant provisions would need to be well thought through. It was also argued that large fleets would already take account of vehicle performance in the course of their purchase decisions and so legislation in this area was not needed. Instead of expanding the scope of the Directive, other stakeholders argued that the focus should be on improving the current CVD in the first instance (see Annex 4).

At the stakeholder workshop, it was noted that the trend is towards cities owning fewer and fewer vehicles and instead procuring services that rely on private fleets. Hence, if consideration was to be given to expanding the scope of the Directive, it could be expanded to all services that are procured by cities that have a significant transport element (see Annex 3). The final recommendations of the Clean Fleets project proposed a similar extension to the scope of the Directive, i.e. to "all operators of public services which involve

the use of vehicles as a major component of the contract”, as well as to those companies sub-contracted by the main contractor (Clean Fleets 2015).

A more comprehensive assessment was undertaken to identify the **potential to introduce monitoring and reporting requirements for Member States** relating to the Directive (see Annex 13). There were conflicting views on the adequacy of the existing reporting requirements, as most stakeholders and some Member States believed that these were inadequate, although some Member States disagreed. The main issue raised in relation to additional reporting requirements, both by those who thought the existing requirements were and were not adequate, was how more reporting requirements would be delivered in practice in a proportionate way. If reporting requirements were too prescriptive, there is clearly a risk that the administrative costs would increase significantly. On the other hand, more monitoring on the part of Member States would provide more information on the application and impacts of the Directive in order to inform evaluations such as this and, subsequently, potential revisions to the Directive. Consequently, at least in the short-term, it would be useful for Member States to report on the application and impacts of the Directive in a manner that is sufficiently consistent for comparisons to be made between Member States, but sufficiently flexible that it does not impose excessive administrative burden on Member States. In this respect, the Commission could consider developing a template for the reporting of the CVD as part of the reporting requirements of either the public procurement Directives or the alternative fuels infrastructure Directive. However, in either case, the use of the template by Member States would be voluntary, and so each national authority could be left to decide whether or not to report on the impacts of the CVD using this format. Such an approach is likely to deliver more consistent, comparable and complete information than a less prescriptive approach.

There has been interest in **joint procurement** as a result of its perceived potential to reduce costs, and therefore increase the efficiency of public procurement. While joint procurement was not mentioned in the Directive itself, the Clean Vehicle Portal included provisions to facilitate joint procurement, which was not the first time that an EU initiative had considered joint procurement as a potential way of reducing the costs of procuring clean vehicles and, in the longer-term, also of reducing administrative costs. According to available information about the PROCURA and COMPRO projects, which finished in 2008 and 2009 respectively, both had initially aimed to further cross-border, joint procurement, but neither was eventually successful in this respect. The COMPRO project reported upon two successful examples of joint procurement for transport, but both were within countries and neither involved road transport vehicles. Two of the case studies developed within the Clean Fleets project focus on joint procurement, but again within a particular country, rather than cross-border procurement (see Annex 11). For the work undertaken for this evaluation, we were unable to identify many activities on cross-border procurement, apart from an ongoing attempt to set up common procurement for hydrogen buses and an initiative launched by the city of Paris to procure electric buses and refuse collection vehicles with other major European cities (City of Paris 2015).

The original Clean Vehicle Portal had a forum with the aim of bringing together users for the purpose of joint procurement, but this was not well used. The revised version of the Portal, which will go live in the second half of 2015, will include functionality and more information to encourage joint procurement. Within the Clean Fleets project, joint procurement has not been a main focus of the project, as potential users ranked other issues of higher importance in the project’s initial user needs assessment (see Annex 11).

No EU level stakeholder that was interviewed for this evaluation was aware of any innovative or joint procurement activities that had been implemented as a result of the CVD. Several noted joint procurement was difficult and mentioned issues that were raised by the final report of the COMPRO project in 2009, including different legal and cultural environments within countries. COMPRO called for the exploration of different financial instruments, such as the EIB’s Elena (European Local ENergy Assistance) facility, as well

as continued support from the Commission for common procurement in order to overcome the barriers. At the meetings with Member States and stakeholders that were held as part of this evaluation, few had any views on joint procurement, although those that did noted similar challenges to those mentioned already. A stakeholder noted that support from the Commission was important, such as that currently being provided under the Public Procurement Innovation instrument, while another suggested that rather than full cross-border procurements, joint expressions might be sufficient (see Annex 3).

6.8.4. Conclusion on whether the effects could have been achieved more efficiently

It was not possible to identify an alternative, politically-feasible approach that might have delivered the desired effects of the Directive with fewer costs. While fiscal incentives or taxation measures could help to stimulate the market for clean vehicles, the former would increase costs, while the latter are often politically difficult. Hence, the CVD, in targeting public sector procurement, is an efficient instrument compared to the potential legislative alternatives. While some of the EU's complementary initiatives do focus on public procurement, such as the Clean Vehicle Portal, Clean Fleets and GP 2020, it is difficult to foresee that such initiatives would be able to reach as many organisations as the Directive does. It should also be noted that using public procurement as a means of increasing the market share of clean vehicles delivers wider benefits that are both difficult to quantify, and which would not be delivered to the same extent by other measures.

It was proposed that making the Directive simpler would make it more efficient, as the impacts could increase as the costs reduce, e.g. by defining what is meant by a 'clean vehicle'. This approach would also address some of the issues mentioned in previous questions with respect to the lack of clarity as to the types of vehicles for which the Directive is aiming to stimulate the market.

Overall, it might be concluded that extending the scope of the Directive to private fleets could increase the impacts of the Directive, although it would be important to identify the extent to which this would bring added value compared to existing practices within the industry. If the purchase of 'clean vehicles' is standard, or at least widely undertaken in large fleets, the impacts of expanding the scope of the Directive to such fleets could be minimal, and not worth the additional costs. The extension of the scope of the Directive to a wider selection of contracts procured by public authorities, i.e. to those in which the use of vehicles is a major component, could be considered. Again, though, it would be worth identifying the extent of the potential in this respect, and also to examine the legal and practical issues associated with the definition and operation of the relevant contracts, e.g. how to 'define' a major component, the extent to which such an approach would deliver change or just a shuffling of vehicles between contracts.

The introduction of reporting requirements on Member States needs to balance the potential significant additional administrative burden on Member States from too prescriptive requirements with the need to understand the application and impacts of the Directive in order to inform the future direction of the policy. Hence, an appropriate way forward to deliver consistent, comparable and complete information could be for the Commission to develop a template for voluntary reporting under the CVD, which will be incorporated as part of the reporting requirements of either the public procurement Directives or the Alternative Fuels Infrastructure Directive. This would provide a framework for Member States to use, if they wish to, but would increase the chances of any information that is received being consistent, comparable and complete.

With respect to joint, cross-border procurement, the practical challenges, not least different legal and cultural environments in different Member States, still appear to provide a barrier to such procurement, even though in the longer-term such procurement could lead to reduced vehicle purchase costs and in the longer-term reduced administrative costs. Additionally, there are financial barriers to the procurement of clean vehicles, which might be overcome through the use of different financing mechanisms, such as those of the EIB. Consequently, it might be beneficial for the Commission to further explore the

extent to which the short-term barriers to cross-border joint procurement might be overcome through the use of different finance measures, perhaps via the EIB.

6.9. European Added Value: Would it have been possible to obtain similar or better results in terms of the market share of clean vehicles without EU intervention, i.e. the Clean Vehicles Directive? (Q8)

6.9.1. Approach to answering the evaluation question

This question seeks to determine whether the results of the CVD could be achieved (similar or better) without EU intervention (i.e. the CVD).

The approach taken to answering this evaluation question was largely qualitative and drew on evidence from:

- Surveys and interviews with procurers;
- Responses of EU-level stakeholders; and
- Member State Fiches, in particular information on supporting actions.

6.9.2. Evidence on achieving similar or better results with EU-level action

As has already been identified in the first question on effectiveness (Section 6.2), the impacts of the CVD have been found to be limited in terms of increasing the market share of clean vehicles and of decreasing CO₂ and pollutant emissions. This suggests that it is likely that similar results would have been achieved without taking action at the EU level, i.e. by not introducing the CVD.

It was identified that 45% of procurers responding to our survey (Annex 4) had procured road transport vehicles since the start of 2012 where the requirements of the CVD were applied, indicating that they were introduced to the concept of operational lifetime energy and environmental impacts in procurement. However, it was also identified that in many cases procurers had been applying environmental criteria in some form prior to the introduction of the CVD. Some Member States and cities stated that existing green public procurement policies for vehicles were likely to be unaffected by the Directive's existence or its potential repeal (see Annex 2). When interviewed, procurers stated that in most cases the same types of vehicles were being purchased as before (see Annex 5). Manufacturers also indicated that they thought there had been very little effect on the choices of fuels and power trains, fuel consumption, or prevailing Euro Standards, and that other factors are more likely to affect vehicle purchase choice over time, such as the adoption of Euro Emission Standards, LDV CO₂ Regulations or market trends more generally (interviews in Annex 6). This evidence supports our assessment that similar results would have been achieved without the CVD.

In the limited cases where environmental criteria were not commonly used prior to the introduction of the CVD, awareness of these issues may have been increased. However, whilst addressing the needs of the Directive to increase awareness, there is no evidence to suggest that this increased awareness has led to the achievement of any of the general, operational or specific objectives of the Directive. Interviews with procurers support this as those procurers who did not apply environmental criteria prior to the introduction of CVD stated that they also did not feel that there was a significant change in the types of vehicles being procured (Annex 5).

It was also considered whether the introduction of the CVD was likely to have had greater impacts in some Member States compared to others, due to the differences in the level of use of environmental criteria prior to the introduction of the CVD. However, the analysis of procurer survey results could not support this theory, as there was no clear divide in terms of respondents who stated that they did or did not apply environmental criteria prior

to the introduction of the CVD and the Member State that they came from. As the application of environmental criteria in procurement decisions was voluntary prior to the introduction of the CVD, it is therefore likely that their use by procurers was determined/promoted by the organisation rather than the Member State.

Few EU-level stakeholders interviewed had any views as to whether it would have been possible to obtain similar or better results without the Directive. Again, this was partly due to the perceived lack of results from the implementation of the Directive, which also indicates that it is likely that similar results would have been achieved without EU intervention.

A number of EU-level stakeholders noted that the Directive is part of a package of measures and as a result other measures could also be used to increase the market share of clean vehicles, such as improving the passenger car CO₂ Regulation and making it more stringent, tax incentives and more central government support to regional and local authorities, which could lead to the achievement of better results. It was also suggested that more effort should go into looking at how the purchase of clean vehicles might be supported financially, for example, with mechanisms set up by the European Investment Bank (EIB). However, a couple of stakeholders did underline the importance of the role that public procurement has to play in increasing the market share of clean vehicles.

Despite the evidence suggesting that similar results would have been achieved without the introduction of the CVD (i.e. no clear benefits), discussions with stakeholders revealed that they would prefer to retain the Directive.

Many stakeholders at the Member State and stakeholder meetings (Annexes 9 and 3) and participating in EU-level stakeholder interviews (Annex 2) were against a full repeal of the Directive. It was suggested by one that the Directive would become more useful in the years to come, as a wider range of vehicles that might be considered to be 'clean' come onto the market. It was also felt by stakeholders that repealing the Directive would give the wrong political message, and that the focus should instead be on making it more effective and ensuring that it delivers better results. As mentioned previously in this evaluation, the need to define what is meant by 'clean vehicle', and addressing issues with the effectiveness of the environmental criteria options will be pertinent in delivering better results.

Its retention is also justified as it is one of many measures that are part of a broader package of supply-side and demand-side policy tools to further develop the market of clean vehicles.

6.9.3. Conclusions on whether results could have been achieved without EU intervention

We expect that it is the case, supported by feedback from various stakeholders, that the Directive has had little impact in many countries (where similar approaches were already being used). However, elsewhere, where such practices had not been established, it is likely to have had more of an impact, although the evidence that we collated on this was not conclusive. The analysis of effectiveness suggests that there may have been some impacts, although these are likely to have been limited. Our assessment of EU added value therefore leads us to the conclusion that similar effects *could* have been achieved without the Directive.

However, despite the lack of clear benefits, stakeholders have stated a preference for retaining the Directive, although with improvements focussing on making it more effective and delivering better results.

6.10. European Added Value: To what extent have the Directive and the associated Commission initiatives initiated and/or supported a

recognised exchange of good practices between contracting authorities in different Member States? (Q9)

6.10.1. Approach to answering the evaluation question

The analysis undertaken to answer this question draws primarily on the assessment of the associated Commission initiatives (see Annex 11). This assessment focused on the two projects specified in the question, i.e. the Clean Vehicle Portal and the Clean Fleets project, and was based on a review of project literature and other outputs, as well as engagement with the respective lead contractors and selected project participants. In addition to these two projects, another three were identified and reviewed that were considered to have the potential to help with answering the necessary questions. These were: GPP 2020, which was an ongoing project and two older projects, PROCURA and COMPRO, which finished in 2008 and 2009, respectively. In addition, questions about the Clean Vehicle Portal and the Clean Fleets project were asked of various stakeholders in different sets of interviews that were undertaken for the purpose of the wider evaluation, including EU level stakeholders (see Annex 2), Member States (Annex 8) and procurers (Annex 4).

6.10.2. Evidence of the initiation or support of the exchange of good practices

The assessment of the complementary initiatives showed that the exchange of good practice on the public procurement of clean vehicles is one of the main elements of two projects that were ongoing at the time of writing: Clean Fleets and GPP 2020 (see Annex 11). The former focused on road transport vehicles; in an assessment of the needs of potential users that informed the activities of the project, the exchange of good practice was identified as an important focus. The good practice case studies on the Clean Fleets website have been downloaded over 6,300 times, while the presentations from the project's workshops, which also focused on the exchange of good practice, have been downloaded more than 8,500 times. Hence, there appears to be a demand for good practice examples.

This demand is also being met in the GPP 2020 project. While the project focuses on the procurement of a range of low carbon products, it covers low carbon vehicles and case studies of practical examples are an important feature of the project. Good practice examples were also being developed under the second phase of the Clean Vehicle Portal, which was also ongoing at the time of writing. It is also worth noting that both the Clean Fleets project and GPP 2020 are led by ICLEI, which has a procurement forum which enables users to discuss aspects of green procurement and on which information about these two projects was circulated³⁵. The final report of the PROCURA project has recommended the provision of information on best practice.

Outside of those who are involved in or who are aware of these projects, there was less awareness of any ongoing good practice exchange. Only two Member State representatives (from Poland and the UK) were aware of the Clean Fleets project, Poland had uploaded a guide from the project onto its national procurement website. The eventual inclusion of good practice examples on the Clean Vehicle Portal potentially has a wider reach, as things stand, as seven Member State representatives were aware of the Portal, and two (Poland and Slovakia) noted that it was used, respectively, in training events and by contracting authorities. In Poland, there was also awareness of another EU initiative, the TOPTEN project³⁶, as a result of the involvement in that project of a national organisation. Additionally, a couple of the procurers interviewed for the project made reference to the usefulness of case studies and being able to obtain information on different types of vehicle (see Annex 5). EU level stakeholders were generally unaware of either the Clean Fleets

³⁵ procurement-forum.eu

³⁶ This project focuses on providing 'top ten' EU and national lists for a range of products, including cars and LCVs, rated according to their environmental performance; see www.topten.eu

project or any related good practice exchange, while engagement with cities did not reveal any good practice exchange other than that which was undertaken as part of one of the projects (see Annex 2).

A number of Member States, including Latvia, Poland and Sweden, felt the need to include worked examples, and in some cases examples of bad practice, in guidance documents to support the implementation of the national legislation. The Netherlands is planning to develop such guidance. While not being 'good practice' as such, the development of such examples highlights that it was felt that there was a need to provide support to public authorities on the application of the Directive's provisions. Both Estonia and Poland mentioned that the provision of more information on good practice examples would be useful (see Annex 8).

6.10.3. Conclusion on the extent to which the Directive and the associated Commission initiatives have initiated and/or supported the exchange of good practice

It does appear that there is a demand for case studies and information on good practice generally with respect to the procurement of clean vehicles. From the evidence presented above, it can be concluded that some of the associated Commission initiatives have **supported** the exchange of good practice, while others have the potential to, once these elements of the respective projects have been further developed. As one of the aims of both the Clean Vehicle Portal and the Clean Fleets project was to complement the Directive, and as Article 8 of the Directive requires the Commission to "facilitate and structure the exchange of ... best practices", it might also be concluded that the Directive itself has supported such an exchange. In this respect, it is also worth noting that some of the Member States have included worked examples of the application of the evaluation criteria in guidance that has been developed to accompany the respective national legislation.

The extent to which these projects, and thus by implication the Directive, have **initiated** an exchange of good practice is more difficult to assess. For the purpose of differentiating between the terms 'support' and 'initiation', we assume that the former refers to exchange within the project and directly as a result of the Directive, while the latter refers to the exchange of good practice beyond the exchange that has been supported. No stakeholder was able to identify an exchange of good practice that was not associated with one of the projects discussed in this section, which suggests that the initiation of the exchange of good practice has not yet been achieved.

6.11. Coherence: How well does this legislation interact with other EU policies with similar objectives, in particular the general transport policy framework as laid down in the 2030 framework for climate and energy policies, the 2011 Transport White Paper, the conclusions from CARS2020, pollutant emissions limits (EURO standards for light and heavy duty vehicles) and CO₂ limits for cars, and the deployment of alternative fuel infrastructure? (Q10)

6.11.1. Approach to the evaluation question

The purpose of this evaluation question is to determine how well the CVD complements, and interacts with other EU policies/legislation with similar objectives. The general, specific and operational objectives of the CVD were outlined and discussed in Section 2.3 in the Intervention Logic (European Commission 2007). Overarching strategies; CO₂ legislation; infrastructure, fuel and energy carrier policies; end-of-life vehicle policies; and air quality and noise legislation have all been considered.

6.11.2. Assessment of how well CVD interacts with other policies/instruments

Table 6-13 provides an overview of how well the CVD interacts with other EU policies and instruments. Each of the relevant policies and instruments are described in more detail in Annex 14.

Table 6-13: Summary of interaction between the CVD and other EU policies with similar objectives

Policy tool/initiative	How well CVD interacts with policy/instrument
OVERARCHING STRATEGIES	
Europe 2020 Strategy	Targets for reducing CO ₂ and energy efficiency – CVD aims to contribute towards achieving targets
2030 Framework for Climate and Energy Policies	Targets to reduce GHG emissions – CVD aims to contribute towards achieving targets
Transport White Paper	High-level GHG reduction targets and 10 specific goals for competitive and resource efficient transport system – CVD aims to contribute to achieving GHG reduction targets, although conflict exists with goal on aiming to half the use of conventionally fuelled vehicles (when monetisation methodology is applied, tends to favour diesels).
CARS 21 Final Report	Strategic vision for automotive sector, including the purchase of clean and fuel efficient vehicles and deployment of alternative powertrains – CVD aims to contribute towards achieving this vision. Vision also acknowledges the lack of HDV CO ₂ data and how this needs to be addressed – if addressed this will also enable the CVD to be more applicable to the purchase of ‘clean’ HDVs with the availability of appropriate data.
Strategy for reducing Heavy-Duty Vehicles’ fuel consumption and CO ₂ emissions	Policy framework for reducing fuel consumption and CO ₂ from HDVs (proposals forthcoming) – CVD also addresses procurement of clean HDVs, but is hindered by the lack of data. New policy in this area will address this.
Sustainable Development Strategy	Targets including those aimed at preventing/reducing environmental pollution and increasing market share of environmental technologies and eco-innovations – CVD aims to contribute to achieving these targets.
Thematic Strategy on Air Pollution	Strategy aimed to encourage shift towards less polluting modes of transport, alternative fuels, reduced congestion and internalisation of externalities into transport costs – CVD aims to contribute towards achieving these objectives
The 7 th Environmental Action Programme (EAP)	Sets out three high-level environmental protection objectives – CVD aims to contribute towards achieving these objectives.
Clean Air Programme for Europe	Proposes legislation to reduce harmful emissions in the long terms. Also aims to address difficulties in achieving air quality standards – Where authorities tailor the use of the CVD to their local needs (i.e. use of Options 1 or 2a), they may be able to address local air quality issues related to transport through procurement of cleaner vehicles. However, there are issues with the use of Option 2b and achieving local air quality standards (if diesel vehicles are procured).
European Energy Security Strategy	Includes aims to shift towards alternative fuel and improved energy efficiency in transport to reduce EU dependence on oil – CVD aims to contribute towards these aims.
CO₂ LEGISLATION	
Passenger car CO ₂ Regulation (443/2009)	Supply-side measure setting fleet-wide average target for CO ₂ emissions of passenger cars – CVD aims to promote the procurement of vehicles with lower CO ₂ emissions.
LCV CO ₂ Regulation (510/2011)	Supply-side measure setting fleet-wide average target for CO ₂ emissions of LCVs - CVD aims to promote the procurement of vehicles with lower CO ₂ emissions.
Directive relating to the availability of consumer information on fuel economy and CO ₂ emissions in respect of the marketing of new passenger cars (“Car CO ₂ Labelling Directive” - 1999/94/EC)	Demand-side measure requiring the provision of CO ₂ emission information for new passenger cars – CVD complements this Directive by promoting the procurement of clean vehicles in public sector

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

Policy tool/initiative	How well CVD interacts with policy/instrument
Fiscal instruments introduced at national level to reduce CO ₂ from road transport vehicles	Aimed at reducing CO ₂ from road transport vehicles – CVD complements the use of these instruments by stimulating the purchase of clean and energy efficient vehicles.
INFRASTRUCTURE, FUEL AND ENERGY CARRIER POLICIES	
Directive on the deployment of alternative fuels infrastructure (2014/94/EU)	Framework for deployment of alternative fuels infrastructure – which will support CVD by ensuring appropriate infrastructure is in place so that CVD can stimulate the purchase of clean and energy efficient vehicles (including AFVs).
Renewable Energy Directive (RED) (2009/28/EC)	Includes goal for increasing the share of energy from renewable sources in transport sector - CVD complements this goal by stimulating the procurement of clean and energy efficient vehicles
Fuel Quality Directive (FQD) (2009/30/EC)	Targets for reducing GHG intensity of fuels and lower air pollutant emissions - CVD complements these targets through stimulating the procurement of clean and energy efficient vehicles
END-OF-LIFE VEHICLES	
End-of-Life Vehicle (ELV) Directive (2000/53/EC)	Aims to prevent or reduce waste from vehicles – possible conflicts with CVD depending on the types of vehicles procured and implications for recycling and recovery at end of life.
Directive 2006/66/CE on batteries	Targets for recycling of vehicle batteries – possible conflicts with CVD depending on the types of vehicles procured and implications for recycling and recovery at end of life.
AIR QUALITY AND NOISE LEGISLATION	
Regulation 715/2007/EC on type approval - LDVs (European Commission 2007)	Supply-side measure setting Euro 5/6 standards (air pollutant emissions) for light passenger and commercial vehicles - CVD complements these standards by stimulating the procurement of clean and energy efficient vehicles
Regulation 595/2009 (European Commission 2009) on type approval – HDVs	Supply-side measure setting Euro VI standards (air pollutant emissions) for heavy duty vehicles - CVD complements these standards by stimulating the procurement of clean and energy efficient vehicles
Air Quality Directive on Ambient Air Quality (AQD) (2008/50/EC)	Sets air quality limit/target values for range of air pollutants – Where authorities tailor the use of the CVD to their local needs (i.e. use of Options 1 or 2a), they may be able to address local air quality issues related to transport through procurement of cleaner vehicles. However, there are issues with the use of Option 2b and achieving local air quality standards (if diesel vehicles are procured).
Environmental Noise Directive (END) (2002/49/EC)	Provides a basis for developing measures to reduce noise, including from transport – CVD aims to contribute towards reducing noise from transport where it is an issue, through the ability to include other criteria in the assessment of proposals, including noise.

6.11.3. Conclusions

The Clean Vehicles Directive largely complements other EU policies and legislation with similar objectives. The overarching objectives of EU policy and legislation strive to increase environmental protection, reduce GHG emissions and attain energy security. The CVD complements a range of other policies and legislation that work together to achieve these objectives, including both supply and demand-side measures in the transport sector.

The CVD is the only piece of legislation that aims to increase the market share of clean and energy efficient vehicles through their public procurement, so does not replicate or overlap with any other policies in this respect.

Whilst the objectives of the CVD are largely complementary with the objectives of other EU policies with similar objectives, it is the outcome of applying the provisions of the CVD that seem to be contradictory. Specifically the application of the monetisation methodology and its subsequent unintentional preference for the selection of diesel vehicles. A number

of Member States have not met required air quality targets (particularly in relation to NO₂ concentrations) as specified in the Ambient Air Quality Directive, and real-world NO_x emissions have also been found to be higher than expected, which has contributed to concerns surrounding transport and local air quality. In particular, there is concern that the increased market penetration of diesel vehicles in recent years across the EU has contributed to this failure to meet NO₂ targets. Therefore air quality is perhaps more of an issue now compared to when the Directive was introduced.

In particular this raises issues with how the CVD interacts with:

- Transport White Paper (European Commission 2011) – specifically goal 1, which aims to half the use of ‘conventionally-fuelled’ cars in urban transport by 2030;
- End-of-life vehicles Directive (European Commission 2000) – depends on the impact that CVD has on the procurement of alternatively fuelled vehicles and implications for recovery and waste; and
- Air Quality Directive (European Commission 2008) – conflicts arise when authorities attempt to address local air quality problems (aiming to meet air quality targets and limit values). Contracting authorities face problems when they apply the CVD’s monetisation methodology in publicly procuring road transport vehicles, which results in the selection of diesel vehicles, whose use can be detrimental in achieving local air quality objectives, particularly in relation to NO₂.

6.12. Coherence: To what extent is the provision of multiple options to include operational lifetime environmental and energy impacts coherent with the objective of harmonising the determination of these impacts? (Q11)

6.12.1. Approach to answering the evaluation question

This coherence question aims to determine the extent to which the provision of multiple options to include operational lifetime environmental and energy impacts (i.e. the three options set out in Article 5(3)) is coherent with the objective of harmonizing the determination of these impacts.

The approach to answering this question is largely qualitative and has drawn on evidence from:

- Responses to the procurer survey and interviews; and
- Interviews with EU level stakeholders.

6.12.2. Providing multiple operational lifetime energy and environmental impact and the objective of harmonizing determination of these impacts

The Directive as adopted in 2009 differs greatly from the Commission’s initial proposal for a Clean Vehicles Directive (European Commission 2005), which proposed that a quota of heavy-duty vehicle purchases should be clean vehicles. This proposal was rejected and a new proposal created in 2007 (European Commission 2007). This 2007 proposal took a different approach and focused on the monetisation of the energy and environmental impacts as a means for taking account of these impacts in the procurement decision. However, this did not preclude any other award criteria that were deemed necessary from being used. This version also expanded the scope of the proposal to all road transport vehicles procured by public authorities. An Impact Assessment was subsequently performed (European Commission 2007).

However, when the Directive was adopted in 2009, Article 5(3) set out three options for taking account of energy and environmental impacts in the procurement decision, rather than just the monetisation methodology presented in the 2007 proposal. The co-legislators intended that providing this flexibility (allowing energy and environmental impacts to also

be taken account of in procurement decisions through technical specifications and award criteria) was deemed important to enable public authorities and operators to select options that best suited local environmental issues and priorities.

The three options as set out in Article 5(3) of the Directive were described in Section 5.1. As revealed in that section on the implementation of the Directive, 25 out of the 28 EU Member States allowed all three options to be used by procurers. The main reasons cited by Member States for this were to ensure flexibility in the application of the Directive for procurers; enabling procurers the ability to use options best suited to their procurement needs/individual circumstances; and reflecting existing sustainable procurement policy where it was applied prior to the Directive.

Evidence from procurers (in the survey and interviews) suggests that CVD has been applied in procurement actions in a varied manner across the EU. 40% of procurers responding to the survey stated that they set technical standards (Option 1). 30% applied a weighting for energy and environmental criteria in the contract evaluation (Option 2a), whereas 13.5% stated that they applied the monetisation methodology (Option 2b). When interviewed, procurers revealed that they used a variety of the options depending on what type of vehicle they were procuring. For example, one procurer used the monetisation methodology for passenger cars and minimum standards for trucks and special vehicles - the main reason for the use of minimum standards in this case was the lack of environmental data for these vehicle types.

The application of each of the options in procurement decisions (procurer surveys and interviews) was previously discussed in Section 6.2. A summary is provided below:

- **Setting technical standards (Option 1):** The majority of procurers setting minimum standards stated that they demanded a certain EURO standard (in most cases Euro 5/V). Procurers only demanded a higher EURO standard than was strictly obligatory for new vehicles for 1% of vehicles procured using the technical standards option. Furthermore, these procurers demanded the higher EURO standard just 6 months before it became obligatory for all vehicles. It can therefore be considered that this option has had very little effect on procurement decisions. It became apparent from the surveys and interviews with procurers that some were unaware of the requirement to set minimum standards for energy consumption, emissions of CO₂, **and** emissions of NO_x, NMHC and particulate matter. This led to a large variation in terms of the aspects for which standards were set, with only 5% of procurers who applied Option 1 in their last contract covering all three (3 out of 63 survey respondents). However, in some cases this may be due to a lack of available data, i.e. CO₂ data for HDVs.
- **Applying award criteria (Option 2a):** Environmental criteria (often including fuel/energy consumption) were given less than 20% weight in the large majority (75%) of the procurement cases. Price is usually given a greater weight (higher than 40% in 50% of the cases examined) while other criteria (such as warranty period, provision technical support, quality of design) are also most often more important than environmental considerations. Again, variation in the weightings applied, and weighting of environmental criteria in comparison to other criteria means that there is little harmonisation in the determination of impacts within Option 2a.
- **Monetisation of impacts (Option 2b):** The least used of all of the options. However, as the method for applying the monetisation option is set out in the Directive, there is less scope for contracting authorities to take varying approaches to applying the option to procurement, thus ensuring harmonisation of the impacts (assuming that the method and parameters set out in the Directive are used).

The variation in the minimum technical standards and award criteria set when applying Options 1 and 2a by procurers implies that there is little harmonisation within each of the options. Furthermore, the provision of the three options in the Directive, and subsequent

transposition of all three into 25 national implementing measures further supports the conclusion that there is little coherence with the objective to harmonise the determination of these impacts.

6.12.3. Conclusions

The Directive states that the “*procurement of vehicles for public transport services can make a significant impact on the market if harmonised criteria are applied at Community level*”. However, providing multiple options to include operational lifetime energy and environmental impacts in the Directive has led to the majority of Member States directly transposing all of these options into national implementing measures. Procurers have subsequently used all three options to varying degrees when procuring road transport vehicles.

Therefore the provision of multiple options to include operational lifetime energy and environmental impacts cannot be considered coherent with the objective of harmonising the determination of these impacts. Due to the variation in which the first two options are applied by procurers, it can also be considered that there is little harmonisation of impacts within each of the options.

The results from the procurer surveys and interviews demonstrated that the three options are often applied in very different ways, with varying effects on the resulting procured fleet. If the objective is to harmonise the determination of these impacts, then the number of options available to procurers should be reduced while at the same time providing more detailed guidance on what is required in applying that selected option.

Whilst the provision of three options is not considered to be coherent with the objective of harmonising the determination of these impacts, the benefits of providing these three options should be recognised - primarily the retention of flexibility which is appreciated by Member States and procurers who can use the most appropriate option to take into account local needs and objectives. However, this flexibility can also be abused ensuring that little impact is had on the procurement decision.

6.13. Coherence: To what extent are the provisions of the CVD coherent, complementary and/or redundant with the horizontal EU procurement legislation (in particular 2014/24/EU and 2014/25/EU)? (Q12)

6.13.1. Approach to answering the evaluation questions

This coherence questions aims to determine whether the provisions set out in the CVD are coherent, complementary and/or redundant with horizontal EU procurement legislation. A largely qualitative assessment has been undertaken, focussing on a comparison and analysis of the legislative texts.

6.13.2. Coherence of provisions of CVD with horizontal EU procurement legislation

Public procurement rules set the way public authorities and public utility operators purchase goods, works and service. It is therefore important to set up specific contract award procedure and standards to ensure that public procurement is made in the most rational, transparent and fair manner. The European Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan (European Commission 2008) set out the legal framework for public procurement whilst aiming to change the way we consume, produce and promote environmental and energy efficient products, including through green public procurement (GPP). The EU GPP criteria for transport were updated in 2012 and public procurement for all sectors was updated in 2014 in the public procurement directive 2014/24/EU (PPD). Procurement by entities operating in the water, energy, transport and postal services sectors are addressed in Directive 2014/25/EU (European Union 2014) and repealing Directive 2004/17/EC.

Directive 2014/24/EU sets out common EU standards on public contracts to boost fair competition and ensure best value for money. It introduces new award criteria that place more emphasis on environmental considerations, social aspects and innovation. To identify the most economically advantageous tender the contract award decision should not be based on price or remuneration only but should also be possible to assess value for money on the basis of other factors depending on the service or product concerned.

The relevant provisions are listed below:

- Best price-quality ratio (Article 67, Directive 2014/24/EU) can consider qualitative, environmental and social criteria such as technical merit, aesthetic and functional characteristics, accessibility, environmental and innovative characteristics, qualification and experience of staff assigned to performing the contract, after-sales service and technical assistance, delivery conditions such as delivery date, delivery process and delivery period or period of completion. This is similar to including energy and environmental impacts in the purchasing decision as set out in the Clean Vehicles Directive;
- Lifecycle cost (including carbon footprint) (Article 68, Directive 2014/24/EU) shall be considered over the life cycle of a product, service or work. Costs that can be considered are related to acquisition, use, maintenance and end of life. Other environmental externality impacts such as emissions of greenhouse gases and of other pollutant emissions and other climate change mitigation costs can be included as additional costs if they can be monetised. This is similar to the method already set out in the Clean Vehicles Directive, but recognising progress in the area of lifecycle costing;
- Production processes used, e.g. the employment of disadvantaged people or the use of environmentally-friendly materials are considered to be linked to the subject-matter of the contract;
- Any “abnormally low bid” (Article 69, Directive 2014/24/EU) will be rejected if it indicates a failure to observe EU labour law or environmental protection obligations;
- Contracts could be reserved for sheltered employment undertakings whose objective is to bring into the labour force disabled or otherwise disadvantaged persons (such as the long-term unemployed or members of disadvantaged minorities).

Therefore, Directive 2014/24/EU has been developed to reinforce the value for money³⁷ focus of Government procurement and to increase competitiveness by making the public procurement process faster, less costly and more effective. Procurers are as a result now able to set social and environment aspects as key requirements for a winning bid, such as certification/labels of social/environmental characteristics, factors directly linked to the production process and full life cycle costing that could promote more sustainable procurements, which could appear initially more costly but might save money over the long term.

Overall, the scope of Directive 2014/24/EU is much broader in scope in comparison to the CVD. It includes social aspects and new rules on the overall bid process and it is not focused (understandably) on vehicles and road transport. On the other hand, both the Directive 2014/24/EU and the CVD have a coherent approach as they both aim to stimulate energy-efficiency by taking into account lifetime environmental and energy impacts when awarding successful bids.

³⁷ Value for money is defined as “the best mix of quality and effectiveness for the least outlay over the period of use of goods or services bought”

Similarly, Directive 2014/24/EU and the CVD are coherent in that Directive 2014/24/EU requires that the contract award decisions shall be based on the most economically advantageous tender and that the most economically advantageous tender from the point of view of the contracting authority shall be identified using different approaches. First, the best price-quality ratio shall be assessed on the basis of criteria including qualitative, environmental and/or social aspects linked to the subject-matter of the public contract in question. Second, Directive 2014/24/EU states that the contracting authority shall specify, in the procurement documents, the relative weighting which it gives to each of the criteria chosen to determine the most economically advantageous tender. Third, the most economically advantageous tender should be identified using a cost-effectiveness approach, such as life cycle costing. "Article 68" and "Article 83" of Directives 2014/24/EU and 2014/25/EU respectively, i.e. "life cycle costing" approach, is the one area that mainly overlaps with the CVD, although these articles, while setting conditions for the monetising method to be used, do not stipulate a concrete method. Section 3 of these articles, states that "*whenever a common method for the calculation of life-cycle costs has been made mandatory by a legislative act of the Union, that common method shall be applied for the assessment of life-cycle costs*", and refer to a list of such legislative acts in Annex XIII. The only legislative act listed in mentioned Annex is Directive 2009/33/EC (CVD). Thus, the CVD is mentioned and included in the most recent Public Procurement Directive, making it a complementary part of the legislation. In fact, if the CVD was abolished, Directive 2014/24/EU would not give any concrete guidance on how to carry out a whole life cost assessment or which standard values should be used in performing the calculations. The total lifecycle approach mentioned in Directive 2014/24/EU is also voluntary, whereas the application of one of the options outlined in Article 5(3) (which includes the monetisation option) of the CVD is mandatory. Therefore there would be no mandatory requirement to consider using total lifecycle approach at all in the public procurement of road transport vehicles.

There was little awareness of the new horizontal EU procurement legislation amongst EU-level stakeholders. However, one stakeholder stated that they believed that the CVD was complementary to the horizontal legislation – this is due to the fact that Directive 2014/24/EU does not contain an obligation to take account of environmental considerations, whereas this is the case for the CVD. It was also noted that this approach was in line with the Commission's stated aim of setting public procurement obligations on a sector-by-sector basis.

6.13.3. Conclusions

In conclusion, the CVD can be considered complementary to the horizontal EU Procurement legislation. Whilst Directives 2014/24/EU and 2014/25/EU set out the broader public procurement requirements enabling procurers to take into consideration a range of criteria (including environmental) and total lifecycle costs (voluntary), the CVD sets out the specific requirements in more detail for the road transport sector, including the monetisation methodology (as set out in Article 6) (the use of one of three options is mandatory). If the CVD were to be abolished, it is likely that contracting authorities would find it more difficult to set qualitative and environmental award criteria since, as due to the broad nature of the Directive 2014/24/EU, there will be less guidance and reference to suitable values to use when performing calculations (see Section 6.14.4 for more discussion on potential impacts if Directive were repealed). In the absence of mandatory requirements to consider the environment, such considerations risk being ignored as a result of economic pressures. Therefore, it is more correct to say that the provisions of the CVD are coherent and complementary to the horizontal EU legislation as it addresses the procurement of road transport vehicles specifically, meeting the Commission's aim of setting public procurement obligations on a sector-by-sector basis. In addition, through the mandatory inclusion of operational lifetime environmental and energy impacts in the procurement decision, the CVD aims to contribute to the way in which we consume and promote environmental and

energy efficient products through green public procurement (GPP) which is one of the main aims of the horizontal EU procurement legislation.

6.14. Sustainability: To what extent would the market develop differently should the intervention be ceased partially or completely at European level? (Q13)

6.14.1. Approach to answering the evaluation question

The approach to answering this question can be considered from a couple of different perspectives. First, given that the aim of the Directive was to increase the market share of clean vehicles, if the market consisted only of clean vehicles, the Directive would clearly cease to have an effect. In this case, its repeal would have no impact on the market. Consequently, in order to explore this aspect, evidence was collated on the proportion of the new vehicle market that can be considered to consist of clean vehicles, which must also reflect the challenges of identifying which vehicles should be considered to be clean, as discussed in Section 6.2.2.

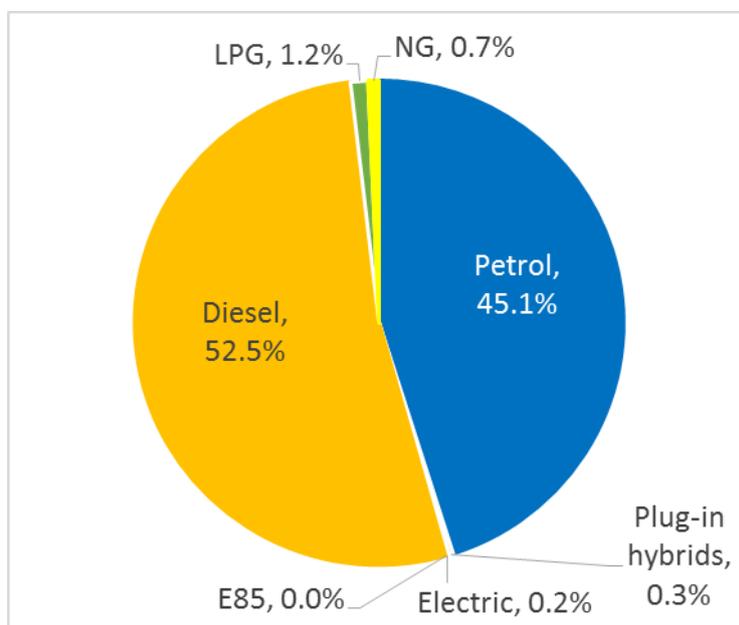
The second perspective is to take the information on the impacts of the Directive, as discussed in Section 6.2, and assess the extent to which continuing impacts of this magnitude will affect the market share of clean vehicles. If these impacts are minimal, it might be concluded that repealing the Directive would have little impact on the market. The wider rationale for the Directive, particularly its focus on public procurement, will also need to be considered in this respect (as discussed in Section 6.3.3). Additionally, the views of stakeholders interviewed or otherwise engaged for this project will be taken into account. These two perspectives will be considered in turn in Section 6.14.2.

In addition to a complete repeal, the question also asks about a partial repeal. As can be seen by the evaluation of the first effectiveness question (see Section 6.2), the monetisation methodology, i.e. option 2b in Article 5(3), has potentially the most significant impact on the market. It is also worth noting in this respect that the Commission's proposal that eventually led to the adoption of the CVD proposed that monetisation was the only option allowed for taking account of energy and environmental impacts (European Commission 2007). Engagement with the Commission early in the project suggested that an evaluation of retaining only this option in a revised Directive was potentially of interest. Hence, the exploration of the partial repeal of the Directive assumed that the only option retained for the consideration of energy and environmental effects in the public procurement of clean vehicles was the monetisation methodology required by option 2b of Article 5(3) of the Directive. This will also be considered in Section 6.14.3.

6.14.2. The role of the CVD in the development of the market for clean vehicles

In order to identify the proportion of the new vehicle market that might be considered to consist of clean vehicles, it is important to identify information on the existing market share of such vehicles. The most comprehensive data on the new vehicle market in the EU are for passenger cars and LCVs, as a result of the monitoring requirements of the passenger car and LCV CO₂ Regulations. The most recent monitoring report from the EEA showed that the number of alternatively-fuelled cars has not exceeded 4% of the new car market since 2000, while the figure for 2013 was only 2.4%. The definition of alternatively-fuelled car used by the EEA was broad, i.e. any car that was not a petrol or a diesel car; no judgement was made on whether these might be considered to be 'clean vehicles'. The sales of new alternatively-fuelled cars have been dominated each year by gas vehicles (LPG and natural gas; see Figure 6-5). Only 1.5% of new LCV registrations were alternatively-fuelled in 2013, and again gas vehicles made up a significant proportion of this figure (EEA 2014). However, it must be noted that even for petrol and diesel vehicles, some will be considered to be 'cleaner' than others and potentially comparable (or even better) in terms of emissions or energy consumption than some of the alternatively-fuelled vehicles (see Section 6.2.2).

Figure 6-5: Number of new registrations of alternatively fuelled cars in the EU-27 in 2013



Source: EEA (2014), based on the registrations given in Table 3.5 of this report

Identifying comparable information for other modes of road transport is more difficult. Information on total registrations of buses, coaches and heavy commercial vehicles is published frequently by ACEA, but this does not distinguish those vehicles using alternative fuels. Information on the gas vehicle stock in Europe is published by the NGVA, but this relates to the whole fleet, not just new vehicles. Figures for 2014 suggest that there are only 13,000 buses and 9,000 trucks using gas in Europe³⁸. For the sake of comparison, the most recent figures from DG MOVE on the total stock of these vehicles in the EU suggest that in 2012 there were 816,100 buses and 34 million goods vehicles (although this figure is likely to be dominated by LCVs); (European Commission 2014). Consequently, it appears unlikely that shares of alternatively-fuelled vehicles in the market for new buses and commercial vehicles will be significantly higher than in the new car market. Additionally, as discussed in Annex 11, there is a need for new vehicles to continue to become more fuel efficient and to reduce their CO₂ and pollutant emissions. Hence, it is clear that the EU new vehicle market cannot be considered to consist of 100% clean vehicles, particularly given the long-term improvements that are needed.

Evidence on the impact of the Directive was presented in the discussion of the first question on effectiveness (see Section 6.2). This demonstrated that the impact of the Directive on the market to date has been relatively small, even under the most generous assumptions. Hence, it might be concluded that repealing the Directive would have little impact on the market. This was indeed the conclusion of some of the EU level stakeholders that were interviewed as part of the evaluation. To support this conclusion, it was noted that some Member States and some cities had been adopting green public procurement policies for vehicles prior to the adoption of the Directive and that such approaches were likely to be unaffected both by the Directive's existence and its potential repeal (see Annex 2).

However, concluding from this discussion that the Directive should be repealed ignores to some extent the original purpose of the Directive. As was discussed in Section 6.3.3, green or sustainable public procurement is considered to be an appropriate policy measure for

³⁸ Downloaded from www.ngvaeurope.eu/european-ngv-statistics on 4 June 2015

stimulating markets where there are barriers to the wider uptake of greener or more sustainable products. This message was reinforced by the 2014 horizontal public procurement Directives, as these set out the framework to enable public procurers to take account of environmental considerations, including the monetisation of operational costs (see Section 6.13). However, these Directives do not require that environmental considerations be taken account in procurement in the way that the CVD requires these to be taken account of in the procurement of vehicles. As set out in Section 6.2.2, there is still a need to improve the environmental performance of road transport. Given the potential benefits of the use of clean vehicles in this respect, but also as a result of their potentially lower total cost of ownership (as discussed in Sections 6.2.2 and 6.2.3), coupled with their low uptake, there is clearly still a need to stimulate the market for clean vehicles. While the repeal of the CVD would not **prevent** environmental considerations being taken into account in the course of the public procurement of vehicles, this would no longer **be required**. As was argued in Section 6.13.3, repeal of the CVD also risks making it more difficult for procurers to take account of environmental considerations in the course of procuring vehicles. Hence, there is still a rationale for requiring the public procurement of vehicles to take account of environmental considerations in order to stimulate the market for clean vehicles, as the Directive aims to do.

In this respect, it is worth noting that both at the Member State and stakeholder meetings that were undertaken for this evaluation, as well as in the EU level stakeholder interviews, many participants were against a full repeal of the Directive (see Annexes 2, 3 and 9). At least one argued that the Directive would become more useful in the years to come, as a wider range of vehicles that might be considered to be 'clean' come onto the market. Others noted that repealing the Directive would give the wrong political message, and that the focus should instead be on making it work better. It was also underlined that the Directive had contributed to raising awareness of the public procurement of clean vehicles, particularly in those Member States and cities that were not previously taking account of energy and environmental considerations when purchasing road transport vehicles.

6.14.3. The implications of retaining option 2b (monetisation) as the only option

The implication of retaining only the monetisation option can be seen in the work undertaken in support of the first effectiveness question (see Section 6.2 and Annex 9) by the fact that the application of the monetisation methodology tends to lead to the purchase of diesel vehicles, instead of petrol, gas or biofuel vehicles. Hence, the retention of this option at the expense of the others would not contribute to increasing the market share of vehicles using gas or biofuels, and indeed could effectively act as a barrier against the public procurement of such vehicles. The methodology also leads to results in favour of electric vehicles, where these are included, but this is at least partially due to the fact that the in-use emissions of these vehicles are considered to be zero, which ignores emissions generated from the production of the electricity used, as well as differences in emissions associated with the production and disposal of such vehicles (see Section 5.4). As discussed in Section 6.2.2, some diesel buses (e.g. Euro VI buses) do indeed appear to have very low levels of pollutant emissions compared to buses using other types of technology. However, even these diesel buses do not perform as well as buses with other technologies with respect to CO₂ emissions and energy consumption. A number of stakeholders also raised the preference of the methodology as it currently stands for diesel vehicles and the lack of consideration of wider emissions associated with electric vehicles as issues in the event that this was the only option retained in the Directive (see Annex 2).

6.14.4. Conclusion on the extent to which the market would develop differently should the Directive be repealed partially or completely at the European level

On the basis of the above discussion, the full repeal of the Directive is unlikely to have a significant, immediate, practical impact on the market. This is largely a result of its relatively low level of measurable impact to date, rather than it having achieved its original objective. However, to conclude from this that the Directive should be repealed is to ignore

its original intention, the ongoing challenges of reducing CO₂ and pollutant emissions from road transport and the guidance that the Directive and the associated initiatives provide in this respect. Together, these argue for a retention of a mandatory requirement to account for environmental considerations in the public procurement of vehicles in order to stimulate the market for 'clean' vehicles. The main way in which public procurement increases the market of clean vehicles, as discussed in Section 6.3.3, is to provide a signal to industry that there is a market for clean technologies and thus to encourage innovation. For cars and LCVs, given the other instruments in place (see Section 6.11) and the relatively small shares of these vehicles that are publicly procured (see Table 6-1 in Section 6.3.2), the role of public procurement is likely to be less important than other measures in directly increasing market shares. However, the other benefits of public procurement, including increasing environmental awareness and providing leadership on environmental matters (see Section 6.3.3), can still be delivered through the public procurement of cars and LCVs.

For buses and some heavy duty vehicles, such as household waste collection vehicles, local authorities are important procurers, if not of the vehicles, then of services using these vehicles (see Table 6-1 in Section 6.3.2). Additionally, for such vehicles complementary legislation that requires manufacturers to improve the fuel efficiency and to reduce the CO₂ emissions from these vehicles is not in place (see Section 6.11). Hence, the market signal provided by the public procurement of these vehicles is potentially stronger than for cars and LCVs. As was noted in the stakeholder workshop, 'clean' technologies have only relatively recently begun to be introduced for heavier duty vehicles, and so moving forward, the Directive may have a greater role to play. However, there is still the issue of the availability of the necessary data for such vehicles (as discussed in Section 6.2).

A partial repeal of the Directive, at least one that retains only the existing monetisation methodology, would lead to the procurement being inadvertently biased towards diesel, and potentially electric vehicles as well, where such versions of these vehicles exist. However, there are issues, as discussed in Section 6.2.2, in considering these vehicles to be 'clean'. Additionally, it is worth noting that diesel tends to be the dominant technology in the heavy duty sector in particular, and so the added value of retaining legislation that effectively favours the dominant technology is questionable. Hence, in order to identify the extent to which the partial repeal of the Directive would impact on the market for clean vehicles, it is first important to identify of which clean vehicles the Directive is aiming to increase the market share. This will be discussed further in Section 7.

The conclusion with respect to the partial repeal, i.e. retaining only the monetisation methodology, is valid in relation to the methodology as it stands. If the monetisation methodology was to be amended in any way, it should have a different impact on purchasing decisions and thus a different effect on the market. However, without an indication of what such amendments might be, it is not possible to conclude what the effects of an amended methodology, or its repeal, might be.

7. CONCLUSIONS

On the basis of the analysis presented in Section 6, in this section we present the main conclusions arising in relation to each of the overall evaluation questions (relevance, effectiveness, efficiency, EU added value, coherence and sustainability).

7.1. Relevance

- The needs at which the Directive is targeted, i.e. the need to decrease transport's CO₂ and pollutant emissions and to increase its energy efficiency and competitiveness, are pertinent, and are likely to remain pertinent in the future.
- Overall, targeting publicly procured vehicles is considered to be a relevant tool to increase the energy efficiency and to reduce the CO₂ and pollutant emissions from road transport. Even though stimulating the public procurement of clean vehicles is not by itself sufficient to achieve these objectives, it is still beneficial. While publicly procured vehicles represent a small share of the overall vehicle market, there is still a case for using public procurement to stimulate the market for clean vehicles, as part of a more comprehensive approach to delivering the stated objectives.
- Furthermore, in the case of specific categories of vehicles (such as buses) the potential for stimulating the market for clean vehicles is significantly greater.
- It is argued that (and there is theoretical justification for) 'stimulating the public procurement of clean vehicles' has the potential to contribute to increasing the competitiveness of the wider EU economy and of cities, although difficult to prove in practice.
- However, in addition to the small market share of publicly procured vehicles, the extent of the contribution of the Directive to increasing the energy efficiency of and reducing the CO₂ and pollutant emissions from transport also depends on whether the focus is on the 'right type' of clean vehicle. This is an aspect that is currently not clearly defined by the Directive and for which there are very different approaches followed by contracting authorities.

7.2. Effectiveness

- Our estimates of the impacts of the CVD – on the basis of available evidence and a set of important assumptions – suggests that these are much more limited than was initially expected. Furthermore, the estimated impacts of up to 5.5% CO₂ emissions reduction for passenger cars and 2.3% for vans in comparison to the baseline represent a best-case scenario, which, most probably, does not take full account of the impact of other relevant policies in place (such as the passenger car CO₂ Regulation). Our analysis suggests that the impacts directly associated with the Directive are more limited, although it has not been possible to get more precise estimates.
- In addition, the analysis suggests that, in terms of air pollutant emissions, the contribution may even be negative, as a result of the tendency of some of the options (see below) being biased towards diesel vehicles.
- A key underlying reason for limited effectiveness of the Directive is the absence of a definition of what a "clean vehicle" is and of relevant provisions for minimum requirements (e.g. limit values in terms of fuel/energy consumption, CO₂ and air pollutant emissions) that contracting authorities should meet when setting their requirements. In their absence, it is very often the case that contracting authorities set requirements that can be met by the majority, if not all, vehicles on the market.
- Another key issue related to the implementation and the effectiveness of the Directive is the perceived complexity of the monetisation methodology and the much greater preference by public authorities for the use of the other options given

in the Directive. On the one hand, the monetisation methodology is the most effective approach in terms of ensuring the internalisation of the operational costs and its more widespread use could ensure a greater level of harmonisation in the approach followed by authorities. On the other hand, in its current form, the monetisation option is perceived to be complicated and demanding by a large share of authorities. In addition, our analysis suggests that, in its current form, it has certain limitations and weaknesses.

- The absence of any harmonised community standard for measuring fuel consumption or CO₂ emissions in the case of heavy duty vehicles, the category of vehicles where public procurement has the greatest potential, means that it is difficult for most contracting authorities to obtain objective, comparable data on these vehicles. As a result, there are possible missed opportunities for contracting authorities to select the most appropriate vehicles.

7.3. Efficiency

- The estimated overall benefit to cost ratio of the Directive is relatively low. Total expected benefits of the policy – reflecting CO₂ and pollutant emissions reduction and fuel efficiency savings – are estimated to be in the range of €42.6 to €521.1 million, against total costs of around €34.6 to €431.0 million. The low cost benefit ratio is expected as the direct impacts associated with public procurement are very limited. In most respects the Directive acts in a complementary way to other policy tools (e.g. CO₂ and emissions requirements, car-labelling etc.) and any wider benefits cannot be quantified.
- At the same time, the administrative costs associated with the Directive are relatively limited (less than €2.3 million on an annual basis). Our analysis suggests that this is primarily a reflection of the limited use of the monetisation methodology and the fact that in most cases the information/data required is readily available.
- It is not clear that the impacts of the Directive could have been achieved in a more efficient way through additional measures or initiatives, as there was – and indeed still is – a rationale for using public procurement to stimulate the market for cleaner vehicles. The analysis suggests that there are certain aspects that need to be addressed in that respect, including the need to simplify those aspects of the Directive that are currently considered to be complex and demanding by public authorities as mentioned above.

7.4. EU Added Value

- Based on the assessment of effectiveness and feedback from various stakeholders, it is likely that the limited impacts estimated to have been achieved by the CVD could have been achieved without EU intervention, i.e. the Directive.
- However, despite the lack of clear benefits, stakeholders have stated a preference for retaining the Directive, although with improvements focussing on making it more effective and delivering better results. Stakeholders believed that a repeal of the Directive would give out the wrong political message. Secondly they generally felt that a mechanism to stimulate the purchase of clean vehicles was still required (as barriers to their uptake still exist) and that public procurement is still potentially useful in this respect. Finally, stakeholders thought that the Directive may become more useful and relevant over time as more clean vehicles come onto the market.
- There is some evidence to suggest that the Directive and the accompanying initiatives have supported best practice exchange.

7.5. Coherence

- The Clean Vehicles Directive largely complements other EU policies and legislation with similar objectives. The overarching objectives of EU policy and legislation strive to increase environmental protection, reduce GHG and air pollutant emissions and attain energy security. The CVD complements a range of other policies and legislation that work together to achieve these objectives, including both supply and demand-side measures in the transport sector.
- The Directive is broadly coherent with most other relevant policies, including the Public Procurement Directives, although there are challenges with respect to air quality, and a lack of coherence with the 2011 Transport White Paper's objective of phasing out conventionally-fuelled cars. Contracting authorities face problems when they apply the CVD's monetisation methodology in publicly procuring road transport vehicles, which results in the selection of diesel vehicles, whose use can be detrimental in achieving local air quality objectives, particularly in relation to NO₂. Therefore, provisions such as the monetisation methodology, may on certain occasions contradict with EU air quality targets, as it does not lead to the purchase of the types of vehicles that are most advantageous to reducing pollutant emissions in urban areas.
- The fact that the Directive allows for multiple alternative options is not coherent with the objective of harmonising the determination of these impacts.

7.6. Sustainability

- A full repeal of the Directive would be unlikely to have significant practical impacts on the market and the current level of demand for clean vehicles. However, the wider benefits – and the broader message – provided by public procurement would be lost.
- Furthermore, in the case of the heavy duty vehicle (HDV) sector, particularly buses, waste collection vehicles and other HDVs primarily used by/in the service of public authorities, the potential impact would probably be greater as there is a lack of a wider policy framework to reduce the CO₂ emissions of these vehicles.
- A partial repeal – i.e. retaining only the monetisation methodology in its current format – would bias towards diesel vehicles, which tend to be the dominant technology in the HDV market anyway, and those technologies that (inaccurately) have zero emissions, as these are measured on the test cycle.

8. RECOMMENDATIONS

On the basis of the conclusions of the analysis we present a set of general – high-level – and more specific practical recommendations.

8.1. *General recommendations*

- **The Directive should be retained:** Despite the limited benefits of the CVD to date, there is supporting evidence identified throughout this evaluation that suggests that the Directive should be retained rather than repealed. Firstly, there continues to be a need to address the stated objectives of the CVD, including reducing CO₂ and air pollutant emissions, and increasing energy efficiency of the transport sector and competitiveness (see Section 6.2.2). It is agreed that public procurement is a tool that can be beneficial in helping to achieve these objectives (as discussed in Section 6.3.3) - encouraging investment in clean vehicles by public authorities should help to increase the market for such vehicles and thus help to deliver the economies of scale that will lead to lower production costs and lower prices. In turn, this should help to stimulate demand more generally. Additionally, it was identified that there are currently no alternative (more efficient) measures that are able to stimulate the market for clean vehicles (see Section 6.8.2), which would further support retaining the Directive. Stakeholders consulted for this evaluation also stated their preference and reasons for retaining the Directive taking action at the EU level, as outlined in the conclusions above. While the repeal of the CVD would not **prevent** environmental considerations being taken into account in the course of the public procurement of vehicles, this would no longer **be required**. It is likely that contracting authorities would find it more difficult to set qualitative and environmental award criteria since, as due to the broad nature of Directive 2014/24/EU, there will be less guidance and reference to suitable values to use when performing calculations. In the absence of mandatory requirements to consider the environment, such considerations risk being ignored as a result of economic pressures. Hence, there is still a rationale for requiring the public procurement of vehicles to take account of environmental considerations in order to stimulate the market for clean vehicles, as the Directive aims to do. It is therefore our assessment that a repeal of the Directive would not be the best action to take, but that it should be retained.
- **The Directive needs to be amended:** The analysis conducted for this evaluation suggests that in its current form the CVD is not particularly cost-effective. However, as discussed in the point above, it is still a useful tool for stimulating the market for vehicles using cleaner technologies forming part of a broader package of supply-side and demand-side policy tools. It is evident that there is scope for improvements to be made to the Directive that would increase its effectiveness and efficiency. This could include changes to the scope of the Directive but also changes to its mechanisms, including the monetisation options. There is also an evident need to improve the level and quality of information and data available that will support future monitoring of its effectiveness and efficiency (see Specific Recommendations below for further information).

8.2. *Specific recommendations*

- **There needs to be more clarity as to what can be considered to be a clean vehicle:** Clarification is required on which types of vehicles might be considered to be 'clean' and what should be the aims of the Directive in this respect. This could require the introduction of specific provisions setting minimum requirements for contracting authorities (see also next point).
- **Encourage higher levels of ambition with regards to clean vehicles purchased required by the Directive:** In order to encourage higher levels of

ambition, the Directive could set higher standards that more ambitious contracting authorities might meet. More specifically, if all of the alternative options for including energy and environmental considerations are retained, the following elements might be considered to ensure that the Directive delivers environmental improvements (also helping to define 'clean' vehicles):

- Option 1: Explicitly set out the minimum technical specifications to be used, e.g.:
 - For pollutant emissions: any future Euro 7/VII standard, if these are eventually introduced, or any relevant standards arising from the light duty real driving emissions (RDE) test that is to be implemented. Voluntary emission schemes and standards should also be included as soon as they are introduced (with a clear distinction towards existing Euro 6 vehicles).
 - For CO₂ emissions: For LDVs, these could be the next target as agreed in the respective Regulations, e.g. 95 gCO₂/km for cars and 147 gCO₂/km for LCVs (to be amended as new targets are introduced in the respective Regulations); for HDVs, minimum technical specifications could be developed once the EU monitoring mechanism for HDV CO₂ emissions has been put in place.
- Option 2a: Explicitly state the minimum weighting that has to be applied to energy and environmental considerations if these are used as award criteria.
- Option 2b: Revise the monetisation methodology to address issues such as fuel prices, emissions cost factors and real world emissions and the other ambiguous elements and better align the emphasis of the methodology with the three environmental objectives of the Directive.

Clearly, the feasibility of any such approach will need to be analysed in more detail, and any changes made would need to ensure that they adequately promote the procurement of what has been more clearly defined as 'clean vehicles'.

- **Facilitate the use of the monetisation option (if this is retained):** While it can/could be considered appropriate to maintain the alternative options, it is also important to promote the use of the monetisation option as this is the only option that explicitly internalises operational costs. This requires actions to address the (perceived) complexity of the approach. Potential supporting actions to consider include:
 - Ensure that contracting authorities are equipped with a user-friendly tool for performing the calculations. The Clean Fleets Lifecycle Costing Tool (Clean Fleets 2014) is an existing spreadsheet tool capable of performing the monetisation calculations, but its effectiveness might be substantially increased if it were converted into a web-based tool and then more widely publicised (potentially even referenced in the legislation itself).
 - Use the information that is to be reported under the forthcoming monitoring mechanism for the CO₂ emissions of heavy duty vehicles to guide the procurement of more fuel efficient heavy duty vehicles. It is essential that objective, comparable information is available on the CO₂ impacts and energy efficiency of these vehicles.
 - Ensure that the information on the Clean Vehicle Portal fulfils its aim of providing comprehensive data on vehicle emissions as a one-stop-shop. As the Portal is being amended at the time of writing, it is not possible to comment on the extent to which this new version meets the needs. However, contracting authorities should be able to find emissions data for different vehicles in a comprehensive and accessible way. Maintaining information in

such a centralised manner may not be an easy or cheap task, but if the monetisation methodology is to be retained, its effectiveness will be linked to the ease with which contracting authorities can find the appropriate information to input into it.

- Further build on the Commission initiatives that have been undertaken to date, particularly the Clean Vehicle Portal and the Clean Fleets project, in order to facilitate the exchange of practices and experience, to promote greater understanding of any revised requirements of the Directive, and to facilitate cross-border joint procurement.
- **Future consideration of Well-To-Wheels (WTW) emissions:** In order to be able to compare the full environmental impacts of vehicles, there is a need to take account of WTW emissions. This issue is also relevant for other EU legislation, such as the passenger car CO₂ Regulation, the fuel efficiency label etc. It should be considered whether it is possible to introduce an approach, e.g. a WTW factor that could be applied in a common way in complementary EU legislation, where it is appropriate.
- **Extend the scope of the Directive:** The scope of the Directive could be extended by lowering the threshold values. However, the benefit to cost ratio of such a change will need to be examined in greater detail. The expansion of the scope of the Directive to all contracts procured by public authorities that have a major transport element, and possibly to private fleets, might be considered. Both of these approaches have the potential to increase the impacts by increasing the numbers of vehicles covered by the Directive, but it would need to be ensured that the approach was efficient once the scale of the potential impacts and costs have been considered.
- **Resolve the challenges posed by the lack of, or inaccurate data:** A lack of information or a means of discriminating between vehicles on the basis of their energy consumption and emissions is a challenge. All new cars and LCVs, and all engines used in HDVs, have to meet the latest Euro emission standards (i.e. 6 and VI, respectively), and so unless a city has the resources and technical capacity to undertake its own dedicated tests, there is no room for a city to differentiate between vehicles on the basis of their pollutant emissions. For cars and LCVs, test cycle information on fuel consumption and CO₂ emissions is available for conventionally-fuelled vehicles, but this information for alternatively-fuelled vehicles is less accurate as there is a greater need to take account of lifecycle and embedded emissions in order to accurately determine which type of technology is better in this respect. Also, for those cars and LCVs for which CO₂ and fuel consumption data is available, there is the additional issue of the discrepancy between real world and test cycle emissions. For HDVs, information on CO₂ emissions and fuel use is often not available in a consistent manner for most cities (again, other than those that have the resources and capacity to do their own tests). Our understanding is that many of these are issues have already been identified as important by the Commission and relevant action is being taken to address them. If this proves not to be the case, or is considered to not eventually be possible, it will be important to provide at least more guidance to contracting authorities in order to ensure that they are aware of how to apply the CVD in such cases.
- **Introduce a voluntary framework to facilitate Member State reporting:** One of the challenges with understanding the effectiveness – and therefore efficiency – of the Directive is the lack of knowledge on its impacts, and indeed costs. It is important not to introduce requirements that would incur excessive administrative costs on Member States, hence, it would be useful to introduce a framework for Member State reporting in which Member States would be encouraged to report on the impacts of the Directive in a consistent and comparable manner. This would facilitate future evaluations and inform future amendments to the Directive.

- **Explore whether there is the potential for a Commission initiative to facilitate cross-border, joint procurement:** As barriers to cross-border joint procurement remain, and the costs of vehicles with some clean technologies remain high, it would be useful to explore whether there is the potential to use financial instruments (i.e. not grants) to help overcome the high initial administrative and capital costs associated with the cross-border, joint procurement of clean vehicles. In this respect, the potential use of instruments developed by the EIB might be explored.

9. ANNEX 1: DETAILS OF BASELINE SCENARIO AND APPROACH TO QUANTIFYING IMPACTS

9.1. Estimation of volumes of publicly procured vehicles

As there is no European database on new registrations or vehicle stock by type of owner, an estimate of annual public sector vehicle purchases was developed based on use of Member State public vehicle fleet and registration statistics in combination with ACEA figures on new registrations (which aggregate public and private) across the EU.

Even national-level data on the extent of public sector registrations and purchases of vehicles is severely limited: for many Member States, it appears that no data has been published on this topic, and for other Member States the data is usually incomplete insofar as it only refers to vehicles held by certain parts of the public sector (such as central government administration) rather than all contracting authorities.

The estimate of total public procurement used in this evaluation is therefore based on available data for a limited number of Member States, namely Germany, Italy, France and the United Kingdom. Where these datasets refer to only parts of the public sector, we have extrapolated a total public sector number from these figures by scaling them according to the numbers of employees in different sections of the public sector.

These Member States include some in which the extent of the public sector is large relative to the typical Member State (e.g. France) and some in which it is relatively small (e.g. the UK). Accordingly, we have found that there is a significant amount of cross-national variation in the number of vehicles in public ownership versus private ownership. Because our estimate of the public sector's share of vehicle purchases is based on averaging across these Member States, it accounts for cross-national variation in the relative extent of public procurement, at least to the extent possible with the available data.

Unfortunately, the sample does not include any Eastern European Member States, as relevant data for these Member States was unavailable. The method used nonetheless aims at representativeness for those Member States to the extent that this is possible given available data: the method consists in multiplying ACEA figures on total annual registrations (which include Eastern Europe) by a factor representing the public sector's share of total procurement. Although that factor is based on data from Western European Member States, the Member States in question comprise a mixture of Member States with relatively large and relatively small public sectors. Eastern European Member States, like Western European Member States, comprise a mixture of Member States with public sectors that are large relative to the EU average, and others that have small public sectors relative to the EU average.

9.1.1. Estimation of factors representing contracting authorities' share of total procurement

For some Member States, data is available on the number of vehicles held in the public fleet, but not the rate at which these vehicles are renewed, and so there is no direct information as to the number of new registrations or purchases each year. Because vehicle stock in the public sector may be renewed at a different rate to the private sector, the public sector share of vehicle *stock* will not necessarily be the same as the public share of annual procurement. Therefore, in the analysis described below, the first step is to estimate the public share of vehicle *stock* in different Member States, and the second step is to adjust this proportion to account for the difference between public share of *stock* and public share of *registrations*.

Step one - estimating contracting authorities' share of vehicle stock

For passenger cars, estimates of public sector stock were taken from (IFRAP, 2010) for Italy and France, (KBA 2014) for Germany, and (Fleet News 2015) for the United Kingdom. Where figures are provided only for public administration or central government

administration, an extrapolation has been made to scale these figures up on the basis of public sector employment (in central administration versus more generally) so that they represent the entire public sector. Total stock (public and private) in each Member State is taken from ACEA. These figures indicate a large variability in the extent of public stock, ranging from below 0.04% in the UK up to 1.7% in Italy. The average value (1.0%) is taken forward as the assumed average value for the EU.

Table 9-1: Comparisons of annual public sector passenger car stock across Member States

	Germany	Italy	France	UK
	Passenger cars			
Total stock	43,851,230	37,078,000	32,555,000	29,611,489
Of which public administration	133,879	150,000 (central administration)	142,000 (central administration)	-
Of which total public sector	363,663 (employment-scaled estimate)	626,760	477,445 (employment-scaled estimate)	13,266 (council car fleet)
% Public admin	0.31%	0.40%	0.44%	-
% Public sector (scaled estimate)	0.83%	1.69%	1.47%	0.04%
% average public sector stock across countries	1.01%*			

Note: * upper bound estimates for Europe-wide share of public sector vehicles in new registrations

Source: Ricardo Energy & Environment analysis of: ACEA registration statistics; (IFRAP, 2010); (KBA 2014); (Fleet News 2015).

For vans and rigid trucks, data on public stock in Germany is derived from (KBA 2014) and for the UK it is taken from (Fleet News, 2015). The EU wide estimate is based on the average value of the German and UK data.

Table 9-2: Comparisons of public sector van and rigid truck stock in UK and Germany

	Germany	UK	Germany	UK
	Vans		Rigid trucks	
Total stock	2,345,752	3,471,280	283,457	473,932
Of which public administration	58,453	-	9,148	-
Of which total public sector	158,779 (employment-scaled estimate)	36,978 (council fleet)	24,849 (employment-scaled estimate)	23,080 (council fleet)
% Public admin	2.5%	-	3.2%	-
% Public sector	6.8%	1.1%	8.8%	4.9%
Upper bound estimate	3.9%		6.8%	

Source: Ricardo Energy & Environment analysis of (Fleet News, 2015) and (UK Department for Transport 2015) for UK figures, Ricardo Energy & Environment analysis and elaboration on (KBA 2014) for German figures.

Step two - estimating contracting authorities' share of new vehicle purchases

The German vehicle registration authority provides data (KBA 2014) on new registrations and vehicle stock by economic sector which can be used to derive a relationship between the public sector share of *stock* and the public sector share of *registrations* (i.e. an assumption as to the relative difference in rates of vehicle renewal in the public sector and the wider market).

The results of this comparison (Table 9-3) suggest that the stock of public sector passenger cars gets renewed around three times as often as the average German vehicle stock, whereas the van and truck stock get renewed less often than the average fleet.

Table 9-3: Data on share of vehicle stock and new vehicles registrations in the German public administration

	Passenger cars	Vans	Rigid trucks
% of vehicle stock registered to 'public administration, defence and social security' (KBA 2014)	0.3%	2.5%	3.2%
% new registrations in 'public administration, defence and social security' (KBA 2014)	1.0%	1.8%	3.0%
Ratio of new registrations share to vehicle stock share	3.37	0.72	0.93

Source: Ricardo Energy & Environment analysis based on (KBA 2014)

The ratios in the final row of Table 9-3 are therefore used to adjust the figures in the final rows of Table 9-1 and Table 9-2 to produce an estimate of the total EU wide public sector share of new vehicle registrations (Table 9-4).

Table 9-4: Estimate of EU wide public sector share in vehicle stock and new vehicles registrations

	Passenger cars	Vans	Rigid trucks
Estimate of % of public sector in total EU vehicle stock	1.0%	3.9%	6.8%
Estimate of % of public sector in total EU new registrations	3.4%	2.8%	6.4%

Source: Ricardo Energy & Environment analysis

Buses

As national datasets do not adequately distinguish between publically and privately procured buses, a different method is used to produce an EU-level estimate of the number of buses procured by contracting authorities.

Long-distance road passenger transport services, i.e. coach services, are privatised across Europe (van de Velde, 2009). Therefore we assume contracting authorities purchase only buses, not coaches. New bus registrations represent around 76% of new bus and coach registrations (AEA 2011), therefore we multiply ACEA's figures on total bus and coach registrations by 76% to obtain the total number of new buses in Europe each year. This is in turn multiplied by a factor representing the share of bus procurement performed by contracting authorities or procured to perform public service obligations (PSOs), rather than bought by private operators for non-PSO routes. Properly representative data on the extent of publically- rather than privately-provided bus transport is not available, due perhaps to the fact that these services are variously provided by local government, publically-owned corporations, and privately-owned companies under different regulatory arrangements in different Member States. In a recent survey of 72 major organisations providing surface passenger transport in European cities, 57% were publically-owned (Boitani, Nicolini, & Scarpa, 2010). A UITP survey of passenger transport operators (UITP,

2012) indicated that around two-thirds were publically owned. As neither of these surveys were designed to achieve fully representative samples and no further information is available on the extent of PSOs, there is high amount of uncertainty over the proportion of buses that fall into scope of the CVD and therefore we set our least-conservative estimate of the possible extent of public procurement somewhat higher, at 75%, to represent the most “optimistic” assumption (the more pessimistic assumption is provided by our analysis of TED data).

Table 9-5: Estimated public sector bus procurement

	Evaluation estimate
Buses and coaches – total annual registrations	31,000
Buses – estimated total annual registrations	24,000
Buses – proportion procured by public sector or for performing public service obligations (high assumption)	75%
Buses procured by contracting authorities or transport operators performing PSOs per year	18,000

Source: Ricardo Energy & Environment analysis based on ACEA registration data; (Boitani, Nicolini, & Scarpa, 2010); (UITP, 2012); and (AEA 2011).

9.1.2. Estimation of the total number of publically procured vehicles

Having estimated contracting authorities’ share of new vehicle purchases, the final step is simply to multiply this share by the number of new vehicle registrations in each year as reported by ACEA.

Table 9-6 Estimated number of publically procured vehicles

	2012	2013	2014	Average per year	% of all registrations 2012-2014
Cars	409k	403k	403k	405k	3.4%
Van	39k	39k	43k	40k	2.8%
Truck	11k	12k	11k	12k	6.4%
Bus	17k	18k	18k	18k	75%

9.2. Estimation of volumes of publically procured vehicles procured via TED

Sections 2.2 and 6.4 explain that the estimated number of vehicles publically procured via TED is used as a conservative lower bound estimate of the number of vehicles that are actually affected by CVD rules, given that the legislation only obliges contracting authorities to apply those rules to contracts over a certain value. This section describes how TED data has been used to estimate the total number of vehicles procured through TED (for each vehicle type).

The first stage was to estimate total numbers of contracts in each vehicle category by performing a keyword search on all contracts for vehicle procurement. Table 9-4 summarises the results. Note that the keywords *fire*, *refuse*, *sweep*, *tractor*, *special* were also categorised under truck.

Table 9-7 Numbers of contracts in TED for purchasing different types of vehicle

Vehicle type	Number of contracts
Car	1555
Van	524
Bus	1481
Truck	4986

Source: Ricardo Energy & Environment analysis of data extracted from TED

Data on contract awards in TED typically does not include information on the *number* of vehicles procured, although by law it necessarily includes information as to the monetary *value* of the awarded contract. Therefore in order to estimate of the number of vehicles procured in each vehicle type (passenger car, van, bus, and rigid truck) it is necessary to divide the total expenditure found in TED by an estimated typical cost per vehicle.

The typical cost estimates that were used in this part of the analysis are derived from the survey of procurers – the survey explicitly asked procurers for both contract values and numbers of vehicles procured, making the estimation of typical per-vehicle costs straightforward. The following average values per procured vehicle were identified:

Table 9-8 Estimated typical prices of vehicles procured by contracting authorities

Vehicle type	Average value per vehicle
Passenger cars	€ 24,603
Buses/coaches	€ 252,806
Light commercial vehicles	€ 22,769
Truck	€ 136,371
Special service vehicles - waste collection trucks and services	€ 172,604
Special emergency service vehicles - ambulances, fire engines etc.	€ 232,865

Source: Ricardo Energy & Environment analysis of procurer survey. Note: prices are presented in real terms, with a price base of 2015

Based on the value of each tender divided by the average contract value per vehicle, an estimate of the number of vehicles procured for each vehicle type can be obtained. Table 9-9 summarises the results.

Table 9-9 Estimated number of vehicles publically procured via TED

	2012	2013	2014	Average per year	% of all registrations 2012-2014
Cars	23k	29k	34	29k	0.2%
Van	10k	7k	12k	10k	0.7%
Truck	8k	11k	13k	11k	5.9%
Bus	3k	4k	5k	4k	16.8%

9.3. Summary of public procurement volume analysis

A summary table of the final estimates of total procurement of vehicles by contracting authorities (both through TED, and more generally) is given in the Table 9-10. These are compared with the original impact assessment figures.

Table 9-10- Comparison of IA and evaluation assumptions in relation to the total number of vehicles procured on an annual basis

	Impact Assessment assumption	Evaluation assumption procured via TED	Evaluation assumption: total public procurement
Passenger cars	110,000	29	405
Vans	110,000	10	40
Heavy duty (freight) vehicles	35,000	11	12
Buses and coaches	17,000	4	18

Source: Ricardo Energy & Environment analysis (see paragraphs and tables above)

9.4. Other key parameters considered in the analysis

Lifetime vehicle mileages are a key parameter in determining the overall energy cost, CO₂ emissions and air pollutant emissions impacts in the analysis. We have drawn on recent studies of vehicle lifetimes and mileages for our estimates. For cars and vans, we have combined data on vehicle survival rates (in the form of a distribution over time since the vehicle was purchased) and mileages (again in the form of a distribution over time since the vehicle was purchased) from a recent study for the European Commission (Ricardo-AEA and TEPR 2015). For heavy duty vehicles, the data come from another recent study for the European Commission (AEA 2011). Note that our mileage assumption for rigid trucks differs very significantly from the assumption used by PWC in the 2007 impact assessment. Ours is an appropriate assumption for heavy duty vehicles performing a municipal utility role. The Impact Assessment's assumption of 1,000,000 km would be more appropriate to commercial trucks used for long-distance transport, not vehicles owned by contracting authorities.

Table 9-11-: Assumed vehicle mileages (in km) and lifetimes, by vehicle type

Vehicle type	Impact Assessment assumptions	Evaluation assumptions
Passenger car	16k × 10 years = 160k	Average 133k - 208k depending on fuel type
Van	21k × 10 years = 210k	Average 197k
Rigid truck (impact assessment: heavy duty non-passenger vehicle)	100k × 10 years = 1,000k	25k × 11 years = 275k
Buses (impact assessment: buses and coaches)	80k × 10 years = 800k	50k × 15 years = 750k

Source: Ricardo Energy & Environment analysis: Rigid truck assumptions taken from profile of "municipal utility" vehicle in (AEA 2011); Buses taken from profile of buses in (AEA 2011); passenger cars taken from profiles used in (Ricardo-AEA and TEPR 2015).

The impact assessment also made use of estimates available in 2007 of the social costs of CO₂ and air pollutant emissions. We have made use of more up-to-date estimates of these costs, which are generally higher. In particular, we take the EU-wide central estimates from the 2014 update to the EU's handbook on external costs of transport (Ricardo-AEA, DIW Econ et al. 2014).

Table 9-12 : Comparison of emissions cost factors used in the IA and the evaluation

	Impact Assessment assumption (2005 prices)	Evaluation assumption (2015 prices)
CO ₂ (€/kg)	0.02	0.072
NMHC (€/g)	Not modelled	0.0016
NO _x (€/g)	0.0044	0.0111
PM (€/g)	0.0871	0.0414

Source: Ricardo Energy & Environment analysis; evaluation emissions factors taken from (Ricardo-AEA, DIW Econ et al. 2014)

Finally, fuel costs (excluding tax) for each year of the analysis period are taken from (European Commission 2015d).

Table 9-13: Average European fuel prices in € per litre (excl. taxes and duties) for each year of the analysis period

	Diesel	Petrol
2009	0.49	0.46
2010	0.60	0.57
2011	0.74	0.68
2012	0.79	0.74
2013	0.73	0.69
2014	0.68	0.65
2015 onwards	0.55	0.52

Source: (European Commission 2015d)

Note: prices are presented in real terms, with a price base of 2015

After 2015, we assume prices stay the same as in 2015 (Fuel prices are constantly in flux and difficult to project into the future). The energy costs implied by our fuel costs are shown in Table 9-14 alongside the impact assessment predictions.

Table 9-14: Comparison of energy costs (€/GJ) used in the IA and the evaluation

	Impact Assessment assumption (2005 prices)	Evaluation assumption (average values 2012-2040, in 2015 prices)
Diesel	16	16
Petrol	15	17

Source: Ricardo Energy & Environment analysis; original impact assessment

9.5. Estimation of passenger car and vans CO₂ effects

For passenger cars and vans, our method consists in looking at the vehicles procured under the CVD and comparing them with the wider market in terms of CO₂ performance. Doing this allows us to estimate an overall improvement in performance without data on the specific choices between sets of alternative vehicles that procurers faced – data which are not available to us.

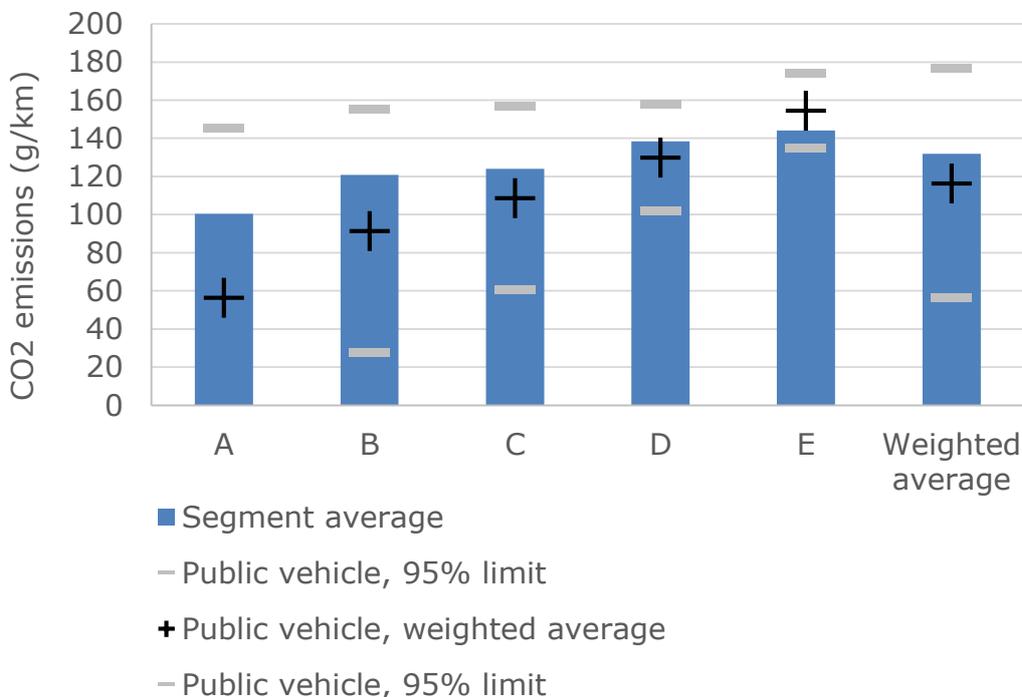
We fully acknowledge that vehicles procured by public authorities may differ in terms of CO₂ performance from the wider market for a number of reasons other than the CVD, including, most crucially:

- (1) Different needs of the public sector in terms of the size of vehicles needed (for example, the public sector might need more medium cars and fewer estates)
- (2) Greater emphasis on total cost of ownership in public procurement regardless of the Directive

In order to control for the effect of the first point, instead of just comparing average CO₂ emissions of all passenger cars bought by public authorities with average CO₂ emissions bought in the wider market, we calculated the average CO₂ performance in each individual mass segment A, B, C, D, E. (Sample sizes for typical CO₂ performance in the other segments were too small to facilitate meaningful analysis). Therefore we were comparing the CO₂ performance of publically procured vehicles with the CO₂ performance of privately procured vehicles of the same size, and eliminating the effect of differences in the typical sizes of public and private vehicles from our estimate of the effect on performance.

After controlling for differences in the mass (segment) distribution of vehicles, we found that public sector respondents' vehicles were 12% more efficient in terms of CO₂ than the wider market average, and respondents' choice of vans was on average 5% more efficient. Figure 9-1 shows the average CO₂ emissions of contracting authorities' vehicles versus the average emissions performance of vehicles procured in the wider market at the same time, per vehicle segment.

Figure 9-1: CO₂ emissions by vehicle segment - cars procured by contracting authorities 2012-2015 versus cars procured in the wider market at the same time

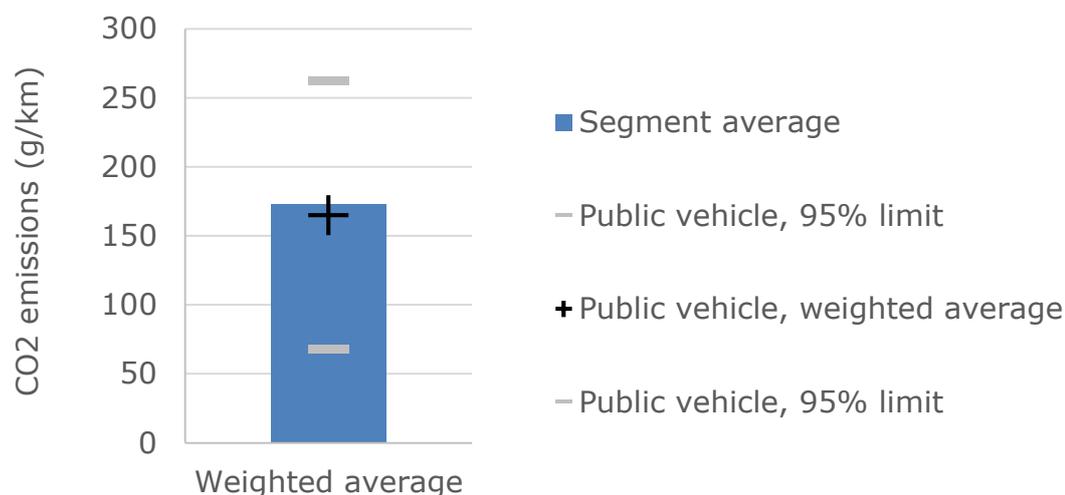


Source: Ricardo Energy & Environment analysis of procurer survey

Note: confidence intervals are computed as if CO₂ emissions of vehicles are normally distributed. As a number of the vehicles in the sample are fully electric (and therefore have zero emissions) the sample is in fact bimodally distributed, and not normal, therefore the confidence intervals probably overstate the actual uncertainty in the estimates. Also note that although the average emissions of public vehicles in segment E are higher than

average emissions in the wider market, the confidence intervals indicate this could be nothing more than sampling variation.

Figure 9-2: CO₂ emissions for vans procured by contracting authorities 2012-2015 versus vans procured in wider market at same time



Source: Ricardo Energy & Environment analysis

Note: confidence intervals are computed as if CO₂ emissions of vehicles are normally distributed. As a number of the vehicles in the sample are fully electric (and therefore have zero emissions) the sample is in fact bimodally distributed, and not normal, therefore the confidence intervals probably overstate the actual uncertainty in the estimates.

These figures must be treated with caution because they are based on small sample sizes from an unknown sampling frame, and respondents to our survey gave somewhat limited descriptions of the exact make and model of each vehicle procured, and therefore we have had to make assumptions about exactly which specific model of the vehicle was chosen.

The second issue (greater emphasis on total cost of ownership in public procurement regardless of the Directive) essentially means that any difference in the CO₂ performance of vehicles of a similar size might be entirely attributable to greater emphasis on total cost of ownership in public procurement *independent of CVD effects*. Therefore, we believe that it is entirely possible that the actual effect of the CVD on CO₂ performance is as low as 0%. On the other hand, a more optimistic view on the CVD's effects would be that the CO₂ performance differential we currently observe between public and private sector is entirely attributable to the effect of the CVD.

One indication we have from the survey about the maximum extent to which the CVD might have actually changed the public sector's approach to CO₂ efficiency is that approximately 54% of respondents indicated that the environmental criteria they had in place with respect to CO₂ were at least as strict in 2012. Therefore, rather than taking the full 12% public-private differential in CO₂ for passenger cars as our maximum estimate of the CVD's effects, we have taken 12% multiplied by the percentage of respondents indicating that they had tightened environmental criteria over time (46%) to obtain a maximum estimate of 5.5%. For vans, performing a similar calculation, the answer we obtain is 2.3%.

We emphasise that the 46% of respondents who have tightened CO₂ criteria over time may have done so for reasons other than the CVD. These could include national initiatives to buy more clean vehicles, or a greater focus on operating costs in the public sector as a

result of the economic crisis. Therefore, we still regard it as entirely possible that the actual effect of the CVD on CO₂ performance was 0%.

Table 9-15 summarises the estimated impacts on CO₂ performance of publically procured vehicles in the evaluation versus those included in the impact assessment.

Table 9-15: Comparison of IA and evaluation assumptions used to estimate impact on CO₂ emissions

		Impact Assessment assumption <i>Internalisation of costs scenario</i>	Evaluation assumption	Source of evaluation assumption
Passenger cars	Change in CO ₂ performance	46% reduction in cost of WTW GHG emissions	Maximum 5.5% improvement in TTW CO ₂ emissions	Analysis of procurer survey
	Associated change in purchase costs	9.0% increase	1.7% increase	Observed relationship between CO ₂ performance and purchase costs
Vans	Change in CO ₂ performance	4.7% <i>increase</i> in WTW GHG emissions	Maximum 2.3% improvement in TTW CO ₂ emissions	Analysis of procurer survey
	Associated change in purchase costs	23% increase	1.0% increase	Observed relationship between CO ₂ performance and purchase costs
Heavy duty freight vehicles	Change in CO ₂ performance	20% reduction in WTW GHG emissions	No change in CO ₂ performance	Analysis of stakeholder feedback
	Associated change in purchase costs	12% increase		
Buses and coaches	Change in CO ₂ performance	13% reduction in WTW GHG emissions		
	Associated change in purchase costs	14% increase		

Source: Ricardo Energy & Environment analysis

9.6. Estimation of air pollutant benefits effects

9.6.1. Air pollutant benefits

Available evidence on this is drawn from those applying the minimum standards option. We assume effects would have been similar for procurers applying the other commonly used option (award criteria).

Many respondents to the survey had adopted EURO standards as minimum criteria for local air pollution, but the vast majority were simply applying the EURO standard that was already obligatory. Only 1% of procurers demanded a EURO standard that had been defined but not yet made obligatory, and on average this was demanded 6 months before the standard became obligatory.

Therefore we have modelled the effect of EURO standards being introduced 6 months early for 1% of all procured vehicles. This was done by assuming that new vehicles' air pollutant

emissions performance is in line with ICCT estimates of real-world NMHC, NO_x and PM emissions per km.

9.6.2. Dieselisation

Additional dieselisation is a possible consequence of the inadvertent bias in the monetisation methodology towards diesel vehicles (the analysis supporting this assessment is provided in Annex 9). Therefore an ancillary analysis was conducted to investigate the possible extent of dieselisation resulting from the Directive, and its effects on pollutant emissions. As described in the main text of the report, our estimate of the extent of Dieselisation is based on analysis of the procurer survey.

In the dieselisation scenario it is assumed that a 0.2% reduction in CO₂ emissions comes from dieselisation. This is a small part of the overall reduction in CO₂ emissions (recall that the overall reduction is 5.4%). Dieselisation will have an adverse effect on air pollutant emissions, which we have estimated through use of TREMOVE data on typical CO₂ and pollutant emissions of passenger cars in the EU.

The TREMOVE model includes real-world (rather than test cycle) emissions of typical passenger cars of different fuel types. We extracted the per-km average CO₂ and air pollutant emissions factors of the EU parc in 2010 from the TREMOVE model, and used these to estimate the air pollutant impact of abating CO₂ if done by substituting a typical petrol vehicle with a typical diesel vehicle.

By comparing the fleet-average CO₂ and pollutant emissions profiles of diesel and petrol passenger cars, elasticities of pollutant emissions with respect to CO₂ emissions in the context of dieselisation were estimated. The elasticities are shown in Table 9-16

Table 9-16 – Difference between test cycle and real world emissions on the basis of TREMOVE model and derived elasticities

Differences in real-world emissions				Elasticity of pollutant emissions with respect to CO ₂ emissions		
CO ₂	NMHC	NO _x	PM	NMHC	NO _x	PM
-12%	-89%	79%	1911%	7.6	-6.7	-162.3

Source: Ricardo Energy & Environment analysis of TREMOVE data

The elasticities of NMHC emissions, PM emissions, and NO_x emissions with respect to CO₂ emissions were then used in combination with the assumption of a 0.2% dieselisation-related reduction in CO₂ to estimate the effect of CVD-related dieselisation on air pollution.

The result is that dieselisation wipes out the modest air pollutant benefits associated with early adoption of EURO standards. Instead, due to the dieselisation of passenger cars, the overall impact of the Directive on air pollutant emissions is adverse (with the monetised additional air pollutant costs of the policy being in place from 2012 to 2014 amounting to €2.2M to €31.4M). Results of the dieselisation scenario (which still includes the air pollutant benefits associated with early adoption of EURO standards) are given in detail in section 6.4.3.

9.6.3. Summary of assumptions and comparison with Impact Assessment

Table 9-17 summarises the evaluation assumptions on air pollutant effects and contrast these with those made in the Impact Assessment.

Table 9-17: Comparison of IA and evaluation assumptions used to estimate impact on air pollutant emissions

	Impact Assessment assumption	Evaluation assumptions		Source of evaluation assumptions
		EURO standards	Other changes	

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

	Internalisation of costs scenario			
Passenger cars	100% switch to CNG; Large improvement in air pollutant emissions	1% adopt EURO 6/VI early (on average, 6 months early)	Central scenario assumes no extra Dieselisation. Dieselisation scenario assumes small proportion of improvement in CO ₂ comes from switching from petrol to diesel vehicles	Analysis of procurer survey
Vans	100% switch to CNG; Small adverse effect on air pollutant emissions		No extra dieselisation as petrol represents a negligible portion of purchases of these vehicle types	Analysis of procurer survey
Heavy duty freight vehicles, buses and coaches	100% switch to hybrid electric; Large improvement in air pollutant emissions			Analysis of stakeholder feedback

Source: Ricardo Energy & Environment analysis

10. ANNEX 2: EU LEVEL STAKEHOLDER INTERVIEWS

EU-level stakeholder groups were contacted in order to invite them to participate in telephone interviews, including city networks, fuel and energy associations, manufacturer associations, procurers and fleet owners, NGOs and consumer associations. The purpose of these interviews was to ask them about their views as part of the evaluation. Twelve were interviewed and a further nine were engaged (but not interviewed) (see Table 10-1). Several did not respond or declined the opportunity to be interviewed as a result of a lack of knowledge of the Directive and its impacts. All organisations were contacted at least twice. EU-Level stakeholders were asked questions closely linked to the 13 evaluation questions (as set out in Section 3).

Table 10-1: Summary of engagement with EU-Level Stakeholders

Category of stakeholder	Interviewed or have provided a written response (11)	Have been engaged, but no interview was undertaken	No response	Declined to be interviewed, and have not provided a written response
City networks	ICLEI	CEMR, EMTA, Eurocities, POLIS		
Fuel and energy associations	EBA (biogas), EBB (biodiesel), EBTP (biofuels), EHA (hydrogen), Eurelectric (electricity), FCH-JU (fuel cells), Eurobat (batteries)	Fuel Cell Industry Association	AEGPL (LPG), ASFE (synthetic fuels), CONCAWE (fossil fuels), EFOA (fuel oxygenates), ePURE (renewable ethanol)	Fuels Europe (fossil fuels), but circulated request to their members
Manufacturer associations, vehicles	ACEA, NGVA (gas vehicles)	CLEPA (suppliers)	JAMA, EUCAR (research), EARPA (research organisations)	KAMA, ERTRAC (research)
Procurers, fleet owners		UITP (public transport), LeaseEurope (leasing companies),		IRU (haulage)
Users, consumers, environment	T&E (environment)	ECF (climate), FIA (drivers)		BEUC (consumers)

The views of the EU-level stakeholders as expressed during the interviews are summarised by question in this Annex. Additionally, the views of some cities are also covered here, as some of the city networks that were approached passed on the questionnaire to selected members of their respective networks. The questions that were asked in the EU level stakeholder engagement can be found in the respective boxes below. Some of these

questions focused on specific evaluation questions, while others focused on different issues. For each question asked, we make it clear in the respective box the evaluation question to which it relates. This section only reports on the findings of the EU level stakeholder interviews; the responses are analysed when discussed in the context of the respective evaluation questions in the main report.

Question 1: In your view, is increasing the market share of clean vehicles an adequate means of:

- a) Increasing the energy efficiency of transport?*
- b) Increasing the competitiveness of transport?*
- c) Decreasing transport's CO₂ and pollutant emissions?*

This question is effectively:

Evaluation Question 1: To what extent is increasing the market share of clean vehicles an adequate mean to contribute to the overall objectives of increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport?

In order to be sure that all elements of Evaluation Question 1 were addressed, interviewees were asked separately for their views on the three separate elements of the question, as presented in the box above.

Many interviewees believed that the questions were either not clear or too simple. A number questioned the use of the word 'adequate' in essence arguing that if 'adequate' was taken to mean 'enough' then the answer to the questions could not be 'Yes', as increasing the market share of clean vehicles is not the only way to achieve the specified aims. However, if 'adequate' was taken to mean 'beneficial', the respective answers were more likely to be 'Yes'. Others commented that the question was difficult to answer as it was not clear what was meant by a 'clean vehicle', with different vehicle technologies contributing differently to the stated aims. In relation to the specific sub-questions, the responses were more positive for energy efficiency (sub-question a) and emissions (c; indeed many respondents did not make a distinction between their responses to these two questions), than for competitiveness (b).

Interviewees generally agreed that increasing the market share of clean vehicles would increase the energy efficiency of transport (sub-question a), although many of these positive responses were qualified or conditional. In this respect, interviewees highlighted that it depended which technology was being substituted and what it was being substituted by, with some highlighting that electric vehicles (including those using hydrogen) were more efficient, while others mentioned gas vehicles in this respect. Additionally, it was noted that sometimes a vehicle with less conventional pollutants uses more energy, e.g. with some changes in previous Euro standards for buses, which underlines that there is not always an automatic correlation between a clean and an energy efficiency vehicle. It was also noted that the energy efficiency of some technologies is developing faster, and has more potential to deliver than others, particularly the technologies that are currently less common (e.g. electricity, gas, etc.). Others highlighted that increasing the market share of clean vehicles only partially delivered this aim as other measures could also be used and that a comprehensive approach was important. Similarly interviewees generally agreed that increasing the market share of clean vehicles would decrease transport's CO₂ and pollutant emissions (sub-question c), although with many of the same caveats as were

mentioned in relation to energy efficiency. The need to take account of well-to-wheel emissions was also noted in this respect.

There was a less conclusive response with respect to whether increasing the market share of clean vehicles would improve transport' competitiveness (sub-question b). This was at least partially to do with the phrasing of the question, as many considered it to be too vague, e.g. it was not clear whether the 'competitiveness' that was being referred to was that of the EU automotive industry, of EU industry more generally, of clean vehicles compared to "other" vehicles or of cities. Some responded positively if the question referred to the competitiveness of the EU automotive industry, while others noted that the main driver of the competitiveness of this industry was the fact that it was simply a competitive sector and so additional measures were not needed in this respect. Other interviewees interpreted the question as referring to the clean vehicles themselves. Even with this interpretation responses were mixed, as some argued that the current, relatively high costs of purchase of clean vehicles demonstrated that these vehicles were not competitive, whereas others argued that many were, or at least will be in the future, once the total cost of ownership has been taken into account. In the latter case, it was then argued that there would be benefits for the competitiveness of EU industry more generally.

Question 2: In your view, which of the following measures do you consider to be most important, and which potentially useful, in terms of stimulating demand for clean and energy efficient vehicles?

- a) Legislation to improve the efficiency of vehicles, e.g. the EU's car and van CO₂ Regulations*
- b) Vehicle taxation in favour of clean and energy efficient vehicles*
- c) Requiring that energy and environmental considerations are taken account of in public procurement*
- d) Providing subsidies for the purchase of clean and energy efficient vehicles*
- e) Providing information to potential users on the benefits of clean and energy efficient vehicles*
- f) Legislation/policies to reduce emissions in urban/highly populated areas, e.g. low emission zones*
- g) Other, please?*

This question aims to identify views in order to inform:

Evaluation Question 2: To what extent is stimulating the public procurement of clean vehicles an adequate mean to contribute to the overall objectives of increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport?

The most important instruments identified by stakeholders for stimulating the demand for clean and energy efficient vehicles were vehicle taxation (option b) and legislation to improve the fuel efficiency of vehicles (a), followed by urban policies (f) and subsidies (d); requiring that energy and environmental considerations were taken account of in public procurement (c) and the provision of information (e) were not seen as being as important. Those who considered vehicle taxation to be most important, and also to some extent subsidies and urban policies, argued that these were important as they directly affect the price that users pay. On the other hand, those that favoured legislation on fuel efficiency (and also to a lesser extent urban policies) argued that these were most important as they

delivered certainty. It was noted that a way of overcoming the absence of a common EU-level approach for estimating the CO₂ emissions of buses was to use the UITP's Standardised On-Road Test (SORT) cycles. As a result of the explanations for option c (i.e. requiring that energy and environmental considerations are taken account of in public procurement), it was clear that stakeholders' respective poor views on the effectiveness of the Directive was a significant reason for the low importance assigned to this option (see response to question 4), as elsewhere there were more positive views about the potential role of public procurement (see response to question 3). A distinction was also made by vehicle type, as it was considered to be good to require public procurers to consider the environmental impacts of buses in their purchase decisions. With respect to information, the relatively low importance was due to a belief that there was already a fairly high level of awareness about different vehicle technologies, although a couple of stakeholders suggested that information about the relative total costs of ownership need to be communicated better. The stakeholders noted that there were 'other' measures that were also important: measures to development infrastructure for clean vehicles (mentioned twice), credits to encourage their development, purchase and use and by setting incentives for bus operators to reduce emissions throughout the term of their public service obligation (rather than simply prior to tendering).

Question 3: In your view, is stimulating the public procurement of clean vehicles an adequate means of:

- a) Increasing the energy efficiency of transport?*
- b) Increasing the competitiveness of transport?*
- c) Decreasing transport's CO₂ and pollutant emissions?*

This question is effectively:

Evaluation Question 2: To what extent is stimulating the public procurement of clean vehicles an adequate mean to contribute to the overall objectives of increasing the energy efficiency and competitiveness and decreasing CO₂ and pollutant emissions of transport?

The only difference between question 3 and the first question (and between Evaluation Questions 1 and 2) is that this question refers to "stimulating the public procurement of clean vehicles" rather than "increasing the market share of clean vehicles". In response many stakeholders answered in a similar way as they had done to the first question (see above) and some simply referred the interviewer to their previous answers. These arguments will not be repeated here. Those that responded with respect to public procurement generally underlined that it was a good means of either meeting the stated aims or more generally of increasing the market share of clean vehicles. Other respondents

Question 4: Is the Directive effective in delivering the above impacts?

This question aims to contribute of the evaluation of 'effectiveness', generally (in terms of whether the objectives of the Directive have been met), rather than any of the specific evaluation question.

again noted that public procurement delivered the stated aims as part of a wider approach, although one argued that public procurement was counter to competitiveness, as it artificially stimulated demand.

The majority of responses to question 4 were negative, although it was also noted that this was difficult to assess. The reasons provided for the negative responses included:

- Until recently there have been few relevant vehicles available on the market, so the Directive was in place before the vehicles existed.
- The complexity of the Directive.
- The stakeholder had not seen any evidence of its impacts.
- Applying the methodology leads to the purchase of diesel vehicles, particularly buses.
- The monetisation methodology prioritises fuel consumption and CO₂ emissions over pollutant emissions, even though in many cities air quality is a major problem.
- The application of the monetisation methodology in the course of procurement is not how procurers decide on which vehicles to buy. Such a methodology would be applied before the decision to procure in order to decide which type of vehicle to procure. A procurer would then launch a procedure to buy vehicles with the chosen technologies.

Several respondents said that the Directive had had no impact in the Member State with which they were most familiar or in the cities that they represented, although some of the city representatives did note that the Directive (or at least their involvement in the Clean Fleets project; see Annex 10) had influenced the way in which they procured some vehicles.

Those who were more positive about the effects of the Directive argued that it had succeeded in focusing attention on green public procurement in the vehicle sector.

Question 5: Could the effects of the Directive have been achieved at less cost (e.g. through other or additional measures)?

This question is effectively:

Evaluation Question 7: Could the effects have been achieved in a more efficient way (e.g. through other or additional (legislative) measures)?

Stakeholders had few views as to whether the effects of the Directive could have been achieved at least cost (question 5). The main reasons for this were the perceived lack of effects (see above) and a lack of knowledge of the costs associated with the Directive. It was underlined again by a few stakeholders that the Directive is only one of many pieces of legislation that aim to deliver the same objectives. Other stakeholders discussed deficiencies in other legislation in response to this question, notably the discrepancy between real world and test cycle emissions as measured for the passenger car CO₂ Regulation and the lack of similar legislation for heavy duty vehicles. It was also argued that the impacts would have increased (and therefore the efficiency improved) if there had been a real obligation in the Directive or if the legislation had been a Regulation that was directly applicable in Member States. Another stakeholder argued that there was a risk that the efficiency of the Directive could be adversely affected if it resulted in investment in less mature technologies.

Question 6: Would it have been possible to obtain similar or better results in terms of increasing the market share of clean vehicles without the Clean Vehicles Directive?

This question is effectively:

Evaluation Question 8: Would it have been possible to obtain similar or better results in terms of the market share of clean vehicles without EU intervention, i.e. the Clean Vehicles Directive?

As with question 5, few stakeholders had any views as to whether it would have been possible to obtain similar or better results without the Directive (question 6). Again, this was partly due to the perceived lack of results from the Directive. In response to this question a number of stakeholders again noted that the Directive is part of a package of measures and as a result other measures could also be used to increase the market share of clean vehicles, such as improving the passenger car CO₂ Regulation and making it more stringent, tax incentives and more central government support to regional and local authorities (see also the answers to question 2, above). It was also suggested that more effort should go into looking at how the purchase of clean vehicles might be supported financially, e.g. with mechanisms set up by the EIB. A couple of stakeholders did, however, underline the important role that public procurement has to play in increasing the market share of clean vehicles. It was suggested that clean vehicles would be introduced without the Directive, but over a longer time period.

Question 7: Are you aware of any exchange of good practices between contracting authorities in different Member States that have been initiated or supported by the Directive or the associated initiatives (i.e. Clean Vehicle Portal, Clean Fleets Project)?

This question aims to contribute to:

Evaluation Question 9: To what extent have the Directive and the associated Commission initiatives (e.g. Clean Vehicle Portal, Clean Fleets Project) initiated and/or supported a recognised exchange of good practices between contracting authorities in different Member States?

Even though both the Clean Vehicle Portal and Clean Fleets project were mentioned in question 7, only one stakeholder referred to the good practice exchange that has been undertaken in the course of the Clean Fleets project (see Annex 10). Generally, stakeholders responded that they were not aware of any good practice exchange between contracting authorities in Member States. In relation to the Portal more generally, some thought that it was a good idea, but that it was not easy to use; others questioned whether it was up-to-date (as mentioned in Annex 10, the Portal had not been recently updated at the time of writing). One challenge with respect to the Portal that was mentioned was that of keeping it sufficiently up-to-date and relevant for 28 national markets, particularly when there were some similar national websites in place.

It was suggested by one stakeholder that there was a need to widen the reach of projects such as Clean Fleets to the majority of EU cities that do not become involved in such projects.

Question 8: To what extent are the provisions of the Clean Vehicles Directive complementary to, or made redundant by, the new horizontal EU procurement legislation?

This question is effectively:

Evaluation Question 12: To what extent are the provisions of the Clean Vehicles Directive coherent, complementary and/or redundant with the horizontal EU procurement legislation (in particular 2014/24/EU and 2014/25/EU)?

Few stakeholders were sufficiently familiar with the provisions of the horizontal EU procurement legislation to be able to answer question 8. The two that believed that the CVD was complementary with the horizontal legislation, as the latter did not contain an obligation to take account of environmental considerations, whereas the CVD was one of the few obligations in this respect. It was noted that this approach was in line with the Commission's stated aim of setting public procurement obligations on a sector-by-sector basis.

Question 9: In your view, would the market develop differently if the Directive was partially or completely repealed?

This question aims to contribute to answering:

Evaluation Question 13: To what extent would the market develop differently should the intervention be ceased partially or completely at European level?

Question 9 was another that many stakeholders had difficulty in answering, again partially as a result of the perceived lack of impact discussed above. A number of stakeholders said that it would give the wrong political message if the Directive was completely repealed and so argued that it should be improved instead, although one stakeholder did suggest replacing the Directive with a legislative framework that drew on California's zero emission vehicle mandate. Another stakeholder argued that the Directive should be simplified along the lines of the approach taken in Sweden, where a clean vehicle is defined and this definition is then used in public procurement decisions and is increasingly being adopted in the private sector. Other views were that the repeal of the Directive would not make any difference at all to the market, particularly in those Member States and cities that had been taking action to clean their vehicle fleets, while another suggested that the market would probably develop more slowly in the absence of the Directive. A couple of stakeholders highlighted the importance of the awareness raising aspect of the Directive, particularly amongst those local authorities that were not previously taking account of energy and environmental considerations when purchasing road transport vehicles.

Question 10: In your view, would the market develop differently if the only option provided by the CVD for including energy and environmental impacts in the purchasing decision was the harmonised monetisation methodology for the calculation of operational lifetime costs?

This question aims to contribute to answering:

Evaluation Question 13: To what extent would the market develop differently should the intervention be ceased partially or completely at European level?

There were stronger views (compared to question 9) in response to question 10 about how the market might develop if only the monetisation methodology was retained. In this respect, several stakeholders suggested that the market would be likely to move in a negative direction (considering the stated aims that were the subject of question 1, as discussed above) if only the monetisation option was retained, as a result of the application of this methodology generally favouring diesel vehicles (see Annex 9). A number of issues were raised in relation to the methodology, including:

- There is not enough weight given to environmental factors, whereas more weight is given to energy efficiency. This is an issue for cities that have air quality problems and so are trying to reduce their NO_x and particulate emissions.
- It uses a hypothetical cost of fuel, rather than a real one.
- There is no consideration of well-to-wheel emissions. This favours electric vehicles as these have no in-use emissions and ignores how the electricity is produced. In this way, there is no advantage of using sustainable biofuels over conventional fuels.
- It is relatively complex, which can lead to it being implemented incorrectly.

It was suggested that the existence of such issues questioned whether a rigid, top-down approach to such a methodology was appropriate. A number of stakeholders felt that an appropriate monetisation methodology could be useful, as long as it could be agreed.

Question 11: A potential future action might be to expand the scope of the CVD, or for the Commission to introduce another initiative, in order to stimulate the uptake of clean and energy efficient vehicles in large, privately-operated fleets.

*a) In your view, would it be appropriate to **expand the scope of the CVD** to stimulate the uptake of clean and energy efficient vehicles in large, privately-operated fleets?*

*b) In your view, would it be appropriate for the Commission to **introduce another initiative** to stimulate the uptake of clean and energy efficient vehicles in large, privately-operated fleets?*

c) If you think that either of the above would be appropriate, what form might this take?

This question does not directly address an evaluation question, but was taken into consideration in response to:

Evaluation Question 7: Could the effects have been achieved in a more efficient way (e.g. through other or additional (legislative) measures)?

Typical responses to question 11 on the potential expansion of the scope of the Directive to private fleets were that this would make sense as these fleets are large and have a role and responsibility to reduce their emissions, but that it was not clear how this might be achieved in practice. It was noted that these fleets are different to public fleets, so any provisions would have to be well thought through. One stakeholder suggested extending the scope of the Directive to light commercial vehicles, while another suggested that private fleets should be required to at least look at the options of using clean vehicles. On the other hand, it was suggested by a couple of stakeholders that rather than expanding the scope of the Directive, at this point the focus should be on making the provisions of the Directive work better, particularly the monetisation methodology. It was also suggested that it would be appropriate to apply the Directive to large privately-owned bus fleets that compete for public tenders, as long as it was clear the level of environmental performance that should be reached. Another suggested that business calculations already take account of taxation and car performance and so an additional measure in this respect was not appropriate.

Some responses mentioned the importance of other measures for cleaning private fleets, including addressing the difference between real world and rest cycle emissions that affect the passenger car CO₂ Regulation (as mentioned above), local prohibitions on the most polluting vehicles, the harmonisation of tax incentives at the EU level, vehicle taxation in favour of more efficient vehicles and the use of financial incentives, generally.

Question 12: We are interested in identifying whether there have been innovative approaches to procurement or joint procurement activities that have been implemented as a result of the Directive.

a) Are you aware of any innovative or joint procurement activities that have been implemented as a result of the Directive?

b) In your view, are innovative and/or joint procurement activities encouraged and/or facilitated by the Directive?

This question does not directly address an evaluation question, but was taken into consideration in response to:

Evaluation Question 9: To what extent have the Directive and the associated Commission initiatives (e.g. Clean Vehicle Portal, Clean Fleets Project) initiated and/or supported a recognised exchange of good practices between contracting authorities in different Member States?

Beyond the references to joint procurement in the context of the Clean Fleets project (see Annex 10), no stakeholder was aware of any innovative or joint procurement activities that had been implemented as a result of the Directive, while none had any views on whether such activities are encouraged or facilitated by the Directive. A couple of stakeholders mentioned some joint procurement that had been undertaken, or were being planned, e.g. in Sweden (see Annex 10) and potentially a group of regional authorities to buy hydrogen vehicles, but did not believe that any of these were the result of the Directive. A number of stakeholders noted that joint procurement was difficult, even within a country, particularly when non-standard vehicles were being bought.

Question 13: Currently, there are no reporting requirements on Member States within the Directive; the Directive only requires the Commission to produce regular monitoring reports on the impact of the Directive.

- a) Do you think that the current monitoring and reporting provisions on the Commission are adequate for the effective assessment of the impacts and operation of the Directive?*
- b) Would introducing monitoring and reporting obligations on MS contribute to the effective assessment of the impacts and operation of the Directive in a cost-effective way?*

This question does not directly address an evaluation question, but was taken into consideration in response to:

Evaluation Question 7: Could the effects have been achieved in a more efficient way (e.g. through other or additional (legislative) measures)?

Question 13 was asked in order to inform the development of options for the assessment presented in Annex 13 with respect to the introduction of potential monitoring and reporting requirements on Member States. The majority of stakeholders felt that the current reporting requirements were inadequate; most of the remainder did not express a view. Hence, most supported some form of reporting obligation on Member States. A couple of stakeholders argued that the lack of reporting requirements on Member States was one of the reasons why the Directive had not been effective, as if they had no reporting obligations it reduced the motivation for action. It was also argued that without reporting from the Member States, it was difficult to have the information to properly inform revisions to the Directive.

Suggestions for Member State reporting included:

- Member States should be required to report on the implementation of the Directive at regular intervals, say every three years.
- Member States be required to report on clean transport activities more generally, which would include the CVD.
- Use the Clean Vehicle Portal to facilitate Member State reporting.
- Use the alternative fuels infrastructure Directive to support reporting under the CVD, as the latter could be seen as a mechanism to implement the former.

On the other hand, a representative from a city was not convinced that reporting requirements on Member States would achieve much, as even within individual countries, where lists of procurers known, it takes a long time to bring all the necessary information together.

Concluding remarks

A number of stakeholders provided general remarks rather than answering the questions addressed above, while some others made concluding remarks at the end of their respective interviews. In the former category, one stakeholder stated that they agreed with most of the comments made at the workshop, particularly that public procurement should be a driver for the electrification of transport. Another responded that their members had seen little impact from the Directive and that the monetisation methodology had caused a fair amount of confusion, as it is complicated, focuses on in-use emissions only and often leads to the choice of diesel vehicles, which is contrary to the EU's wider objectives of reducing oil dependency and the wider climate and environmental objectives.

Another stakeholder noted that there was a big difference in attitudes to the CVD in different countries. In those countries that had already implemented green public procurement for vehicles, such as in Sweden, there is a sense that the Directive is holding them back. However, in the newer Member States, the view is generally more positive as the Directive has forced policy makers to think about green procurement in the context of vehicles.

It was also argued that the Directive should be applied to the Commission, as it should lead by example. This would demonstrate the leadership that is needed. It was suggested by another that the Directive needs to provide a strong, clear legislative pathway; this might be more painful politically in the short-term, but it would deliver a clearer policy framework.

Another stakeholder noted the contractual challenges faced by operators that use buses with new technologies, particularly the length of contracts during which buses are operated, the uncertainty associated with technological developments and the period over which returns on investments can be recouped. For electric buses, additional challenges were the need to install recharging points, train staff and exploit bus depots differently, which were not always appreciated by public authorities. It was argued that the EU's clean vehicle procurement legislation needs to be implemented alongside a range of other actions to reduce emissions. Finally, it was noted that a distinction might be made between a 'clean fleet', which focuses on reducing air pollutant emissions, and a 'green fleet' in which the focus is on reducing CO₂ emissions.

11. ANNEX 3 - WIDER EU STAKEHOLDER WORKSHOP – AGENDA, ATTENDEES AND SUMMARY

The study team organised and delivered a half-day stakeholder workshop on Friday 17th April 2015 in Brussels aimed at wider EU stakeholders (afternoon session). A background paper was circulated including details of the study, the methodology, summary of the tasks (including progress to date) and key questions (where appropriate).

Invitations to attend the workshop were sent to 59 stakeholder across a range of interest areas, of which 21 attended.

The agenda, full list of participants and summary of the Stakeholder workshop can be found in this Annex.

Agenda

Wider EU Stakeholder Workshop Agenda

- Welcome (EC)
- Overview of the ongoing evaluation study (Ricardo-AEA/TEPR)
- Implementation of the CVD (Ricardo-AEA/TEPR)
- Task 8: An assessment of the options referred to in Article 5(3) (Ricardo-AEA/TEPR)
- Task 9: Assessment of the methodology for monetised costs (Ricardo-AEA/TEPR)
- *Comments of participants*
- Possible improvements to the Directive – addressing the evaluation questions and developing policy recommendations (Ricardo-AEA/TEPR)
- Summary and wrap-up (EC)

Attendees

Name	Organisation
European Commission	
Van Honacker, Mr Hugues (Chair) DG MOVE	
Fernandez Garcia, Mr José (Chair)	DG MOVE
Önel, Mr Kemal	DG MOVE
Van de Schouw, Mr Guus	DG MOVE
Contractors	
Brannigan, Ms Charlotte	Ricardo-AEA
Skinner, Mr Ian	TEPR
Luckhurst, Mr Stephen	Ricardo-AEA
Representing Member States	
Uhlik, Mr Krisztián	
Asplund, Mr Erik	Finnish Transport Safety Agency (Trafi)
Ågren, Ms Ulrika	Swedish Transport Agency (Transportstyrelsen)

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Moran, Mr Bob	UK Office for Low Emission Vehicles (OLEV)
Representing Industry and Consumers	
Aab, Ms Liz	Alliance for Synthetic Fuels in Europe (ASFE)
Brangeon, Mr Victor	Federation Internationale de l'Automobile (FIA)
Caramizaru, Ms Aura	Eurelectric
Cervilla, Mr Luis	Alliance for Synthetic Fuels in Europe (ASFE)
Di Stefano, Ms Amalia	CLEPA
Dolejsi, Mr Petr	ACEA
Maedge, Mr Matthias	Natural & bio Gas Vehicle Association (NGVA Europe)
Reijalt, Ms Marieke	European Hydrogen Association (HyER)
Scarsi, Mr Gian Carlo	Eurelectric
Schroeder, Mr Rene	Association of European Automotive and Industrial Battery Manufacturers
Vega, Mr Nicolas de la	Euro Biogas Association (EBA)
Witkamp, Mr Bert	The European Association for Electromobility (AVERE)
Carroll, Mr Chris	European Consumers' Organisation (BEUC)
Representing local/city government and city networks	
Barrera, Ms Gabriela	
Catlow, Mr Ian	Greater London Authority (GLA)
Clement, Mr Simon	Local Governments for Sustainability (ICLEI)
Ericson, Mr Jonas	City of Stockholm
Flin, Mr Cédric	Council of European Municipalities and the Regions (CEMR) (CCRE – Francais)
Köhler, Ms Dagmar	European Cities and Regions networking for innovative transport solutions (POLIS)
Neirotti, Mr Ivan	EUROCITIES

Summary of the workshop

Welcome

Mr Van Honacker (DG MOVE, Unit C.1) welcomed participants and gave an introduction to the purpose of the workshop and the evaluation.

Overview of the ongoing evaluation study

The contractors gave a presentation on

- **Overview of the ongoing evaluation study**
 - Aims/objectives
 - Tasks
 - Methodology (including progress to date with tasks)

- **Implementation of the CVD**
 - Overview of MS fiche info
- **Task 8: An assessment of the options referred to in Article 5(3) – status of options allowed in transposed legislation.**
 - Overview of task, its aim and method
 - Options allowed in each MS/included in NIMs
 - Snapshot of survey feedback on which options had been used in procurement actions.
- **Task 9: Assessment of the methodology for monetisation of costs**
 - Overview of task, its aim and method
 - Description of the monetisation methodology
 - Feedback from MS fiches / Interviews / Surveys
 - Initial calculations/case studies

Round table discussion

Local city governments and networks	<p>ICLEI also conducted a survey on the monetisation methodology, and found that almost nobody had applied it. ICLEI had discovered only two applications of it, and in one of those cases, there was just a single tender.</p> <p>The methodology is complex, and not understood by procurers and suppliers. ICLEI is sceptical that anyone will apply a methodology this complex.</p> <p>Furthermore, ICLEI suspects it will not have the impact procurers want it to have. The procurers who might want to apply it are presumably ones with a progressive approach to clean vehicles. But these people will realise that the monetisation methodology will not yield the desired result.</p> <p>It was argued that a major issue with the methodology is the predominance of energy efficiency over pollutant emissions. It was argued that improving energy efficiency should be seen as a means to an end, rather than an end in itself – the end is to improve CO₂ and pollutant emissions. Therefore if the methodology is retained it needs to be substantially revised.</p> <p>The methodology also cannot be applied to certain heavy duty vehicles at present.</p>
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Industry and consumers	<p>Some stakeholders in this group argued that cities will find that the monetisation parameters in the directive will not relate to their perspective. In principle, they were in favour of allotting costs to pollutant emissions – but argued that the explanation and tools provided in the Directive are not helpful. It was felt that the monetisation option currently causes more confusion than help.</p> <p>A stakeholder representing an alternative fuel technologies was concerned that the Directive’s monetisation methodology had no positive impact whatsoever on their technology, despite CO₂ benefits.</p> <p>Some stakeholders felt that the Clean Vehicle Portal was inadequate as a means of helping their technology to succeed, because it did not contain details of vehicles using their technologies. If Contracting Authorities were to search the portal for vehicles with the alternative fuel technologies in question, they would reportedly only see Diesel vehicles.</p> <p>It was argued that a key question that ought to be considered at this point is whether energy efficiency or CO₂ is the more important issue. One stakeholder argued that a target of 95g CO₂ per km could be met with currently available alternative fuel technology.</p> <p>Stakeholders representing alternative fuels also raised the issue of how CO₂ emissions should be dealt with for heavy duty vehicles.</p> <p>Stakeholders drew attention to the fact that clean vehicle technology had developed significantly in recent years – and called for this progress to be reflected in the monetisation calculations. In particular, it was felt that the calculations should reflect the fact that the total cost of ownership of certain alternatively fuelled vehicles may now be lower than Diesel vehicles. Certain spreadsheet tools already exist for helping buyers to calculate the cost of ownership of buses, for example.</p>
Local city governments and networks	<p>One of the stakeholders in this group underlined that a key objective of the Directive is to stimulate the market for clean vehicles.</p> <p>The City of Stockholm owns only 0.2% of all vehicles running in Stockholm. It is possible that Stockholm is an extreme example, but in general, cities own fewer and fewer vehicles. Therefore, it was argued, the actions city governments take on their own fleets will not influence the market on their own.</p> <p>To attempt to influence the market, Stockholm made a simple definition of what a clean vehicle is; 95g CO₂ per km. (With biofuels, the value is allowed to be slightly higher). Last year, 23% of all cars sold in the city of Stockholm were below this 95g limit. The city led the way in achieving this outcome. The simplicity of the definition made it possible for private companies to adopt it for their own fleets. In most cases it was adopted voluntarily, although in some cases the companies were pushed a bit by the city’s transport procurement department. The criteria have spread from company to company; some companies have made it a requirement of their business partners. The city of Stockholm therefore argued that a simple definition is better than a complicated but accurate one.</p>
Chair	<p>The chair pointed out that the impacts of the Directive go beyond cities – they include greater visibility of clean vehicles, for example among customers of public transport, or passers-by who see clean municipal vehicles. The Directive also has an impact on the fleets beyond its formal scope.</p>
Local city governments and networks	<p>One of the stakeholders in this group reiterated that the number of vehicles owned publically is decreasing as the number of public services being outsourced increases. They suggested that if the scope of the CVD were changed, one area in which it could be expanded is to cover vehicles used in the provision of services which governments have outsourced to the private sector.</p>

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	Another stakeholder in this group suggested that there needed to be a discussion about what the definition of a clean vehicle ought to be, and that this definition should not focus solely on CO ₂ .
Industry and consumers	One of the stakeholders in this group asked if compliance with this Directive is really so different to the requirements procurers currently have to comply with as a result of other legislation.
Local city governments and networks	Stakeholders in the cities group advised that the basic idea of green procurement is not new. There are three examples of sector-specific green procurement law: Energy Star, the energy performance of buildings, and the Clean Vehicles Directive. What is different about the Clean Vehicles Directive, one of these stakeholder argued, is the Directive's degree of complexity. It was felt to be "far more complicated" than sector-specific green procurement legislation elsewhere.
Chair	The chair asked stakeholders to provide their views on whether the Directive still provides added value, and if it can be improved, or whether it should be repealed.
Local city governments and networks	<p>One of the stakeholders stated that a Clean Vehicles Directive is better than <i>no</i> Clean Vehicles Directive, even if it is weak in the standards it sets. Simply having the Directive in existence sends an important message. But it can be strengthened enormously.</p> <p>It was argued that the main potential improvement would be a definition of "Clean Vehicle" – a definition that gets stricter over time, and is more ambitious than the car and light van CO₂ regulations.</p> <p>Another potential improvement is to expand the scope to cover privatised public services.</p> <p>Another issue is cleaning up old vehicles in cities – they are responsible for a large share of pollution. Some sort of obligation to remove highly polluting older vehicles would potentially be very important.</p>
Chair	The city of Brussels banned the use of taxi vehicles which are more than seven years old. Buses and taxis make up a small proportion of all vehicles in cities, but their annual mileages are especially high, and in this sense their impact tends to be higher than other vehicles.

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Industry and consumers	<p>In the context of remarks about “cleaning up” older vehicles, it was suggested that cleaner burning fuels such as paraffinic fuels should be considered by procurers when making their procurement decisions.</p> <p>Eco-driving programmes to improve fleet emissions were also mentioned in this context.</p> <p>Some stakeholders in this group also stated that the Directive is better than having nothing.</p> <p>One of the stakeholders stated that with electric vehicles, it is only recently that vehicles have begun to come onto the market which are interesting from the perspective of this Directive. The utility of the Directive for these vehicles will increase exponentially over the next 3, 5, and 10 years as new vehicles come on to the market.</p> <p>Further remarks were made by stakeholders in this group who felt that the Clean Vehicles Portal may not be doing enough to encourage people to look at alternatively fuelled vehicles. A stakeholder reported difficulty in finding any electric buses or alternatively-fuelled trucks on it. This stakeholder was concerned that contracting authorities might look at this portal, be discouraged by the search results, and then just return to their known suppliers of conventionally fuelled vehicles.</p> <p>Stakeholders underlined the importance of regularly updating price information on the Clean Vehicles Portal, because it compares the prices of vehicles using mature technology and vehicles which are ‘experimental’ and subject to relatively rapid changes in price. One stakeholder also suggested providing some indication of expected future prices, since (for example) experts have forecast various trajectories for future battery prices.</p> <p>Stakeholders asked that the Directive not be repealed without something better being brought in to replace it.</p> <p>Stakeholders also underlined that it was also important to pay attention to the supply side – one suggested that the Portal could be made more attractive by adding more pictures, and that vehicle suppliers should be encouraged to be more active here.</p> <p>A stakeholder representing gas vehicles stated that there was a very broad, mature technology offering in this area, but sales remain low, and the only means of improving them is through public procurement. This stakeholder commented that procurement of this technology should not be taken for granted and that it needed to be supported, otherwise the segment could die. It was pointed out that the Alternative Fuels Infrastructure Directive has mandated the build-up of electric and gas infrastructure to support these technologies in future. It was argued that Diesel vehicles, by contrast, needed no more support.</p>
Local city governments and networks	<p>A stakeholder representing the City of Stockholm reiterated that the city only possesses 0.2% of the fleet in the city. Half of that fleet comprises special vehicles which non-government actors would not be interested in buying. (Buses are different, because public entities have a large impact in that segment, procuring about half of all buses in Europe.) For passenger and light duty vehicles, this stakeholder argued that we should consider which groups ought to be targeted. The city of Stockholm works with taxi drivers and craftsmen, and uses its procurement power to change their vehicle fleet. The city uses incentives or “nudges” (like allocation of delivery windows) that can change the delivery market. A significant diffusion in practices also takes place from company to company.</p> <p>And things have been helped by the national government putting out a framework for deciding what is and isn’t a clean vehicle.</p> <p>This stakeholder suggested that there might be some difficulties in agreeing a definition of a “clean vehicle” elsewhere, including difficulty in getting vehicle manufacturers to agree among themselves on a common definition. Stockholm’s</p>

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	<p>definition of “clean vehicle” also might be slightly too ambitious for all Member States to attain; it includes EURO 6 among other requirements.</p> <p>One of the city networks stated that it would be necessary to take into account the known problems with EURO 6. And not all cities will be able to impose the same access restrictions on cars as Stockholm, for example.</p> <p>It was suggested that a common understanding of what is a “clean vehicle” could help cities work with transport operators. The Commission has previously done work on fleet recognition schemes.</p> <p>Stakeholders also underlined the importance of coordinating efforts in this area with the air quality package and with action on retrofitting, for example.</p> <p>Another stakeholder commented that the immediate problem with the methodology in the Directive is that air quality needs to be weighted much more heavily.</p>
Local city governments and networks	<p>A stakeholder representing the Greater London Authority (GLA) commented that although it does not own its bus fleet, the city regulates what the (private) operators of that fleet can buy or use. There are 8,000 buses in London, so the city has significant buying power. The number of black taxis is probably about 15,000, and in addition there are many more private hire vehicles which the city regulates.</p> <p>It was stated that although the numbers of vehicles publically procured are small in proportion to the number on the road, they have a disproportionate impact on the emissions in the middle of a city.</p> <p>The GLA has various other policy levers for tackling emissions, including congestion charging, and restricted access to London’s Low Emissions Zone. These are acknowledged to have not been enough on their own to achieve the air quality obligations on London, which is why the Mayor has proposed an Ultra-Low Emissions Zone from 2020. That would entail requirements on both passenger cars and heavy vehicles to meet certain EURO standards.</p> <p>The Greater London Authority does not have an answer on what the impact of the Directive has been in London. The city stated that it is already aiming to create as clean a fleet as it can, and that it is probably slightly ahead of others on clean procurement, so unless the Directive becomes much more ambitious it is unlikely to have an effect on what London is doing.</p> <p>One of the city networks commented in response to this that London and Stockholm are not the target audiences for this Directive. Nevertheless, the Directive should not hinder these cities from taking progressive action.</p> <p>According to one of the city networks, sustainable fleet management certification schemes are a very powerful potential tool for procurers when procuring services. Procurers can set award criteria for contractors having this certification.</p> <p>It was also suggested that providing national centres of expertise in clean vehicles would help contracting authorities make better procurement decisions. Public authorities are unlikely to be experts in clean vehicles, and they won’t have access to the information others have. In case of Sweden and UK, there are particular bodies that can provide that info; they know about various issues such as how different fuels perform in different duty cycle.</p>
Chair	<p>The chair asked how effective the Clean Vehicles Portal was.</p>

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Local city governments and networks	<p>Some stakeholders highlighted issues with keeping the data in the Clean Vehicle Portal – and portals more generally – up-to-date. A Belgian study conducted around 10 years ago had concluded that it was difficult to keep these portals updated frequently enough.</p> <p>Some stakeholders had observed problems in their country with the Clean Vehicles Portal – such as being unable to find some vehicles, because they have been given “wrong” names (i.e. different names to what they are sold under in that particular country). Data on costs, emissions, and total cost of ownership was also alleged to be lacking.</p> <p>It was acknowledged that there are difficulties with accessing the data needed to populate the portal. This is especially the case with vehicles that are not passenger cars, especially buses and freight vehicles.</p> <p>There was some discussion of various national-level Portals with similar functions to the Clean Vehicles Portal, such as ecoscore.be, which is more tailored to specific national requirements in Belgium.</p> <p>In Sweden, there is a national portal which gets updated once or twice a day because that is felt to be the level of updating activity that is necessary to keep the portal useful.</p>
Industry and consumers	<p>A consumer organisation commented that it has not followed the Directive in great detail, but in regards to potential repeal, its position is that it is in favour of initiatives that support government or private company uptake of clean fleets. This is because consumers are currently often priced out of the clean vehicles market. They are therefore in favour of initiatives that encourage uptake and drive down prices. If there are problems with the Directive, their suggestion would probably be to fix the problems. Repeal would send out a poor political signal, i.e. that public authorities are losing interest in procurement of clean vehicles.</p>
Industry and consumers	<p>Further stakeholders from this group agreed that repealing the Directive would be a mistake.</p> <p>One stakeholder suggested that the definition of clean vehicles could have up to two elements: CO₂ benefits, or pollutant emissions benefits, or both. Another stakeholder underlined the importance of allowing different powertrains to be considered as well as different fuels – and asked that the definition be consistent with technology neutrality.</p> <p>In the national frameworks required by the Alternative Fuel Infrastructure Directive, public procurement is mentioned as a tool. One stakeholder stated that infrastructure itself remains a problem, but this is the responsibility of the Member States.</p> <p>Another issue with making fleets cleaner is retrofitting. One stakeholder suggested that this issue should be tackled in stages.</p> <p>On joint procurement, one stakeholder stated that their understanding was that procurement was already “a headache” and that joint procurement was even more difficult.</p> <p>One stakeholder stated that they originally had high expectations for the portal, but from their perspective, it had suffered several problems. One of these problems with the hardware supporting the portal. Another was that knowledge of the portal could have been better; it was argued that levels of usage of the Portal were low, in part due to knowledge of it not being disseminated very successfully.</p> <p>One stakeholder noted that the Directive refers to the impacts of vehicles as costs, which implies that someone will pay for them.</p>
Chair	<p>The Chair invited attendees to discuss the question of who should bear the costs of paying for clean vehicles.</p>

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Member States	<p>Mr Moran from OLEV stated that in the UK, it is UK taxpayers who take up the brunt of the cost. Since 2010, OLEV has spent close to £1bn in clean vehicles including about £500m for cars and vans, helping to bridge the gap for those who want to adopt early. OLEV has also spent £25m on green taxis, £25 on green trucks, and made further investments in infrastructure, among other expenditure.</p> <p>Mr Moran acknowledged that the demand side is essential.</p> <p>The UK will review the Directive next year. At the moment though, the OLEV position is that providing £1bn in incentives appears to be the best action.</p>
Industry and consumers	<p>Some stakeholders suggested that it might be appropriate to make finance available from the EIB or link regional development funds to vehicle procurement. Clean vehicles have lower operating costs but higher purchase costs, potentially justifying the use of these funding/finance instruments. Some governments which are currently not looking at options for clean vehicles might then be encouraged to take an interest in them. In some Member States, EURO I and even EURO zero buses are still common.</p> <p>One stakeholder made further remarks on the Clean Vehicles Portal, stating that a meeting had been held to discuss it 2-3 years ago but that recommendations raised at that meeting had not been taken forward. This stakeholder stated that the portal completely fails to represent certain types of alternatively fuelled vehicles and recommended that the Portal be taken offline. The stakeholder suggested that maintaining a Portal to a sufficient standard requires formidable amounts of effort and resource. Emissions, operating costs and purchasing costs all need to be clearly explained, and payback periods for alternatively fuelled vehicles should be shown, to illustrate the fact that sufficient mileage makes them economically competitive choices.</p> <p>A stakeholder representing the gas vehicle segment argued that large amounts of financial support were not necessarily required, and that infrastructure constraints could also be readily overcome if the vehicles were procured.</p>
Local city governments and networks	<p>A stakeholder representing one of the cities networks agreed that the question of who should pay for the clean vehicles was key, and stated that legislation cannot just pass all costs on to cities and other procurers. And the clean vehicles Directive is just one among a number of policies on uptake on clean vehicles.</p> <p>It was remarked that the total cost of ownership of some electric vehicles is now close to parity with conventional vehicles. But procurers can struggle to procure on the basis of total cost of ownership, partly due to the difficulty making the calculation, and partly because of way public budgets are managed and split up (for example fuel costs are sometimes dealt with separately to other costs of ownership).</p> <p>One stakeholder suggested it might help if procurers could be given the option of making regular, small, manageable payments.</p> <p>One of the city networks also remarked that it sees an increasing number of comments from cities the real-world emissions profiles of the vehicles they buy do not resemble the “promised” emissions profiles.</p> <p>Some cities are now saying they will set targets such as 25% of their fleet being “clean”, but others cannot afford to do this.</p>
Local city governments and networks	<p>Upon a question for clarification by DG MOVE, the City of Stockholm advised that it uses a professional services company that scans the market for company cars every day. Although this costs money, Sweden sees it as a very helpful service. There is no statute forcing the creation of this information. Similar services are probably available in other Member States.</p> <p>It was also remarked that because progress is being made on reducing CO₂ emissions from new cars, a target such as the 95g limit used in Sweden might not remain relevant for very long.</p>

Chair	<p>The Chairman pointed out that Commission colleagues in DG CLIMA are already giving consideration to how to move forward with the CO₂ Regulations beyond 2020.</p> <p>The chairman noted that there was a clear view among attendees that the Directive should not be repealed.</p>
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Possible improvements to the Directive – addressing evaluation questions and developing policy recommendations

The contractors gave a further presentation on topics related to:

- possible improvements to the Directive;
- the specific Evaluation questions in this study; and
- the issues raised by COM (2013) 214.

Contractors	Mr Skinner suggested beginning by discussing the relevance of the Directive to the achievement of the Commission's objectives.
Local city governments and networks	<p>A stakeholder representing the City of Stockholm remarked that he was confident that cities have a role in creating the market for clean vehicles, but that they can't do it alone, and one Directive isn't enough – complementary measures are needed, at local and national levels and possibly at the EU level. In Sweden, national measures to stimulate clean vehicle procurement are redundant, not by design, but because cities are taking the lead with tools they have at their disposal and national governments don't. In Sweden, the city of Stockholm is closer to private companies and it is actively targeting their behaviour.</p> <p>A stakeholder representing the Greater London authority remarked that harmonisation in the way impacts are determined seemed problematic, and might not be possible. For example, one should consider the different impacts that occur when running vehicle on flat routes versus hilly routes. Sufficient flexibility to take into account local demands and experimentation at a local level. This stakeholder asked if a single formula would really be capable of doing this.</p> <p>Several attendees around the room indicated that they agreed that while some degree of harmonisation at an EU level was desirable, harmonisation "at a detailed level" may not be.</p> <p>One of the city networks remarked that a unified, coherent signal needed to be sent to vehicle suppliers – as 28 different sets of criteria wouldn't make sense in a globalised vehicle market. It was also stated that it would be easier to achieve "balance" if energy efficiency was not the main focus of quantifying impacts.</p>
Industry and consumers	<p>One of the stakeholders suggested that "clean" and "energy efficient" is somewhat contradictory. The legislation is called the clean vehicles Directive, not the energy efficient vehicles Directive, and its design should reflect that.</p> <p>Another stakeholder suggested that as an alternative to effectively setting <i>quotas</i> for purchase of clean vehicles, their procurement could be stimulated by altering prices. Vehicle taxes are one potential instrument for doing this. At present, road taxes are already somewhat proportional to emissions. This stakeholder asked why vehicle taxes could not be used to incentivise improvements in emissions. Others in the room suggested that measures like that may be beyond DG MOVE's remit.</p> <p>One stakeholder remarked that these taxes might amount to tens of thousands of euros per vehicle. One stakeholder stated that this would just be commensurate with the impacts of their emissions.</p> <p>A stakeholder urged DG MOVE to communicate and collaborate with other DGs (e.g. ENER, CLIMA), as it was felt that the issue cannot be tackled from the transport perspective in isolation.</p>

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Chair	DG MOVE thanked the stakeholders for their suggestions.
Contractors	Mr Skinner asked if the Directive had resulted in increased awareness
Local city governments and networks	One of the cities remarked that the Directive has resulted in increased awareness in the newer Member States. A city network noted that some cities in their network were unaware of the Directive.
Contractors	Mr Skinner suggested discussing the questions on efficiency.
Local city governments and networks	The stakeholder representing the city of Stockholm noted that almost 20% of new cars bought in the city were below 95g CO ₂ per km. In light of that success, it was suggested that Stockholm's model should at least be tested in more Member States.
Contractors	Mr Skinner suggested discussing added value. How could the added value of the Directive be improved?
Local city governments and networks	One of the city networks commented that all of the recommendations given by stakeholders so far would improve added value.
Contractors	Mr Skinner suggested discussing coherence, including coherence with other procurement legislation.
Local city governments and networks	One of the city networks comments that the current design of the Directive is meant to make it entirely compatible with existing horizontal procurement legislation, which currently provides no obligations on Member States specific to individual sectors. So the Directive is entirely complementary with that legislation. The possibilities for lifecycle costing in public procurement are also entirely compatible across the CVD and other EU public procurement legislation.
DG MOVE	Mr Önel asked about joint cross-border procurement, and what could be done at EU level to facilitate it.
Local city governments and networks	One of the city networks commented that this idea has been incredibly difficult to push at EU level for many years. The problems include difficulties in aligning the needs of different procurers. There are also language barriers and legal difficulties. One thing that might help, it is argued, is providing money. This is happening with Public Procurement Innovation projects – the EU pays a certain amount of the procurement value as an incentive. This is arguably crucial to making joint procurement attractive. Paris is reportedly building a network for this. Another of the city networks argued that cross border procurement increases effort and time massively, and does not bring overall costs down, according to members of the city network. Nevertheless, there is felt to be a benefit to collaborating across borders when doing innovating things, as this shares risks and potentially pushes development in a new direction. One of the city networks also commented that there may be legal issues with joint procurement in the context of current EU legislation. According to this stakeholder, joint procurement activities can conflict with the Public Procurement Directive when a contract is developed after competitive tender and additional parties enter the agreement after the competition. If this increases the volume of goods purchased significantly, this can be illegal. At the same time, for joint procurement efforts, joining at a late stage like this may make sense.
Industry and consumers	The Fuel cells and Hydrogen Joint Undertaking has been looking at joint procurement possibilities. Prices in this segment are coming down, and with subsidies, we are now approaching "normal" prices. There is an initiative for collecting first commitments of interest in purchasing buses in quantities of tens or hundreds. These alignments do seem to bring costs down. Therefore, one stakeholder argued, it may not be necessary to go as far as organising joint procurement – joint expressions of interest from procurers might help.

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Contractors	Let's discuss the points raised by the Commission's Communication, i.e. COM (2013) 214, in response to the 2012 report on the Directive.
Local city governments and networks	One of the city networks commented that whatever happens with the revision of the Directive, cities should be closely involved in designing it, as they will be largely responsible for implementation.
Industry and consumers	One stakeholder commented that the 20:20:20 targets have to be considered together with these objectives, and that change to the Directive should not be discussed without knowing what is going to happen with the deployment of alternative fuels, for example.

Summary

Chair	<p>The chairman offered the following remarks to sum up contributions made by attendees:</p> <p>It's important to note that the objective of the Directive is to stimulate the market for clean vehicles (although there may now be some controversy as to what this means – in particular whether it should include energy efficiency). Since 2009, things have evolved, and our thinking process has gone further. Perhaps it is time to revise or define the concept of a clean vehicle as attendees suggest. In any case, there seems to be a consensus that the Directive shouldn't be repealed, It should be improved on a number of fronts instead.</p> <p>The Directive is thought to be complex. And awareness of it at a local level is poor. But I am sure that public authorities know the national legislation exists, and they will know that ignorance of the law would not exempt them from having to apply it.</p> <p>The monetisation methodology seems to be too complex and gives predominance to energy efficiency criteria.</p> <p>Another factor criticised was the difficulty of getting data on heavy duty vehicles.</p> <p>The monetisation methodology has no positive impact on natural gas vehicles – hence the question of what ought to be more important, energy or CO₂?</p> <p>Cities own fewer and fewer vehicles themselves. But they procure services which rely on private fleets, and this procurement might be brought into scope of the Directive.</p> <p>A weak Directive is still felt to be better than no legislation in this area.</p> <p>Cleaning up older vehicles has also been highlighted as an important idea, as has eco-driving.</p> <p>Cities may need help to purchase these vehicles in conditions where there is currently no supply of them, so we must also look at the supply side, and provide positive signals there, for example through the deployment of alternative fuel infrastructure (and Directive 2014/94/EU). At the same time, the demand side is essential.</p> <p>The clean vehicles portal has been criticised, and suggestions have been made to update it or to put it offline. There are doubts about its usefulness in light of lacking data, and the existence of better national databases. Public authorities procuring vehicles are not the experts in clean vehicles, which is why there is a need for better portal information.</p> <p>Mandating minimum fleet shares of alternatively-fuelled vehicles was also suggested.</p> <p>Technological neutrality concerning powertrains was also mentioned.</p> <p>It was suggested to review the Directive in multiple stages.</p>
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On funding, we had suggestions that procurement could be supported through the EIB or the regional development fund.

The role of Member States in terms of taxation as a lever for encouraging uptake of clean vehicles was also discussed.

The Directive seems to need an overhaul, but it won't be enough on its own – complementary national legislation is important.

Harmonisation at EU level is appreciated, but should not go into excessive detail.

Joint procurement could be a means of bringing prices down.

The involvement of stakeholders in this process is very important.

The thinking process will continue – and attendees are invited to provide further comments to the consultants.

12. ANNEX 4 – ONLINE PROCURER SURVEY

A detailed survey tailored to authorities that have procured road transport vehicles since 2012 was developed. Due to the number of potential procurers in EU Member States, five countries were agreed with the Commission for prioritising the data collection, including Germany, Hungary, Italy, Spain, and the UK.

A total of 4,520 unique email addresses for procurers were identified in the Tenders Electronic Daily (TED) database³⁹. Potential respondents from all 28 Member States were invited to take part in the survey. Apart from the email addresses that were used to send out the online surveys, additional data, such as contract values and types of procured vehicles were identified in order to be used in our quantitative analysis.

The questionnaire included a range of open and closed questions covering the following themes:

- Information regarding the most recently signed contract to procure road transport vehicles;
- Use of environmental criteria in assessments;
- Setting technical standards for environmental and energy performance;
- Using weighting/award criteria in assessments;
- Monetising energy and environmental impacts; and
- Use of environmental criteria prior to 2012.

Drafts of the survey were agreed with the Commission before they were translated and made available on an online platform in six languages (English, German, Hungarian, Italian, Spanish, and French⁴⁰). Translated surveys were subsequently pilot tested (with Member State/City contracts) and updated. The links to the finalised surveys were sent out to the list of contacts obtained from the TED database in mid-March 2015. Respondents were given approximately six weeks to respond to the survey (two email reminders were sent).

In addition to the direct mail out to procurement contacts, city networks were approached and asked to distribute the survey to their members. Polis Network, Eurocities, Local Governments for Sustainability (ICLEI), and The European Network for Rural Development (CEMR/CCRE), all agreed to circulate the surveys to their European networks/members.

Table 12-1 provides a summary of the number of responses by prioritised Member State and the rest of the EU. The overall response rate of 19.1% amongst prioritised Member States can be considered satisfactory considering the mass nature of the emails to send out the survey links.

Table 12-1: Number of responses for the procurers' survey

Country	Contracting Authorities (TED)	No. of responses	Response rate
United Kingdom	173	22	12.7%
Germany	1,479	311	21%
Hungary	111	15	13.5%
Italy	155	34	21.9%

³⁹ Tenders European Daily (TED) - <http://ted.europa.eu/TED/main/HomePage.do>

⁴⁰ French was also included to ensure wider language coverage.

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Spain	147	24	16.3%
Rest of EU	2,455	141	5.7%
Total	4,520	547	12.1% (19.7% for prioritised MSs)

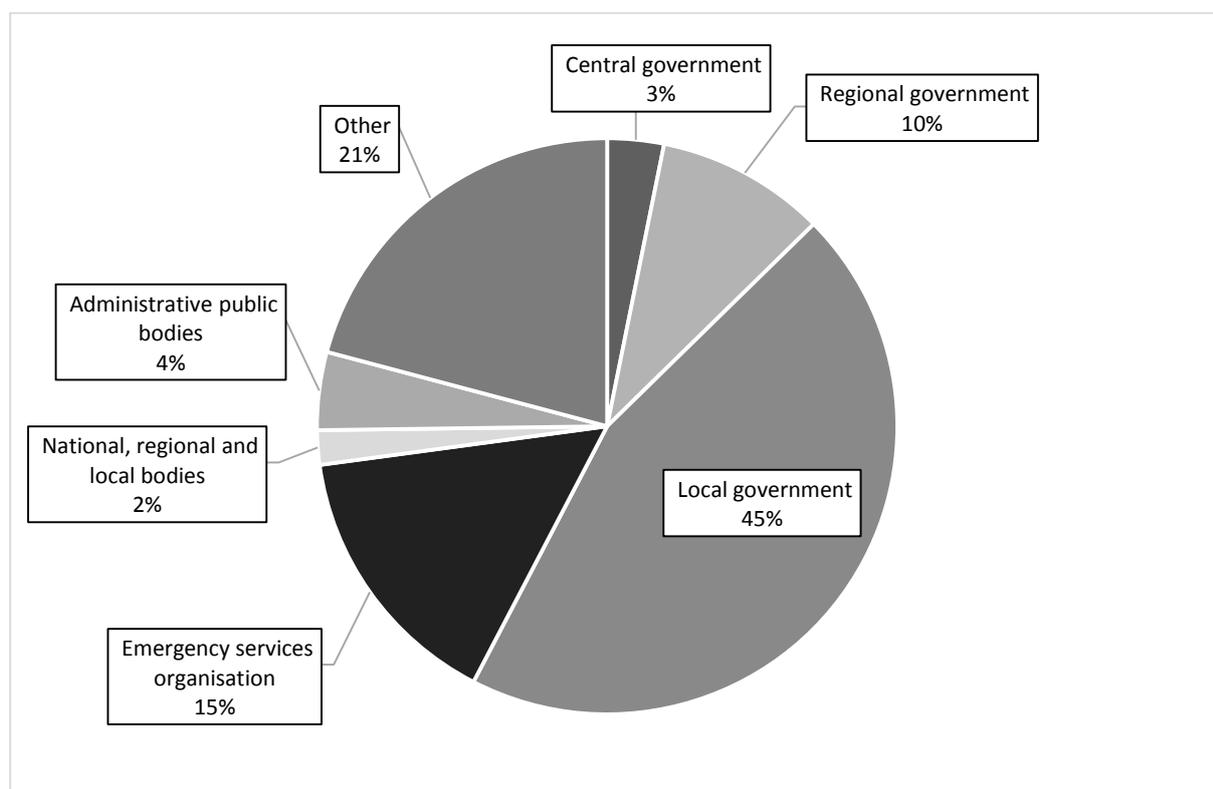
Source: Online Survey of Procurers – March-April 2015, Ricardo-AEA

The table shows a satisfactory response rate of 19.66% across the prioritised Member States (and 12% across all countries). Germany was the Member State with by far the most contacts available through the TED database which corresponds to the number of tender award notices. Together with Italy, Germany also had an above average response rate. The lowest response rates of the prioritised countries had the UK with roughly 13%. As expected the response rate for the rest of Europe was significantly lower (only 6%) due to language barriers.

In the following we will discuss the results from the main questions of the survey.

What kind of organisation do you represent?

Figure 12-1: Respondents - Type of organisations represented



Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

With regards to the type of organisation that the respondent was representing, the most (45%) were from local government. This was followed by 'other' (21%), emergency services organisations (15%), and regional government (10%) (Figure 12-1).

"Other" types of authorities included: public transport operators, water/gas utility authorities, waste management service provider, state-owned companies, procurement service providers.

Which Member State is your organisation based in?

The following table gives an overview of the responses for each Member State country that took part in the survey sorting from highest number of responses to the lowest number of responses.

Table 12-2: Numbers of respondents by Member State

Country	Number of responses	Country	Number of responses
Germany	311	Czech Republic	6
Italy	34	Finland	5
France	25	Ireland	5
Spain	24	Poland	5
United Kingdom	22	Luxembourg	4
Sweden	21	Estonia	3
Hungary	15	Slovakia	3
Belgium	13	Bulgaria	2
Austria	11	Romania	2
Denmark	10	Slovenia	2
Lithuania	8	Greece	1
Netherlands	7	Latvia	1
Croatia	6	Serbia	1

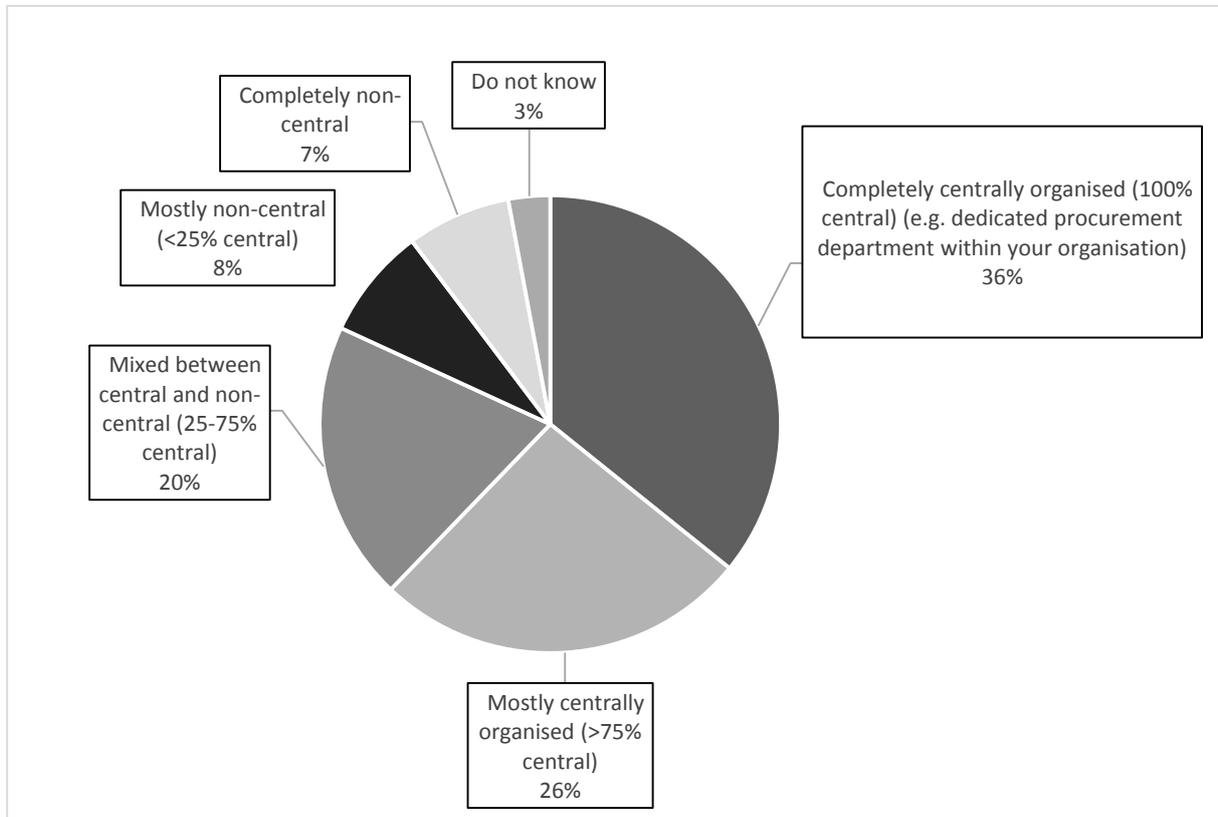
Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

The most responses were received from Germany, followed by Italy and France (although not a priority Member State, the survey was also available in French). Responses were received from all EU 28 Member States, with the exception of Malta, Portugal and Cyprus⁴¹. One contribution was obtained from a non-EU country (Serbia), however, no Serbian authority was contacted directly.

⁴¹ Surveys were not sent to any contacts within Cyprus directly, due to no contract award notices being made since the start of 2012.

How is procurement organised in your organisation?

Figure 12-2: Organisation of procurement (547 out of 547)



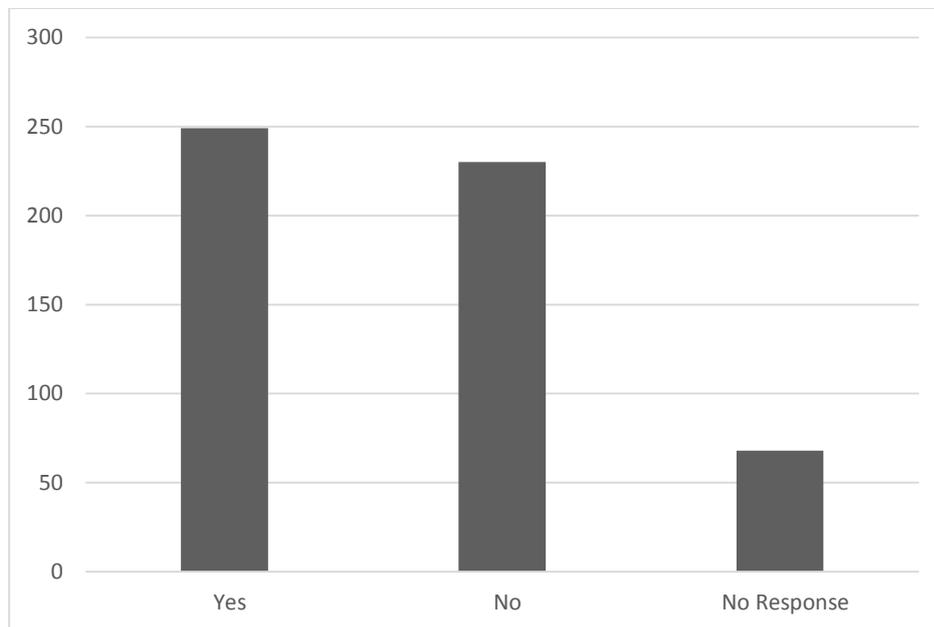
Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

The most common approach to procurement amongst respondents was 'completely centrally-organised' (36%), followed by 'mostly centrally-organised' (26%) and a 'mix between centrally and non-centrally organised' (20%). This shows a clear trend from centrally organised to non-centrally organised procurement.

Has your organisation procured road transport vehicles under a contract which was subject to the requirements as set out in the Clean Vehicles Directive since the start of 2012?

In order to determine the level of procurement activity affected by CVD, respondents were asked to confirm whether they had procured road transport vehicles subject to the requirements of the Directive since the start of 2012. Less than half of the respondents (249, 46%) stated that they had (Figure 12-3).

Figure 12-3: Procurement cases since the start of 2012 (547 out of 547)



Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

Which model(s) of vehicle did you procure, and how many did you procure?

To get an overview of the distribution of vehicle types being procured, procurement authorities were asked to state which quantities and models of vehicles were procured in their last contract. This information was then used to group the vehicles into seven different categories. The following table (Table 12-3) provides an overview of the quantities and types of vehicles for all EU28 countries that data was received from including the number of procurers that have responded.

Table 12-3: Type of vehicles procured by type of vehicle

Country	Number of procure rs	Passeng er car	Van	Rigi d truc k	Tracto r trailer	Coac h	Bu s	Vocation al	Insuf fi- cient data	All
EU28	507	2,208	294	147	11	7	1,036	23	84	3,810
Austria	9	-	1	1	-	-	-	-	-	2
Belgium	12	11	-	-	-	-	-	-	52	63
Croatia	5	4	-	-	-	-	-	-	-	4
Czech Republic	6	-	-	-	-	-	-	-	-	-
Denmark	9	-	-	-	11	-	-	-	1	12
Germany	297	1,678	171	65	-	-	243	8	2	2,167
Spain	22	-	24	6	-	-	34	-	-	64
Estonia	1	-	-	-	-	-	-	-	-	-
Finland	5	6	-	5	-	-	-	1	-	12
France	22	8	3	-	-	-	191	-	6	208
Hungary	15	-	-	18	-	4	7	-	-	29
Ireland	5	-	10	4	-	-	70	8	-	92
Italia	32	95	64	40	-	3	346	6	23	576
Latvia	1	-	-	-	-	-	-	-	-	-
Lithuania	7	4	3	-	-	-	-	-	-	7
Luxembourg	4	-	-	-	-	-	-	-	-	-
Netherlands	7	-	-	2	-	-	-	-	-	2
Poland	4	-	-	-	-	-	80	-	-	80
Romania	2	-	-	-	-	-	-	-	-	-
Slovakia	3	-	-	4	-	-	-	-	-	4
Slovenia	2	321	-	-	-	-	-	-	-	321
Sweden	18	81	18	2	-	-	65	-	-	166
United Kingdom	18	-	1	-	-	-	-	-	-	1

Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

Of the procurers responding to the survey, passenger cars were by far the most commonly procured vehicles (58% of all vehicles) followed by busses (27%). Other vehicle types were procured in much smaller quantities.

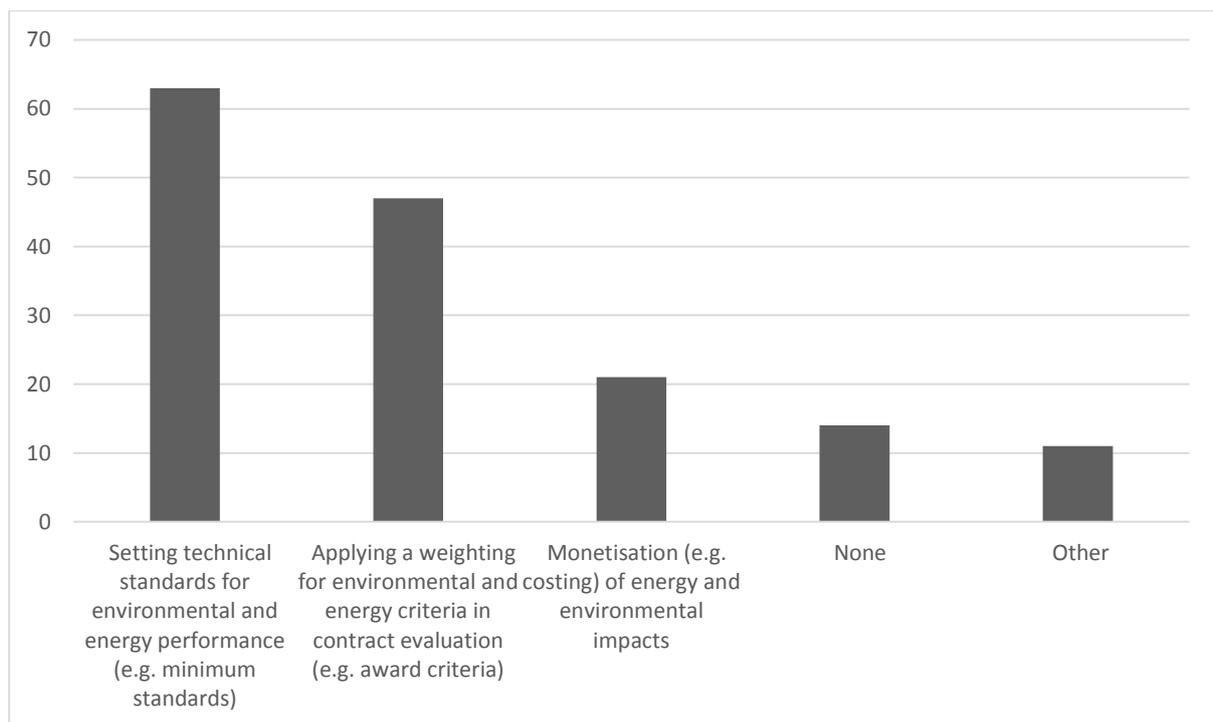
Which of the following environmental evaluation options did you apply in this contract?

- Setting technical standards for environmental and energy performance (e.g. minimum standards)
- Applying a weighting for environmental and energy criteria in contract evaluation (e.g. award criteria)
- Monetisation (e.g. costing) of energy and environmental impacts

As identified in desk research and engagement with Member States, 25 of the 28 EU Member States allow the use of all three options (1, 2a) and 2b)) in their National Implementing Measures (NIMs). The Czech Republic allows options 1 and 2a), Estonia enables option 1, and Slovenia allows option 2b) only.

In order to determine which options have been used in practice, respondents were asked to identify which of the three options they applied in their most recent contract to procure road transport vehicles (see Figure 12-4).

Figure 12-4: Application of Article 5(3) environmental criteria options in most recent contract from the start of 2012 (156 out of 249)



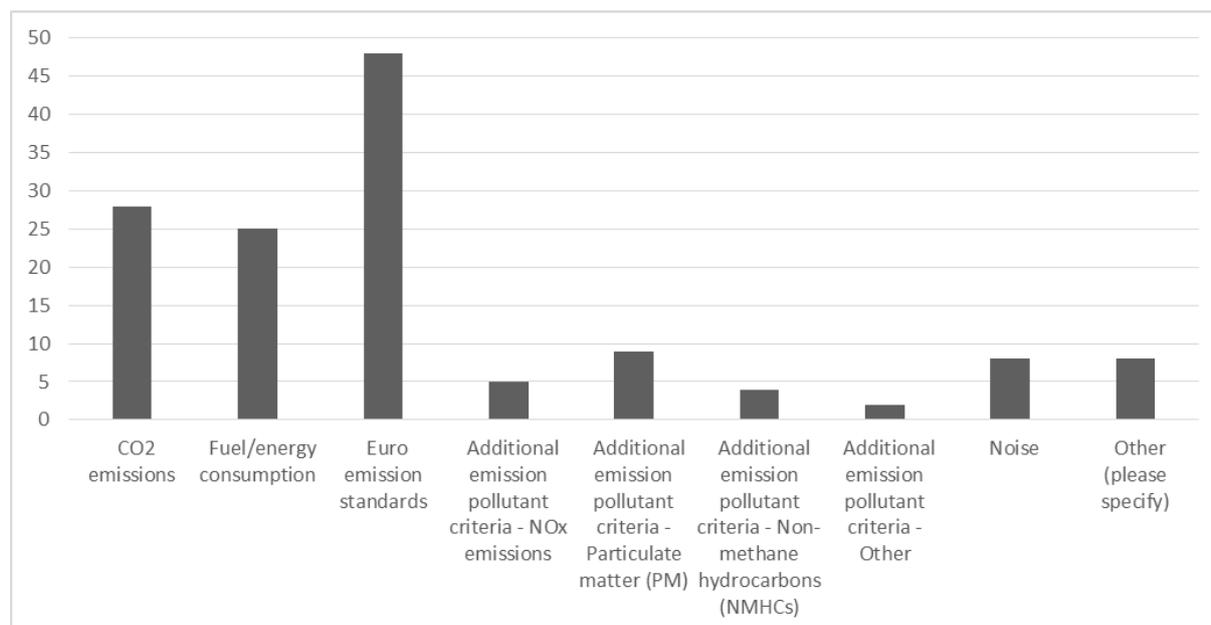
Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

The majority of the procurement authorities (40%, 63) stated that they set technical standards (Option 1). 30% (47) applied a weighting for energy and environmental criteria in the contract evaluation (Option 2a), whereas 13.5% (21) stated that they applied the monetisation methodology (Option 2b). Fourteen respondents didn't apply any evaluation option and 11 applied options other than the ones outlined in the Directive. No examples were given for other evaluation options.

When setting technical standards for environmental and energy performance, which environmental criteria did you include in this contract?

The respondents that had applied technical standards (Option 1) were asked about the environmental criteria that were applied in more detail. The figure below shows which criteria were applied in the latest contract.

Figure 12-5: Setting technical standards (Option 1) - Environmental criteria included in the contract (63 out of 63)



Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

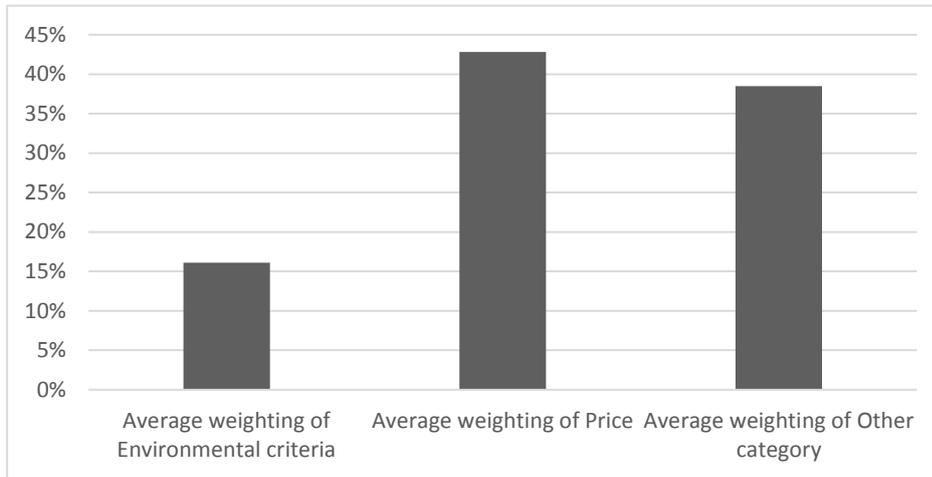
In most cases Euro emission standards were applied (35%). This is followed by CO₂ emissions (20%) and Fuel/energy consumption (18%). The figure shows discrepancies between how the legislation is set out and the numbers for the different options. The Directive specifies that at least the three following environmental criteria have to be considered for the operational energy and environmental impacts:

1. Energy consumption;
2. Emissions of CO₂; and
3. Emissions of NO_x, NMHC and particulate matter

Only in 19 out of 63 cases all three environmental criteria were taken into consideration. For the rest of the contracts only one or two of the options were considered.

When using weighting/award criteria in contract evaluation, what was the percentage weighting given to environmental criteria compared to other tender evaluation criteria in this contract?

Figure 12-6: Weightings used for different award criteria (Option 2a) (40 out of 47)

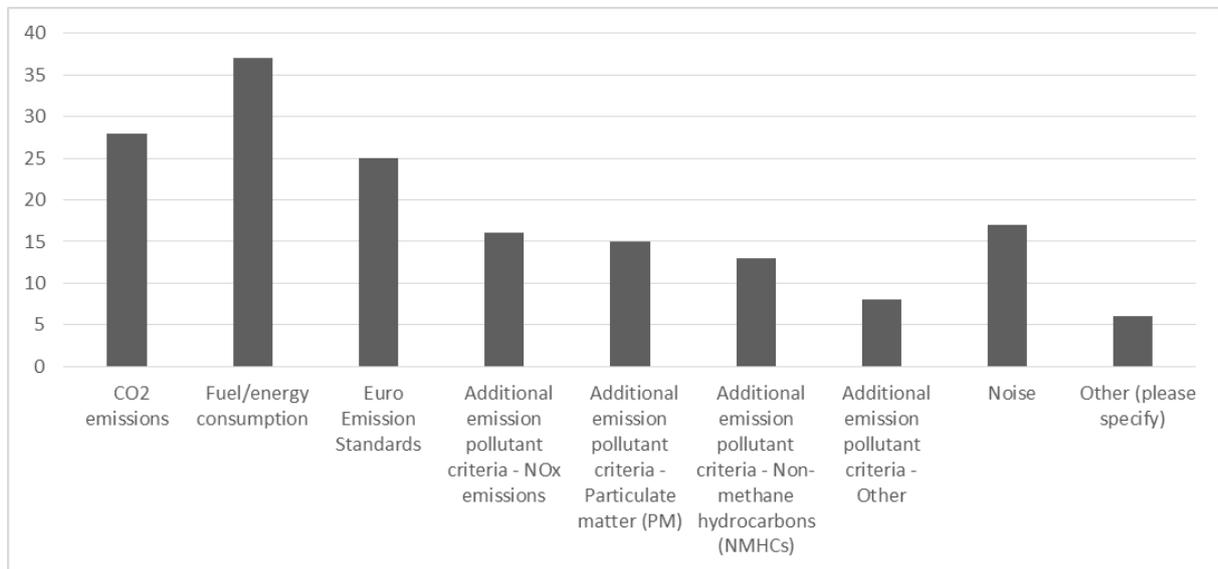


Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

An analysis of the applied weighting factors showed that almost 43% of weight on average was given to price compared to 16% for environmental criteria. Other weighting criteria have a high impact (38%) and include warranty periods, technical parameters, delivery, maintenance and running costs.

When using weighting/award criteria in contract evaluation, which environmental criteria did you include in this contract?

Figure 12-7: Weighting (Option 2a) - Environmental criteria included in the contract (46 out of 47)

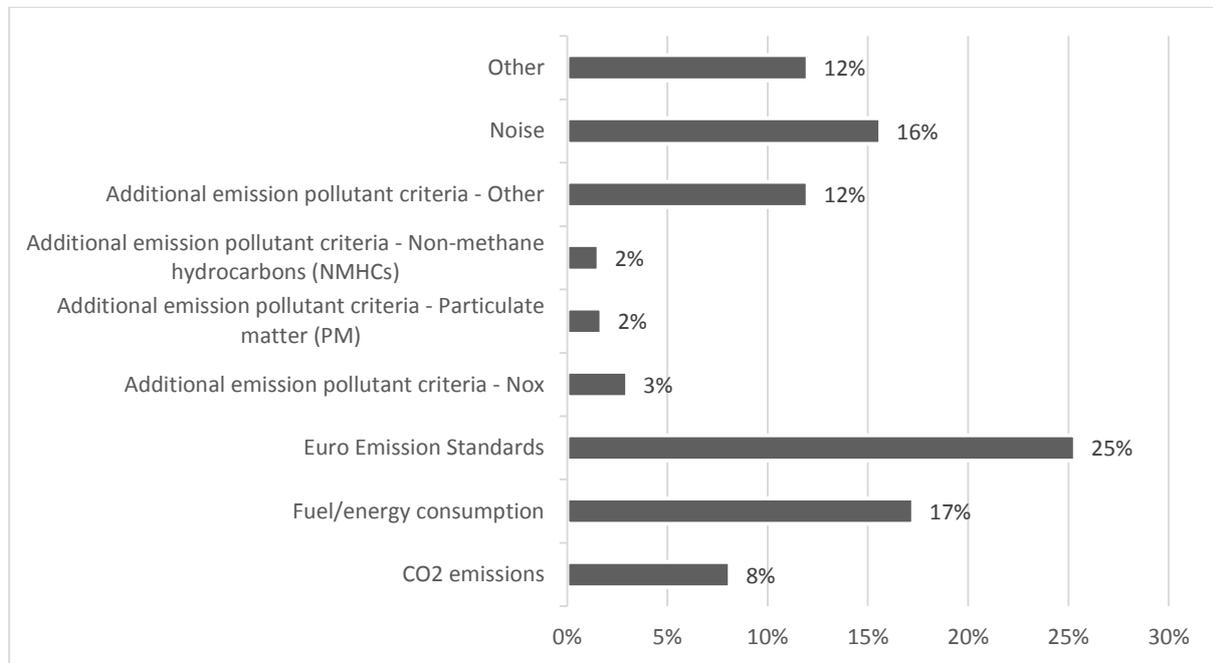


Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

For environmental criteria used when applying the weighting methodology the Fuel consumption is the most commonly used criteria when applying award criteria (Option 2a)(22%) followed by CO₂ emissions (17%) and Euro emission standards (15%) (see Figure 12-5).

What was the percentage weighting given to specified environmental criteria (where used)?

Figure 12-8: Percentage weighting for specified environmental criteria (Option 2a) (27 out of 47)

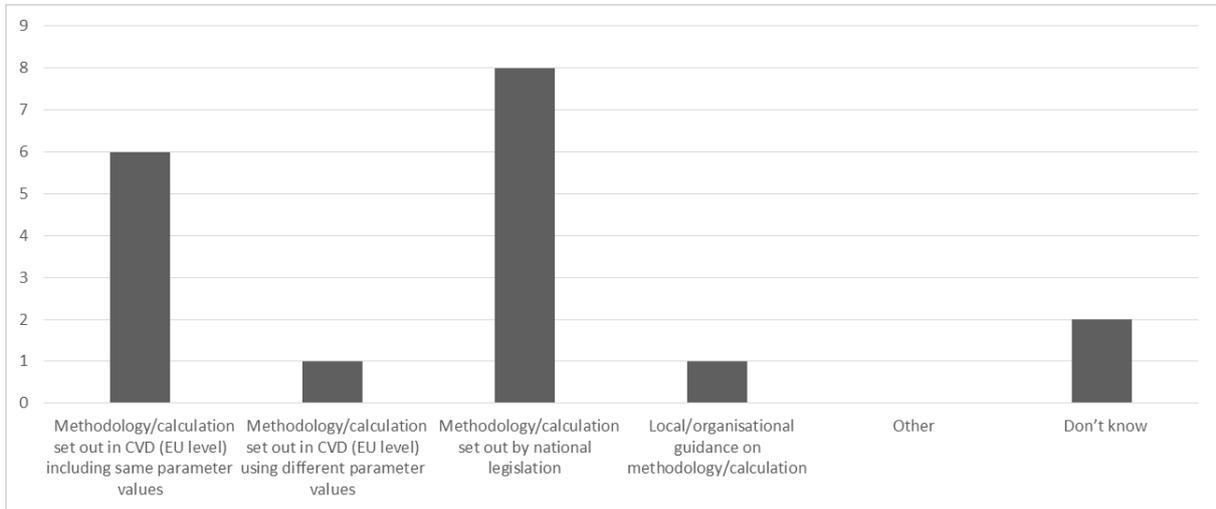


Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

Figure 12-8 shows the average weightings for different environmental criteria used from a sample of 27 respondents. Euro emission standards were given the highest weighting factor (25%), followed by fuel/energy consumption (17%), Noise (16%). CO₂ emissions are found in the midfield with 8%.

When monetising energy and environmental impacts, what methodology did you use in this contract?

Figure 12-9: Methodology used to monetise impacts (Option 2b) (18 out of 21)

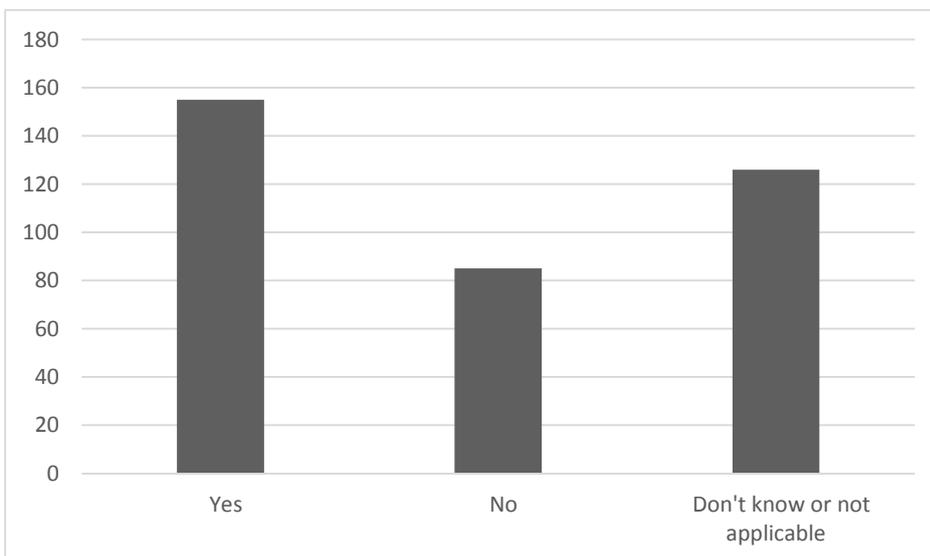


Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

Only 21 out of 249 respondents that procured a vehicle since 2012 actually had applied the monetisation methodology. Out of those stating they applied the option, most of the respondents (44%) used the methodology as set out in the national legislation – however, it is not possible to determine from the survey whether the methodology used differs from the Directive, or has been transposed directly as set out in the Directive into National Implementing Measures. Thirty-three percent used the methodology set out in the Clean Vehicles Directive directly including the same parameter values. Only one respondent each have used a local/organisational guidance or the Clean Vehicles Directive but applying different parameter values.

When purchasing road transport vehicles before 2012, did you include environmental criteria in your assessments?

Figure 12-10: Use of environmental criteria before 2012 (366 out of 547)



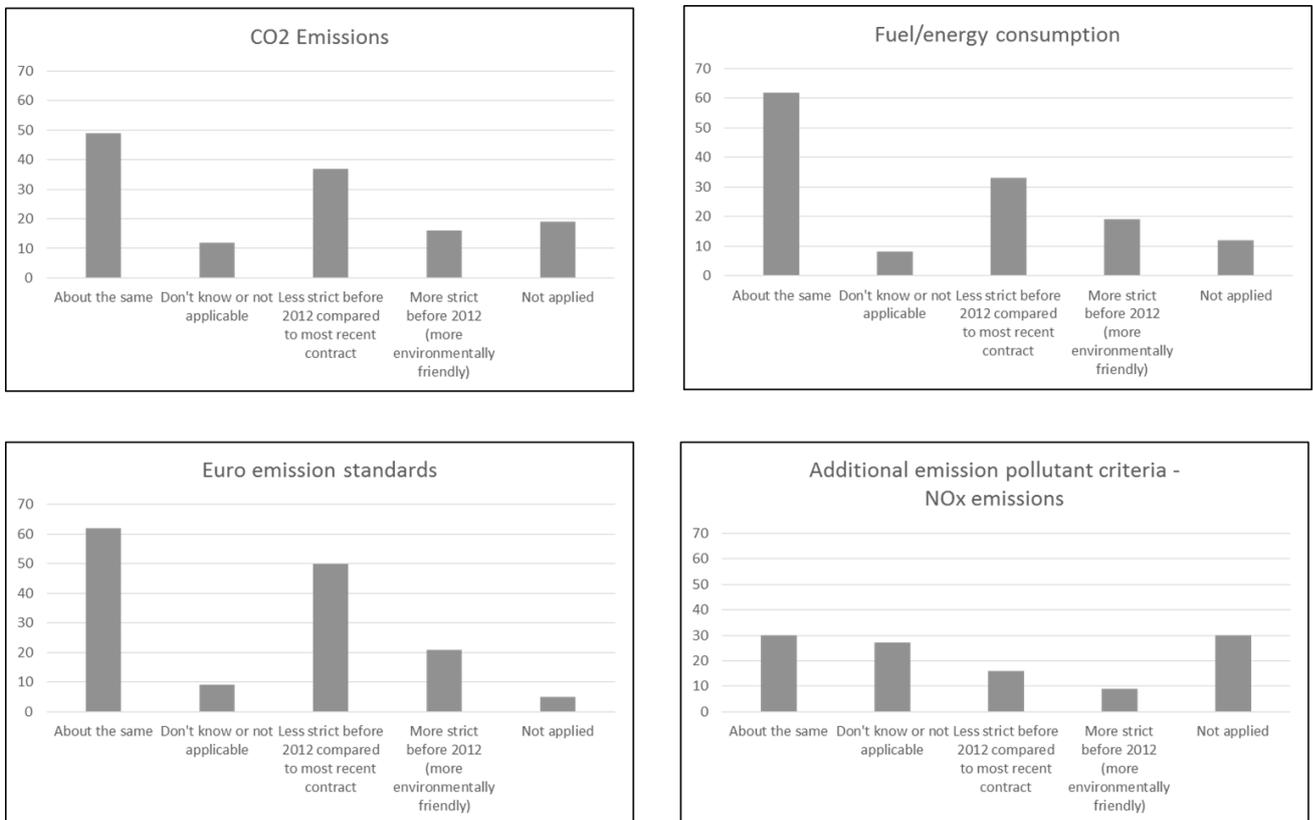
Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

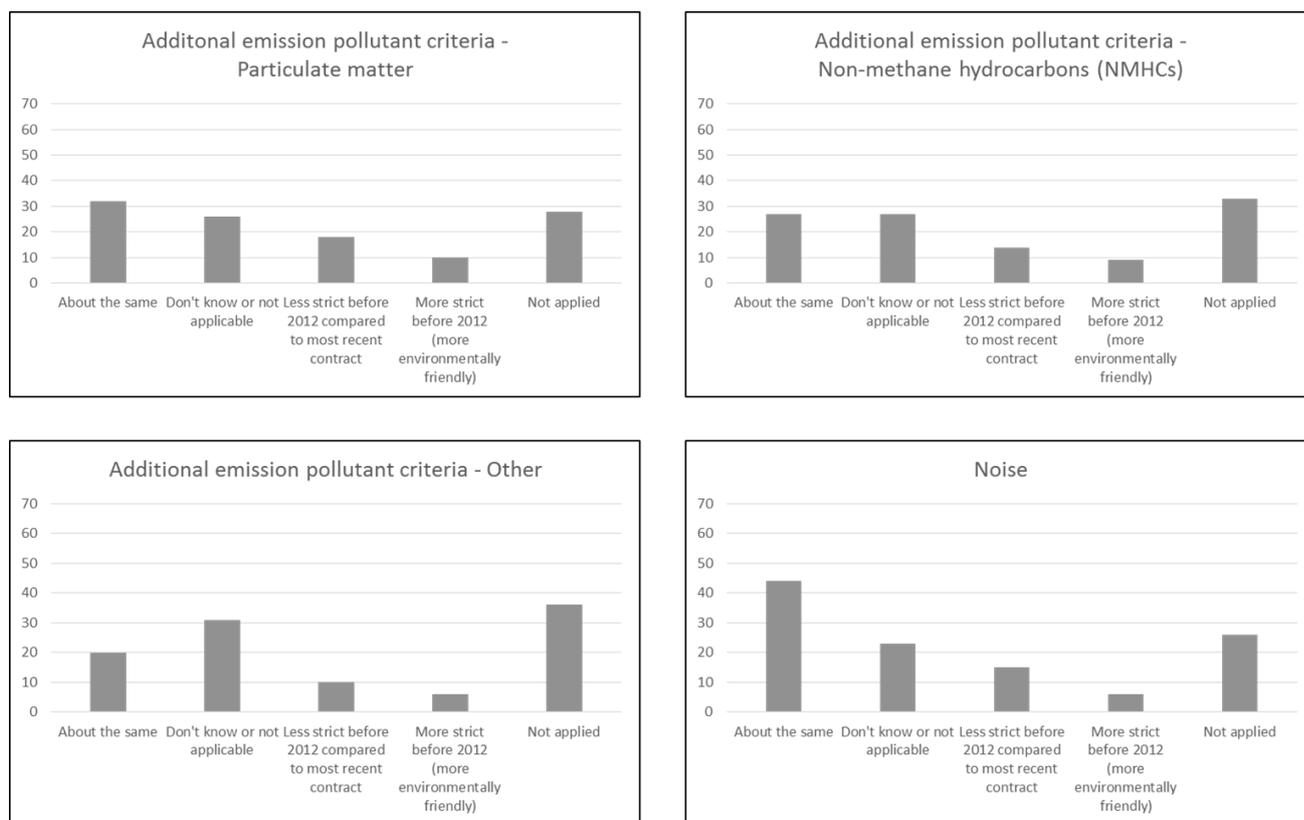
Forty-two percent of all survey respondents stated that they had applied environmental criteria prior to 2012 (before requirements of CVD were widely applied) whereas 23% (85 respondents) had not. In 34% (126) of all cases the respondent stated that they didn't know or the questions was not applicable.

Were the environmental criteria that were applied before 2012 more or less strict than the ones used in your most recent contract?

Figure 12-11: Strictness of environmental criteria applied before 2012



Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles



Source: Online Survey of Procurers – March-April 2015, Ricardo Energy & Environment

When asked if the environmental criteria that were applied before 2012 were stricter or less strict than in the recent contract, for all criteria the answer option “About the same” was the most common, followed by “Less strict” and then “More strict”. For Euro emission standards the highest percentage of respondent answered “More strict” compared to the other criteria. The option “other” environmental criteria was only selected for 63 out of 155 respondents. Examples that were given were recycling or country-specific eco labels.

Do you have any further comments related to this survey?

We received 31 comments regarding the survey in general. Raised issues were:

- A number of respondents questioned the usefulness of applying environmental criteria to special vehicles such as firefighting vehicles. While firefighting vehicles do not necessarily fall under the Clean Vehicles Directive this section was also used to raise criticism against the Euro Emission Standards regarding special vehicles. One case were reported where exemptions were needed from national authorities as a fire fighting vehicle couldn't comply with the Emission Standards.
- It was criticised that the legislation was designed for the purchase of vehicles and not the situation of long-term leases.
- It was suggested that the questionnaire should be translated into more national languages as local governments struggle with answering the questions in English.

Furthermore the comment section was used to go more in detail about specific clean vehicle purchases and emphasizing over-compliance with the directive (e.g. applying the CVD for cases under the threshold value).

13. ANNEX 5 – PROCURER INTERVIEWS

Follow-up interviews were carried out with selected procurers from a number of different EU Member States. Along with the invitation to participate in an interview, an interview guide was sent out with additional questions to the online survey. Interviews were carried out with 13 procurers. Out of these 13 interview partners 10 provided a completed interview guide. In addition 6 procurers completed the guide but were unable to do a phone interview (see Table 13-1). In total we received 16 written contributions. In the following the results from the questionnaire as well as the phone interviews will be discussed.

Table 13-1: Interviews with Procurers

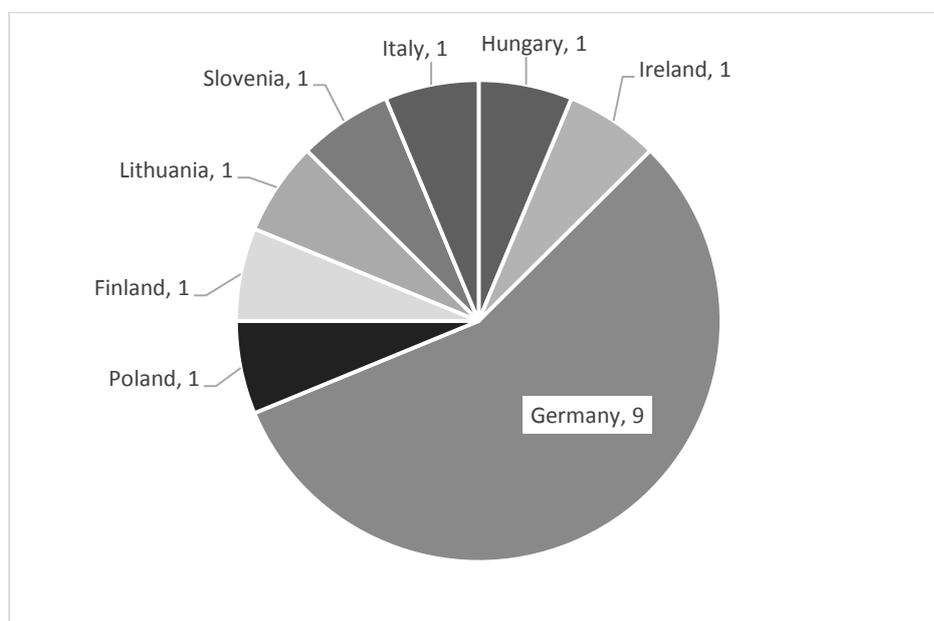
Number procurers contacted	of	Number interviews completed	of	Written contribution only	Declined	No response
97		13		6	22	57

Interview guide

In contrast to the online procurers' survey that referred to the latest procurement contract the procurers' interview guide included more general questions about the procurement of road vehicles.

The 16 written contributions were received from a range of Member States as shown in Figure 13-1.

Figure 13-1: Completed procurer interview guides by Member State (written contributions)

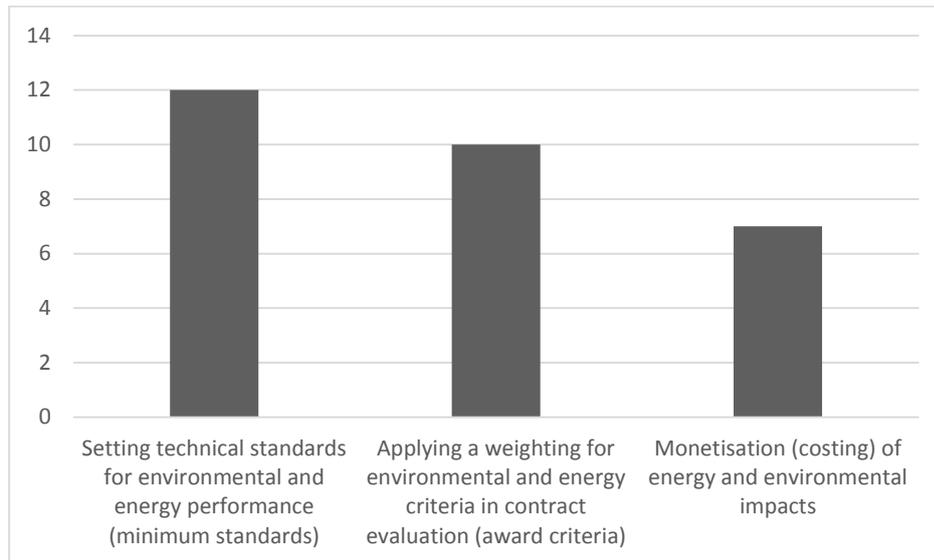


Source: Procures Interview Guides – May 2015, Ricardo Energy & Environment

Most respondents were from Germany due to the high number of German procurer contact details available. Seven other responses were received, from Poland, Finland, Lithuania, Slovenia, Italy, Hungary and Ireland.

Please indicate which of the following environmental criteria you have applied when procuring road transport vehicles in contracts identified above since the start of 2012.

Figure 13-2: Use of Article 5(3) environmental criteria options since the start of 2012

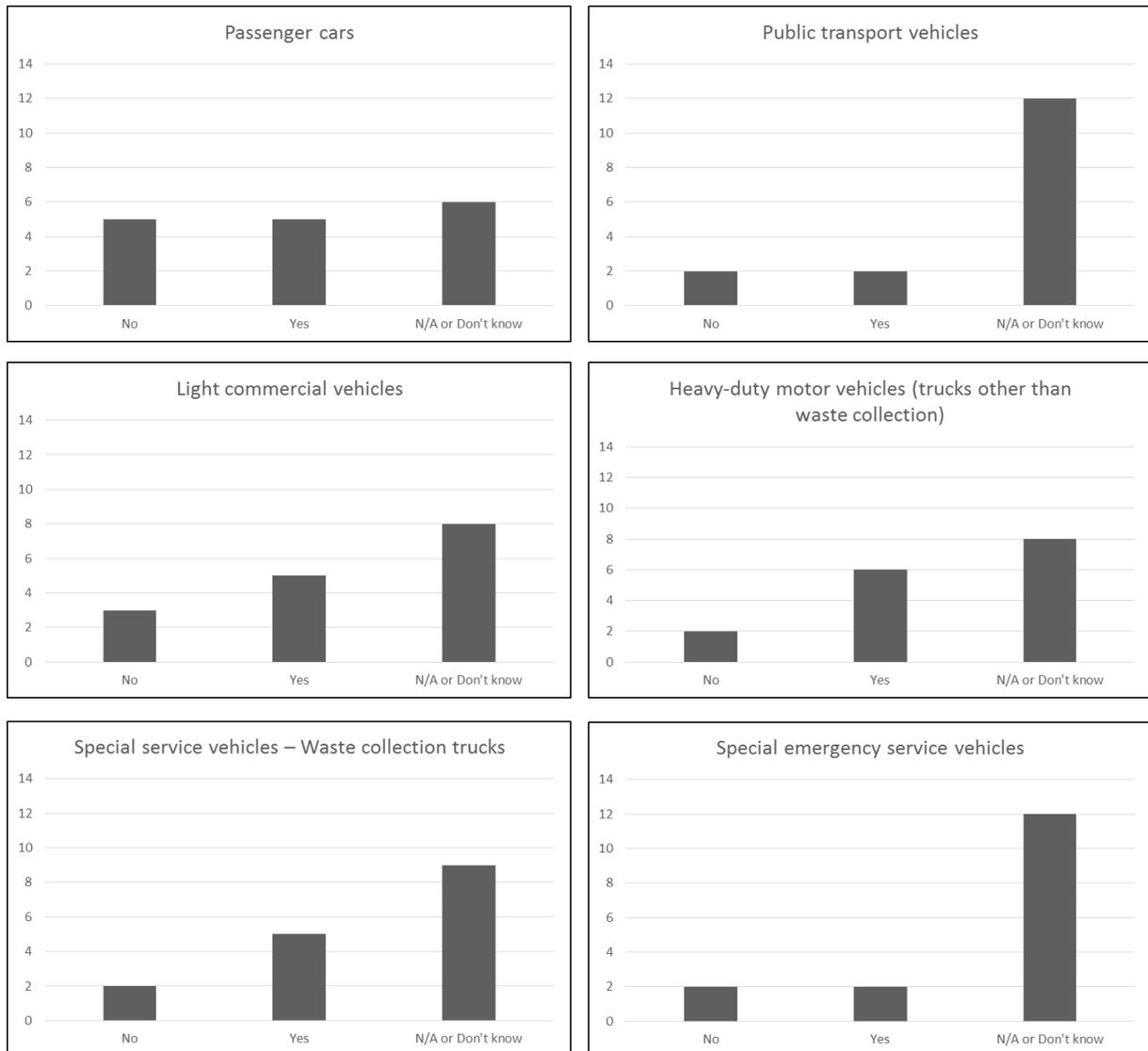


Source: *Procures Interview Guides – May 2015, Ricardo-AEA*

Most of the respondents had applied minimum technical standards (Option 1) (12) followed by weighting criteria (Option 2a) (10). Monetisation (Option 2b) was the criteria least used (7) which supports the results from the online survey. The responses revealed that in some cases more than one criteria was applied. Four of the respondents applied all three options in the same contract.

In your opinion, would you have purchased the same vehicles (or equivalent in terms of environmental impacts) without the requirement to use environmental criteria?

Figure 13-3: Difference in purchase decisions for different vehicles

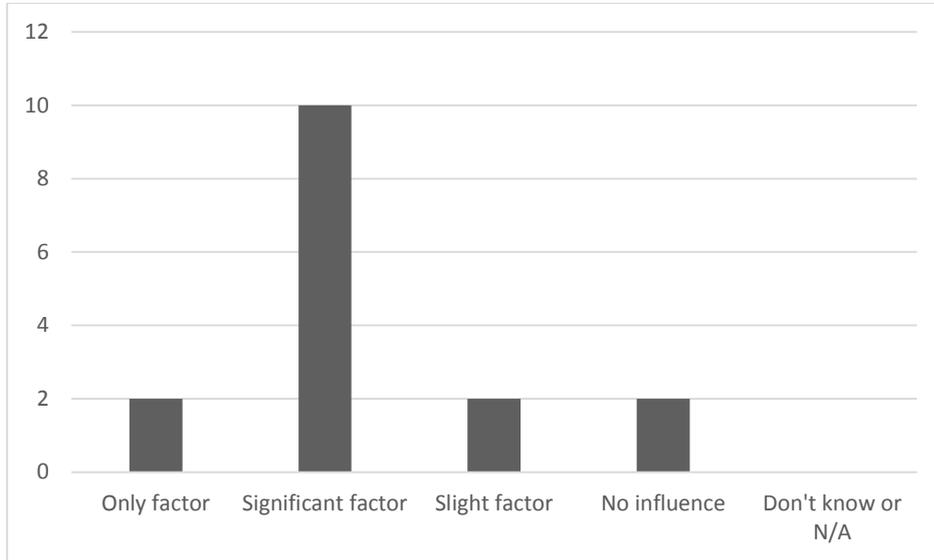


Source: Procures Interview Guides – May 2015, Ricardo Energy & Environment

For all vehicle types the answer that the same vehicle would have been purchased without using environmental criteria was either more common (3 cases) or the same (3 cases) as the number of respondents answering in the negative. For none of the vehicle types the option no was more frequently used as yes. See the section below on telephone interviews where the reasons are behind these effects is explored in more detail.

To what extent was the CVD a driving factor in your decision to introduce environmental criteria?

Figure 13-4: CVD as driving factor in procurer’s decision to introduce environmental criteria in the procurement decision

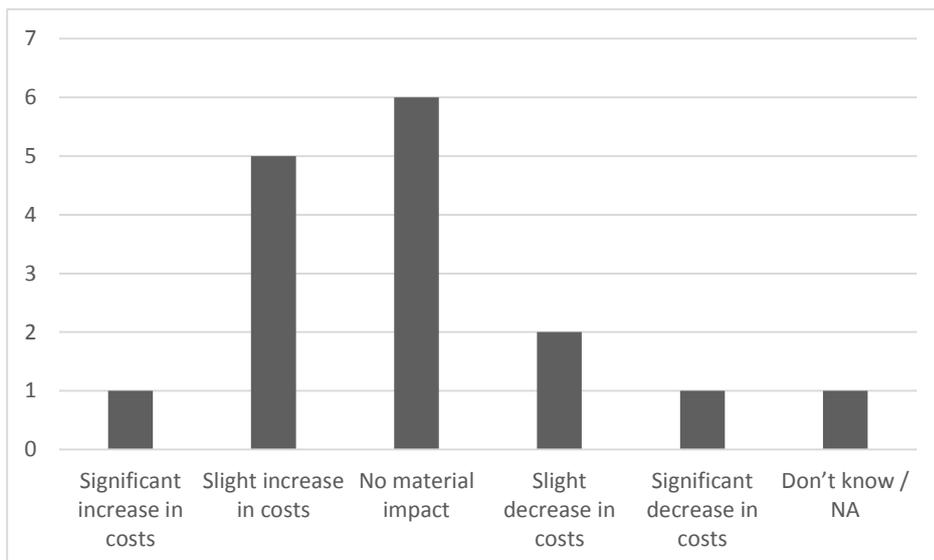


Source: Procures Interview Guides – May 2015, Ricardo Energy & Environment

Most respondents (10 out of 16) answered that the CVD was a significant factor in their decision to introduce environmental criteria. For each of the following answers: that the CVD was the only factor; a slight factor; or had no influence; there were two respondents each.

Did applying environmental criteria have an effect on your purchase or running costs?

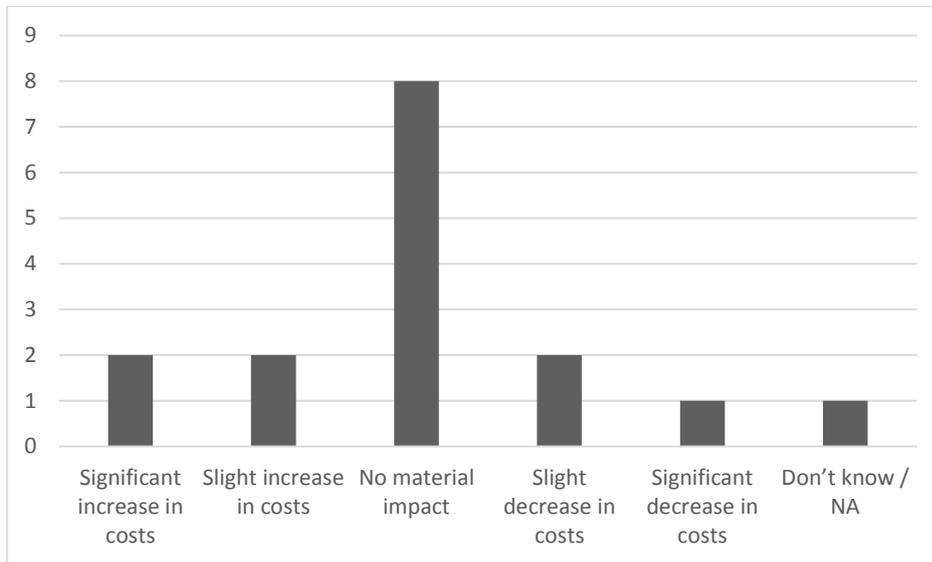
Figure 13-5: Application of environmental criteria and effect on purchase costs



Source: Procures Interview Guides – May 2015, Ricardo Energy & Environment

For purchase costs most procurers (6) responded that environmental criteria had no material impact on their purchase costs followed by a slight increase in costs (5). All other options were selected by 2 or less respondents.

Figure 13-6: Application of environmental criteria and effect on running costs

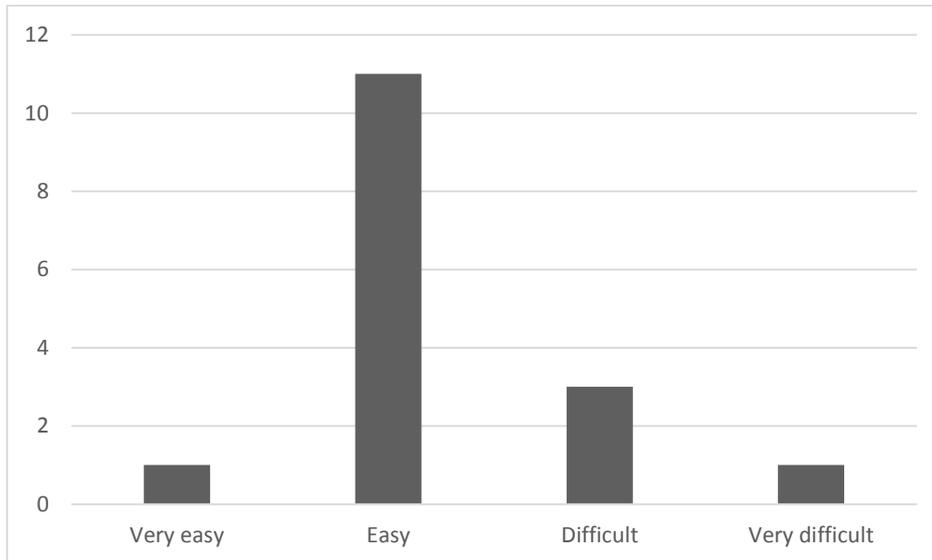


Source: *Procures Interview Guides – May 2015, Ricardo Energy & Environment*

For running costs half of the respondents stated that there was no material impact, all other options only selected by 2 or less procurers.

How easy/difficult has it been for your organisation to apply the environmental criteria to the procurement of new road transport vehicles?

Figure 13-7: Ease of applying environmental criteria to procurement of new road transport vehicles

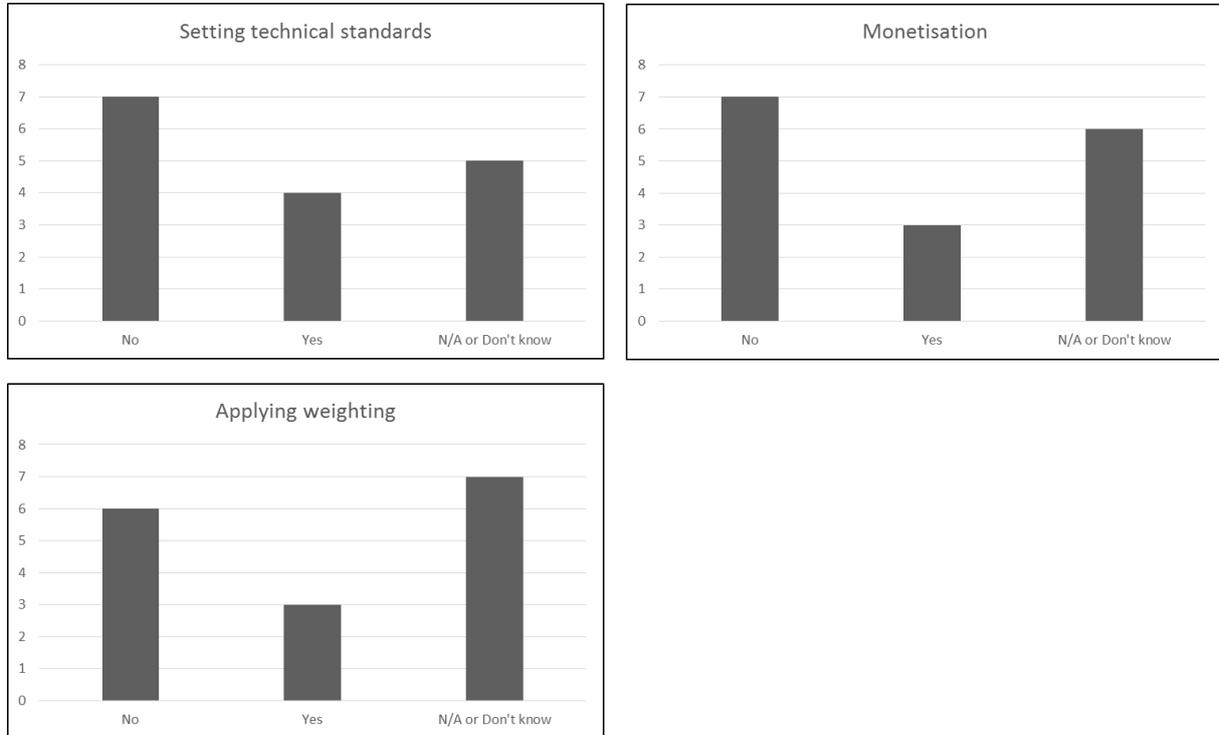


Source: *Procures Interview Guides – May 2015, Ricardo Energy & Environment*

The majority of the respondents (11) stated that it was easy for them to apply environmental criteria. Three procurers stated that it was difficult. One respondent each selected "very easy" and "very difficult".

In your experience, has the administrative time spent per contract increased due to the inclusion of environmental criteria?

Figure 13-8: Reported increases in administrative time per contract due to inclusion of environmental criteria

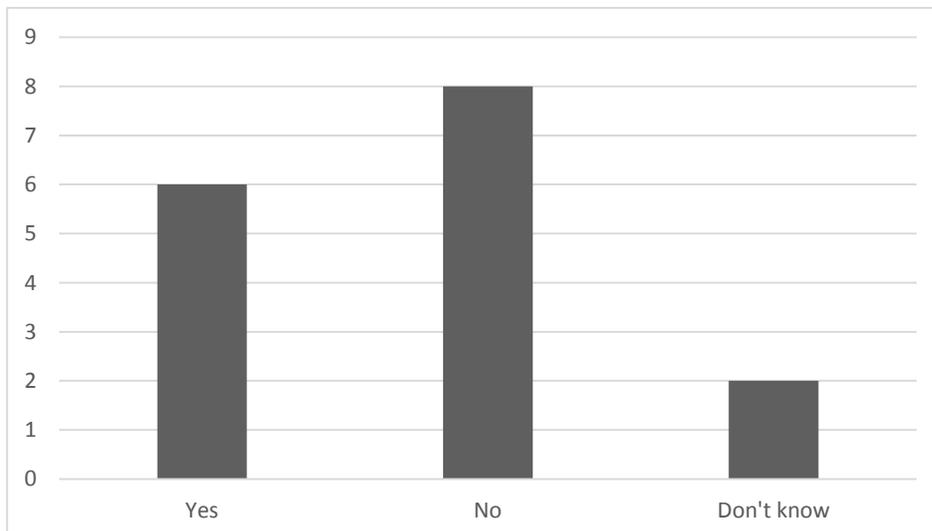


Source: Procures Interview Guides – May 2015, Ricardo Energy & Environment

For all three options most procurers stated that there was no increase in administrative time per contract, or that they did not know/not applicable. . Fewer respondents felt that administrative time had increased.

In your opinion, are there differences in the administrative effort required for different types of vehicles?

Figure 13-9: Are there differences in the administrative effort required for different types of vehicles?

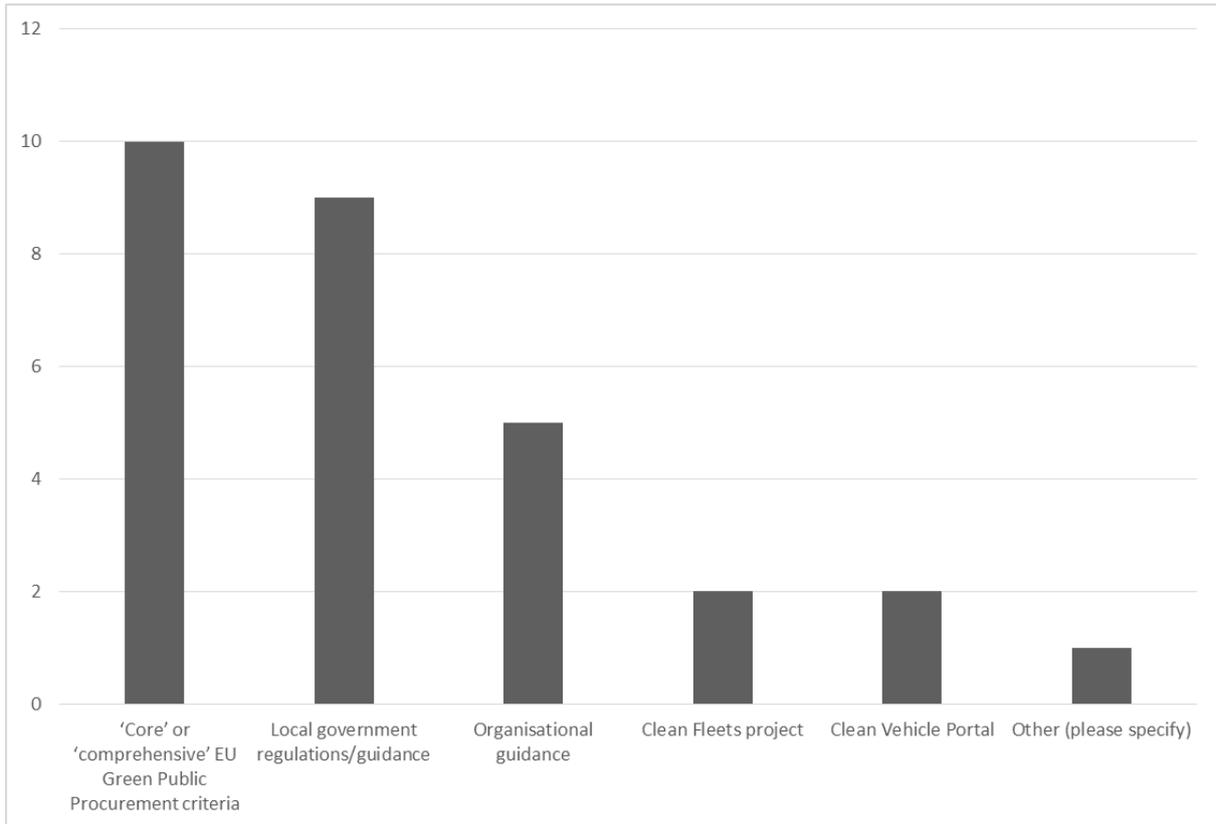


Source: *Procures Interview Guides – May 2015, Ricardo Energy & Environment*

Half of the respondents (8 out of 16) stated that in their opinion there was no difference in administrative efforts between different vehicle types. Six respondents stated that there was, whereas two respondents had no opinion on the question.

When setting environmental criteria, did you apply any guidance or other documentation?

Figure 13-10: Use of guidance documents when setting environmental criteria



Source: *Procures Interview Guides – May 2015, Ricardo Energy & Environment*

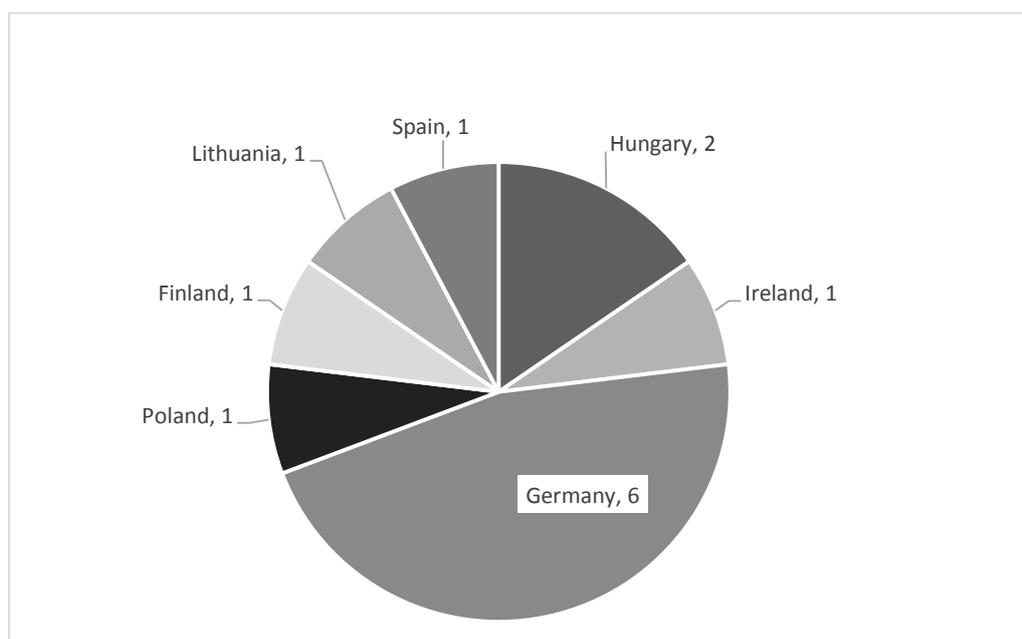
Most respondents stated that they had used EU GPP guidance (10) or local government guidance (9) when setting environmental criteria. Less than half of the procurers applied organisational guidance. As for the Clean Fleets project and the Clean Vehicle Portal, they were only used by two of the respondents each.

Telephone Interviews

In total, 13 procurers were interviewed from a variety of organisations (majority from local authorities). Vehicles were procured at scales both below and above the organisation's relevant threshold value for EU-wide tender.

The chart below (Figure 13-11) shows the distribution of interview candidates by Member State. Again a large number of the respondents (6) were from Germany, 2 interviews were carried out with Hungarian procurers. Furthermore one interview each was conducted for Poland, Finland, Lithuania, Spain and Ireland.

Figure 13-11: Number of telephone interviews by Member State



Source: Procures Phone Interviews – May 2015, Ricardo Energy & Environment

Depending on their answers in the procurers interview guide the interviewees were asked an individual set of questions. Where no interview guide was received the interview had a loose structure around a number of topics essential for our analysis. In the following we will elaborate on these different topics in detail.

Use of environmental criteria in assessments (options presented in Article 5(3))

The process of choosing which environmental criteria option to use in assessments was not always very transparent. A number of interviewees were not aware that they had three options to choose from (as set out in Article 5(3) of the Directive). Reasons provided included that the legislation text was confusing to them or that they had received instructions from an organisational or regional level to use a certain criteria. An additional analysis of the national legislation showed that in all cases all three options were indeed available to interviewees.

Several interviewees chose to use a combination of two or even all three options.

One procurer stated that they were using different methodologies for different vehicle types: monetisation for passenger cars and minimum standards for trucks and special vehicles due to the lack of environmental data for these vehicle types. In this case the procurer was not aware of the option to apply weighting.

Setting minimum technical standards (Option 1)

Minimum technical standards (Option 1) were applied in most cases due to the perceived simplicity of the option. In a lot of cases Euro standards were used as the minimum

standards for pollutant emissions. A couple of procurers had only set this minimum standard and were not aware that minimum standards for CO₂ emissions and fuel/energy consumption had to be set as well.

Applying award criteria (Option 2a)

In the cases where weighting/award criteria (Option 2a) were applied the weighting factors for environmental criteria range between 6% and 40%. In the cases where the environmental criteria weighting was specifically low the interviewees were asked to elaborate on the reasoning behind choosing these factors. The interviewees stated that they did acknowledge that the number was rather low and would have no or only a marginal effect on the outcome but they perceived other factors to be more important in the procurement decision – the flexibility in the Directive enables this to happen. Putting more weight on environmental factors in the future was not considered.

One Hungarian procurer described a case where his organisation had applied weighting for environmental criteria but was reprehended by the tender authorities on the grounds that these restrictions were against the concept of free competition. In this case the procurement authorities decided to only apply the newest Euro standard as a minimum criteria for future tenders. A separate Hungarian stakeholder commenting that he did not feel that tender authorities understood the aims of the CVD and could thus not efficiently enforce the set rules.

Monetisation of impacts (Option 2b)

Most interviewees (8 out of 12) had not applied the monetisation option when assessing contracts. Many felt that it required some specialist knowledge to perform the required unit conversions etc. Some questioned the usefulness of the monetisation approach which they felt was 'academic', and the single values for external costs detached from the reality that air pollution issues are geographically unevenly spread and procurers in highly polluted regions need to attach greater significance to emissions performance than procurers in less polluted regions. In the case of Hungary the data for the calculation of operational lifetime costs is missing from the national legislation text which makes it an obstacle for Hungarian procurers to apply it.

Given the Directive's requirement to include energy consumption, several interviewees indicated that they required bidders to use the MJ/Litre values set out as part of the monetisation procedure for converting fuel consumption into energy consumption. One interviewee felt that this conversion made the process unnecessarily complex and that the analysis should be limited to CO₂.

One suggestion for improving the monetisation methodology was that the monetary value per unit of energy should not be based on diesel or petrol but on the respective fuels/energy types.

Effects and Impacts of the Clean Vehicles Directive

Few interviewees had introduced environmental criteria entirely due to the requirements of the CVD. Several were using environmental criteria before the introduction of the legislation (which was also the case in the survey with procurers), although in most cases the tendering procedures were modified in order to meet specific requirements of the Directive in terms of specifying emissions, energy consumption and CO₂ as separate criteria.

Interviewees often felt that setting environmental criteria was 'good practice' and in most cases didn't constitute significant extra effort. They therefore often apply the same criteria to tenders below the EU threshold value.

While generally having a positive attitude towards the Directive, interviewees felt that CVD's impacts on their procurement decisions had been fairly limited. In most cases the same vehicles as before were being procured. One reason for this was that environmental criteria had been considered prior to the introduction of the CVD and there was no

significant change to their procurement procedures. However, procurers that didn't apply environmental criteria prior to the introduction of the CVD also did not feel that there was a significant change in vehicles being procured. Reasons mentioned were that minimum technical standards could be very relaxed or that award criteria/weighting factors were low. As the Directive is not very prescriptive in these areas, interviewees felt that the directive was rather ineffective.

When asked if they had seen a shift in their vehicle fleets towards alternative vehicle technologies due to the implementation of the CVD, many procurers stated that they had not. The reason given was the high purchase costs of these vehicles. For electric vehicles the purchase costs were stated to be two to three times higher than for conventional vehicles. This meant that in open calls where all fuel types were allowed the alternative technologies would always lose on price. In reality these open calls are very rare anyway as a lot of the tenders already specify the desired fuel type. The municipalities that had procured alternative vehicle technologies had put out specific tenders. The decision to procure clean vehicles, however, was not driven by the CVD but by strategic decisions on the city level. One example given was the Clean Air for Warsaw initiative.

A shift was only observed towards more energy efficient vehicles which also makes sense from a financial perspective as most of the procurers were taking running costs into account regardless of the methodology used for applying environmental criteria.

Additional administrative effort

When asked about the potential additional administrative effort per contract to apply the CVD, the answers were very varied. While a lot of the respondents didn't think there was any additional time spent on it, the times given for the cases where there was some additional effort ranged between 10 minutes and 4 hours per contract on average. This number was highly dependent on the number of offers per contract. While in some cases (e.g. special vehicles) only one offer was received there were cases (e.g. passenger cars) where the number of offers was significantly higher. Some respondents therefore felt that there was a difference in administrative efforts for different types of vehicle. The most time consuming part mentioned was the communication with the potential contractors to receive the relevant data. Especially in cases where the tenders were written in an unclear way misconceptions could lead to significant delays in the tender process. One case in Hungary was reported where the process was delayed for 1.5 years as the issue had to be decided in court.

One suggestion that was made by several interviewees to significantly reduce administrative effort was to centralise procurement processes. Due to small municipalities having to procure their road vehicles on their own, a lot of the employees writing the tender calls and evaluating the bids have to cover a wide range of goods and are no vehicle experts. This missing practice makes it very time consuming for them to apply the CVD.

Use of Guidance and Commission Initiatives

Most interviewees stated that they had only used the national legislation or the Clean Vehicles Directive directly for guidance. More than half of the respondents had never heard of the Clean Vehicles Portal or the Clean Fleets Project. The interviewees that had accessed the Clean Vehicles Portal found it helpful as a first overview on the performance characteristics of low-emission cars and vans. For trucks, interviewees stated that they found the portal of little use. Some of the interviewees also looked at the Clean Fleets Project. A German interviewee felt that this was of limited use as a large share of the information provided was not available in German.

Suggested Improvements

The discussions showed that a lot of the interviewees had trouble with interpreting the legislation. Especially the monetisation methodology was often perceived as too complex. In only one case it was reported that a workshop on how to apply the CVD was attended. In order for the Directive to reach its full potential training on how to apply it was felt

necessary. This is especially true for authorities that procure a wide range of goods and thus are not vehicle experts.

Furthermore it was suggested that the Member States needed to give feedback on tenders to ensure that the legislation is applied correctly.

When asked whether, if able to decide, they would repeal, amend or keep the Directive as it is, most interviewees said they would keep it as is, suggesting that any difficulties in implementation are not an issue of the Directive per-se, but general issues about lack of data for the vehicle category to be procured, or issues with processes, expertise and knowledge gathering within the relevant procuring organisations.

14. ANNEX 6 – MANUFACTURER INTERVIEWS AND QUESTIONNAIRES

Stakeholder consultation of manufacturers took place through distribution of a written questionnaire, as well as telephone interviews with a number of manufacturers. ACEA, the European Automobile Manufacturer’s Association, provided input on behalf of its members by answering our general survey.

Although 15 manufacturers were contacted, only four were able to participate either in a telephone interview or by sending a completed questionnaire within two months of being contacted. Two manufacturers declined to participate. Full details of the total response received are given in Table 14-1.

Table 14-1: Response rates for the procurers' survey

Number contacted	Number of interviews completed	Declined	Written contribution only	No response	Indicated interest, did not send any response in time
15	3	2	1	5	4

Although it was initially conceived that there would be a quantitative analysis of questionnaire responses, owing to the low number of responses and the fact that most manufacturers preferred to provide their input in the form of a telephone interview, the analysis in the remainder of this section consists of a combined summary of the information gained from telephone interviews and the two written contributions received. The analysis is arranged under topic headings.

Data on sales/deliveries to contracting authorities

Manufacturers were asked whether they had specific details of the numbers and types of vehicles sold to contracting authorities, in order for us to determine whether we might be able to use this information to estimate the extent of public procurement of vehicles in the EU, or measure the effects of the Directive in terms of the energy and environmental performance of vehicles procured by contracting authorities. The manufacturers mostly stated that this information is not available, for various reasons.

Neither of the light duty vehicle manufacturers were able to provide us with data on the number of publically procured vehicles. One of them stated that this was because calls for tenders are sometimes not published by the public bodies who ultimately use the vehicles, but instead, third party organisations organise procurement on their behalf on a large scale. In other cases, vehicles are sometimes sold to dealerships rather than end users.

The heavy duty vehicle manufacturers were only able to share a limited amount of information with us. One of these manufacturers estimated that the share of heavy duty vehicles sold to the public sector in Germany was around 10%, and was able to provide numbers of special purpose vehicles procured in Germany in total and by municipal governments in Germany. Neither of the contacts at the two heavy duty manufacturers was able to provide any figures on buses.

Impacts on types of vehicles procured by contracting authorities

Notwithstanding the lack of precise quantitative evidence available to them, manufacturers were asked whether they thought the Directive had affected contracting authorities’ decisions with respect to the types of vehicles bought. The manufacturers indicated that they thought there had been very little effect on choices of fuels and powertrains, fuel consumption, or prevailing EURO standards. One of light duty vehicle manufacturers stated two reasons for this: the Directive’s rules for taking energy and environmental impacts into account are too loose, and the legislation is poorly understood. The heavy duty vehicle manufacturers also stated that the lack of standardised community test procedures meant that the Directive could not have had an effect on fuel consumption or CO₂ performance of heavy duty vehicles.

More than one of the manufacturers also drew attention to the fact that other factors have affected the choices of contracting authorities over time – the adoption of new EURO standards, the light duty vehicle CO₂ Regulations, and “market trends”. One of the heavy duty vehicle manufacturers was sceptical that the Directive was responsible for any significant effort by contracting authorities to purchase vehicles with higher EURO standards than were strictly obligatory at the time.

Effects on manufacturing scales and significance of CVD in driving investment decisions

The light duty vehicle manufacturers indicated that legislation other than CVD was one of the main forces driving strategic investment decisions. One stated that the Directive had not resulted in any noticeable technological shift and the other stated that it had not impacted investment decisions at all.

The heavy duty vehicle manufacturers also stated that the Directive had not had any material effect on the uptake of new technology. One of the reasons stated for this was that the Directive leaves contracting authorities with the option of specifying lax environmental standards that allow “anything” to be bought.

Manufacturers also indicated that they thought fuel prices and deployment of alternative fuel infrastructure had a much more significant effect on their strategic decision-making (in the case of alternative fuel infrastructure, one manufacturer indicated that they thought deployment of such infrastructure was a powerful force in theory, but that in practice, it was hardly being done). One of the light duty vehicle manufacturers stated that fleet owners already place importance on total cost of ownership and this also affected the manufacturers’ strategy.

Costs and unintended effects resulting from the Directive

The light duty vehicle manufacturers indicated that the Directive had not had any effect on their costs. One said that the administrative work of supplying information about vehicles’ energy and environmental performance was something manufacturers were already required to do before the Directive.

The two heavy duty vehicle manufacturers suggested that the Directive had created some (unforeseen and unintended) costs for them.

One of the heavy duty vehicle manufacturers stated that the Directive had contributed to contracting authorities expressing interest in the idea of hybrid electric trucks, and asking manufacturers to offer such vehicles. However, this manufacturer stated that the additional interest had yet to translate into any additional sales, as hybrid drivetrains roughly double the cost of the vehicle chassis and contracting authorities are not willing to pay such high premia for them. This manufacturer suggested that the Directive may have been responsible for manufacturers investing in new production lines in order for them to be able to offer vehicles with alternative powertrains. But given the low numbers of vehicles purchased which use these alternative powertrains, the Directive had done nothing to drive down per-vehicle costs of manufacture.

The other heavy duty vehicle manufacturer stated that in Germany, the introduction of the Directive had led to confusion among contracting authorities, causing some of them to delay or postpone their purchases, and also led to an incident in which the manufacturer had to make a one-off investment of €20,000 in order to participate in a bid to supply a municipal government. Both of these issues were ultimately caused by the fact that there is no standardised community test for fuel consumption of heavy duty vehicles, and some contracting authorities in Germany are confused as to how to react, given that the Directive requires them to take the energy efficiency of vehicles into account in procurement decisions. Some contracting authorities have reacted simply by deciding that it is impracticable to compare heavy duty vehicles for fuel consumption as part of the procurement process, and procured on the basis of price alone. Others, though, have felt compelled to define their own test cycles and ask manufacturers to subject their vehicles

to these cycles in order to qualify for bidding. In particular, government of the city of Berlin orchestrated its own test of waste disposal trucks' fuel consumption, and the manufacturer claimed that it cost €20,000 for them to send 20 of their vehicles to be tested on this cycle. After other German cities invited the manufacturer to participate in other, differently defined cycles, the manufacturer decided it was unsustainable for it to continue participating in these tests, and stopped. The manufacturer now writes to contracting authorities who ask for information on fuel consumption per kilometre letting them know that there is no standardised way of measuring this for heavy duty vehicles. Allegedly, other manufacturers choose instead to respond to these requests with their own figures on fuel consumption.

Effectiveness of the Directive versus other policy measures

Manufacturers generally portrayed the Directive as being less effective at reducing CO₂ and pollutant emissions and increasing the market share of clean vehicles than many other policy measures.

"Price-based measures (e.g. taxation or tax credits/direct subsidies)" was often singled out as a particularly effective measure. More than one manufacturer suggested it had the most influence on achieving the relevant objectives.

Manufacturers generally believed that R&D support (in the form of grants or tax credits for research by public or private institutions) was more effective, as is (financial) support to commercialisation, and deployment of alternative fuel infrastructure.

"Performance based regulations and standards (e.g. improvement in environmental performance of vehicles)" were generally felt to be at least as effective as the Directive, if not more.

There was no consensus as to whether demonstration and verification efforts were more or less effective than the Directive. There was also no consensus on the relative effectiveness of networks and partnerships.

"Information based measures" such as labelling were generally felt to be as effective as the Directive, with one manufacturer stating that they were less effective.

ACEA's comment was that "The market uptake of energy efficient vehicles is depending on a number of factors and depend on concrete situation on a given market. For some markets in the EU certain measures have more impact than the others, there is no one-fit-all solution. As the key decision of the consumers is price, one can derive that taxation is probably the most influencing one in general."

Effects of repeal of the Directive, and recommendations on reform

All the manufacturers directly commenting on the possible effects of repealing the Directive stated that the effects would be "neutral" or "of no major importance" to them. The reason given for this was that the Directive currently has no measurable effect on them that they are aware of.

However, as a caveat to this, the manufacturer claiming the Directive had confused procurers of heavy duty vehicles in Germany suggested that the Directive should be suspended until there was a standard for measuring fuel consumption of these vehicles has been defined and rolled out.

ACEA were opposed to extending the scope of the legislation to cover large private fleets, and stated that the owners of these fleets were already sensitive to energy efficiency concerns as part of their assessments of total cost of ownership.

One of the light duty vehicle manufacturers recommended that a certain set of considerations be taken into account in any future definition of the term "clean vehicle". These included that the definition should be simple and readable in order to gain acceptance, and also "rely upon existing and available criteria (Euro regulation, Euro CO₂ target for vehicle)."

15. ANNEX 7 – CONTRACTOR ONLINE SURVEY

A survey was also developed aimed at capturing data and information from the contractors who have been awarded contracts for providing (selling or leasing) road transport vehicles (including manufacturers and other suppliers). The link to the online survey was sent out to all 1,713 contractor contacts identified (unique email addresses identified via the TED database), and was available online for a period of two-weeks in May 2015. The survey received 65 completed responses. An overview of responses to the contractor survey is provided below.

BACKGROUND INFORMATION

Which Member State is your organisation based in?

The table below (Table 15-1) shows the number of responses received for the online contractors' survey from different Member States.

A total of 66 responses were received for the online contractors' survey. Most respondents belonged to organisations based in either the United Kingdom (30%) or Germany (29%). The remainder of the respondents were distributed between other Member States.

Table 15-1: Number of respondents for the contractors' survey by Member State

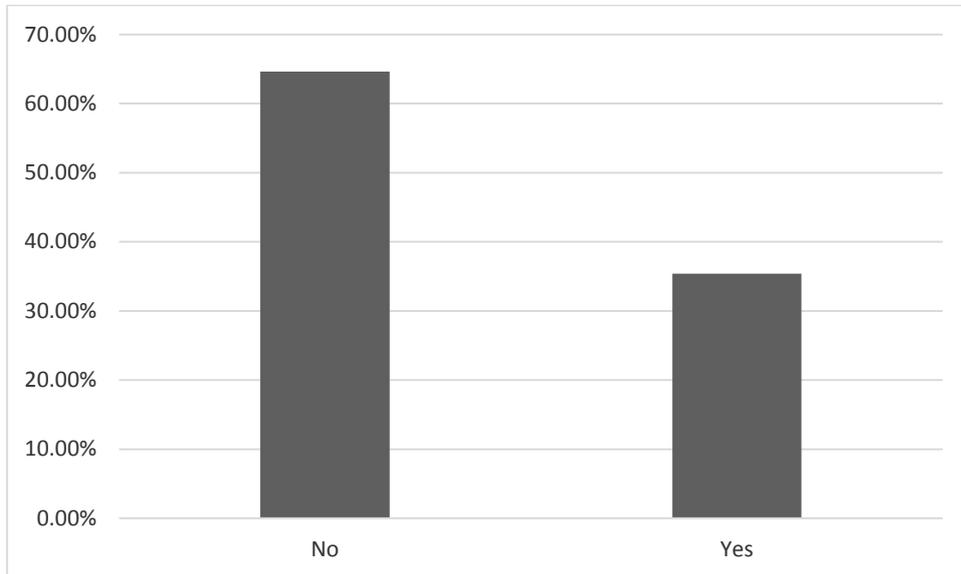
Member state	No. of responses	Percentage
Belgium	2	3%
Bulgaria	1	2%
Czech Republic	1	2%
Germany	19	29%
Greece	1	2%
Hungary	1	2%
Ireland	2	3%
Italy	1	2%
Latvia	2	3%
Lithuania	2	3%
Malta	2	3%
Netherlands	1	2%
Other	2	3%
Poland	2	3%
Romania	5	8%
Sweden	2	3%
United Kingdom	20	30%
Grand Total	66	

Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

Do you manufacture vehicles?

To get an overview of the type of organisations the respondents were representing (and to target later questions), we asked respondents if they manufactured, sold or leased vehicles. 23 (35%) of the 66 respondents stated that they manufactured vehicles.

Figure 15-1: Do you manufacture vehicles?



Source: *Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment*

Do you sell or lease road transport vehicles to public contracting authorities or to operators providing government-subsidised public transport services?

The next set of questions were specifically targeted towards respondents who sold or leased vehicles.

Forty-six respondents sold or leased vehicles. 11 of them sell to 'public contracting authorities', 9 of them lease to 'public contracting authorities', 19 sell to 'operators providing government-subsidised public transport services', 8 lease to 'operators providing government-subsidised public transport services' and 17 of them stated they did 'none' of the above.

Figure 15-2: Respondents who sell or lease road transport vehicles to 'public contracting authorities' or to 'operators providing Government-subsidised public transport services'



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

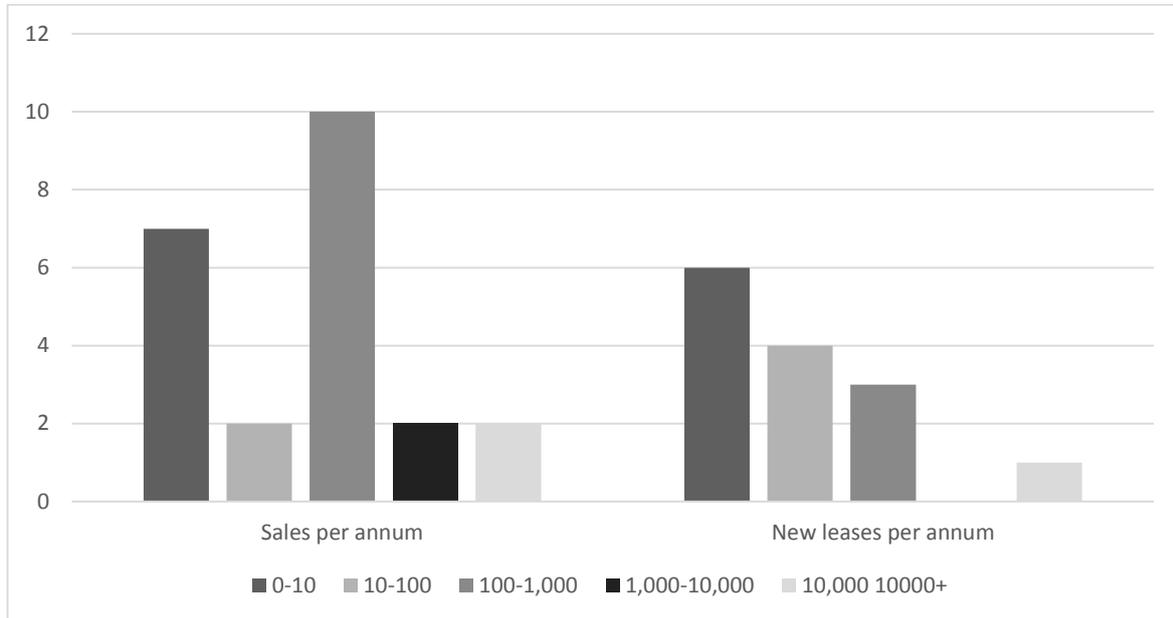
Approximately how many vehicles do you sell or lease in total per year?

To get an overview of the size of the respondents' business, we asked them the number of vehicles they typically sell/lease per annum. Twenty four contractors responded to this question, out of which 14 respondents leased vehicles and 23 of them sold vehicles (Note: some respondents did both).

Of the respondents who sold vehicles, most respondents (10) stated 100-1,000 vehicles per annum, whereas 7 of the respondents sold '0-10', 2 sold '10-100', 2 sold '1,000-10,000' and 2 sold 'more than 10,000' vehicles per annum.

Of the respondents who leased vehicles, most respondents (6) stated that they leased '0-10' vehicles per annum, whereas 4 leased '10-100', 3 leased '100-1,000', 1 leased 'more than 10,000', and 0 leased '1,000-10,000' vehicles per annum.

Figure 15-3: Number of vehicles sold or leased in total by the respondents per year (24 out of 46)



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

Which of the following types of vehicles do you currently sell/lease (select all that apply)?

To get an overview of the distribution of vehicle types being sold/leased by contractors, respondents were asked the details of the vehicle segments and fuel types sold/leased by them. The following table (Table 15-2) provides an overview of the vehicle segments and fuel types sold/leased by the respondents. 'Passenger car' segment is currently the most sold/leased and type of fuel preferred across different segments is 'diesel'. No fuel cell vehicle has been sold/leased by the contractors surveyed.

Table 15-2: Details of type of vehicle segment and fuel type sold/leased by the respondents (46 out of 46)

Types of Vehicles	Petrol	Diesel	Electric	Hybrid	Fuel cell	Other
Passenger Cars	6	6	5	4	0	0
Buses or Coaches	0	4	0	0	0	0
Light (<3.5t) Commercial Vehicles	4	9	2	0	0	0
Heavy goods vehicles (trucks other than waste collection vehicles)	0	7	0	1	0	0
Special service vehicles - Waste collection trucks and services	0	9	0	1	0	0
Special emergency service vehicles – e.g. ambulances, fire engines etc.	2	6	0	0	0	0
Other	0	3	1	0	0	1

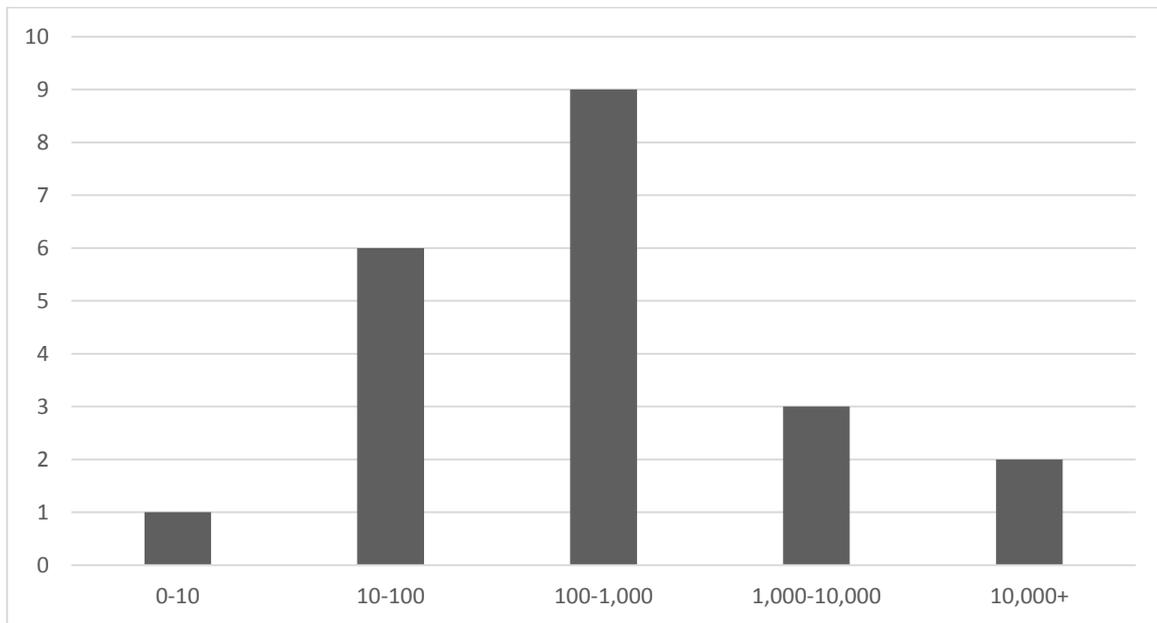
Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

Approximately how many vehicles do you manufacture in total per year?

The next two questions were specifically targeted towards respondents who manufactured vehicles.

To get an overview of the size of the respondents' business, we asked them the number of vehicles they typically manufactured per annum twenty three contractors responded to this question, out of which 9 manufactured '100-1,000' vehicles per annum, 1 of them manufactured '0-10' vehicles per annum, 6 manufactured '10-100' vehicles per annum, 3 manufactured '1,000-10,000' vehicles per annum and 2 manufactured 'more than 10,000' vehicles per annum.

Figure 15-4: Number of vehicles manufactured by the respondents per annum (21 out of 23)



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

Which of the following types of vehicles do you currently manufacture?

To get an overview of the distribution of vehicle types being manufactured by contractors, respondents were asked the details of the vehicle segments and fuel types manufactured by them. The following table (Table 15-3) provides an overview of the vehicle segments and fuel types manufactured by the respondents.

The most commonly manufactured vehicle segment is 'special service vehicle' segment and the most common fuel type across different segments is 'diesel'.

Table 15-3: Details of type of fuel and vehicle segment currently manufactured by the contractors

Types of Vehicles	Petrol	Diesel	Electric	Hybrid	Fuel cell	Other
Passenger Cars	1	2	2	1	0	0

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

Buses or Coaches	0	6	1	3	1	1
Light (<3.5t) Commercial Vehicles	1	5	0	0	0	0
Heavy goods vehicles (trucks other than waste collection vehicles)	0	6	0	2	0	0
Special service vehicles - Waste collection trucks and services	0	13	1	5	1	0
Special emergency service vehicles – e.g. ambulances, fire engines etc.	1	4	0	0	0	0
Other	0	3	0	0	0	0

Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

IMPACT OF CLEAN VEHICLES DIRECTIVE

In your opinion, have the requirements of the CVD had an impact on the types of vehicles (e.g. model, fuel type etc.) that are procured publically (e.g. governments/public bodies etc.)?

Both manufactures and contractors who sell/lease vehicles were asked their opinion of the impact of CVD on the types of vehicles that are procured publically.

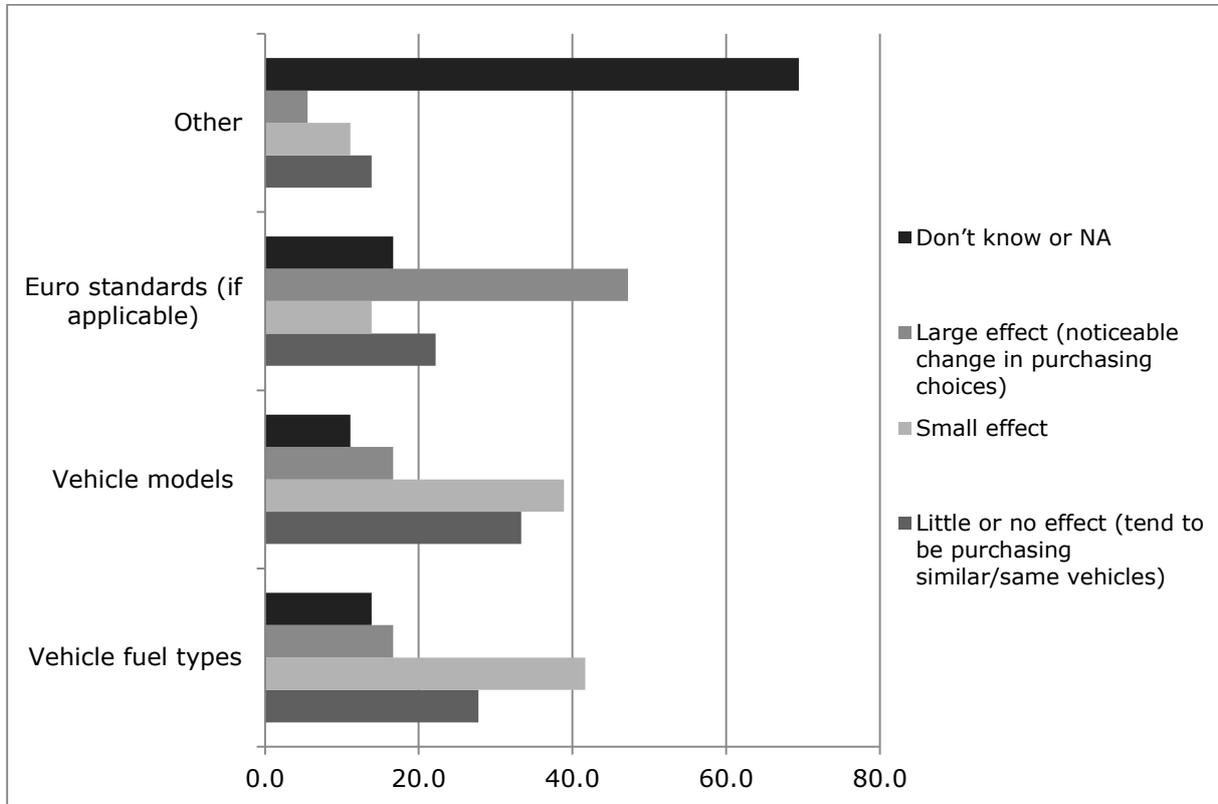
Impact on fuel type- Most (15) believe that there was a small effect on the type of fuel of the vehicle that was procured by public/Government bodies, 10 believe there was a little or no effect, and 6 believed that CVD had a large effect. The rest (5) had no opinion on that matter.

Impact on vehicle model- Most respondents (14) believe that there was a small effect on the model of vehicle that was procured by public/Government bodies, 12 believe there was a little or no effect, and 6 believe there was a large impact. The rest (4) had no opinion on that matter.

Impact on Euro emission standards- Most respondents (17) believe that CVD had a large effect on Euro emission standards of vehicle that was procured by public/Government bodies. 5 believe that there was a small effect while 8 believe there was a little or no effect. The rest had no opinion on that matter.

Other factors- 2 of the respondents believe that CVD had a large effect on other factors of vehicle that was procured by public/Government bodies. 4 believed that there was a small effect while 5 believed there was a little or no effect. The rest (25) had no opinion on that matter.

Figure 15-5: Impact of CVD on the types of vehicles (e.g. model, fuel type etc.) that are publically procured



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

In your opinion, how significant has implementation of the Clean Vehicles Directive been on your strategic/investment decisions in clean and energy efficient vehicles in these markets?

In order to understand the contractors' views on the impact of Clean Vehicles Directive, both manufactures and contractors who sell/lease vehicles were asked their opinion of how significant the impact of CVD has been on their strategic/investment decisions in clean and energy efficient vehicles in different markets.

Passenger cars: Most of the survey respondents (6) believe that implementation of CVD has had little or no impact on their strategic/investment decisions in clean and energy efficient vehicles in the passenger cars market whereas 4 of them believe it has had a moderate to high level of influence. The rest have no opinion on this matter.

Light (<3.5t) commercial vehicles: Most of the survey respondents (5) believe that implementation of CVD has had a moderate to high level of influence on their strategic/investment decisions in clean and energy efficient vehicles in the light commercial vehicles market whereas 4 of them believe it has had little or no impact. The rest have no opinion on this matter.

Buses and Coaches: Most of the survey respondents (8) believe that implementation of CVD has had a moderate to high level of influence on their strategic/investment decisions in clean and energy efficient vehicles in the bus and coach market whereas 6 of them believe it has had little or no impact. The rest have no opinion on this matter.

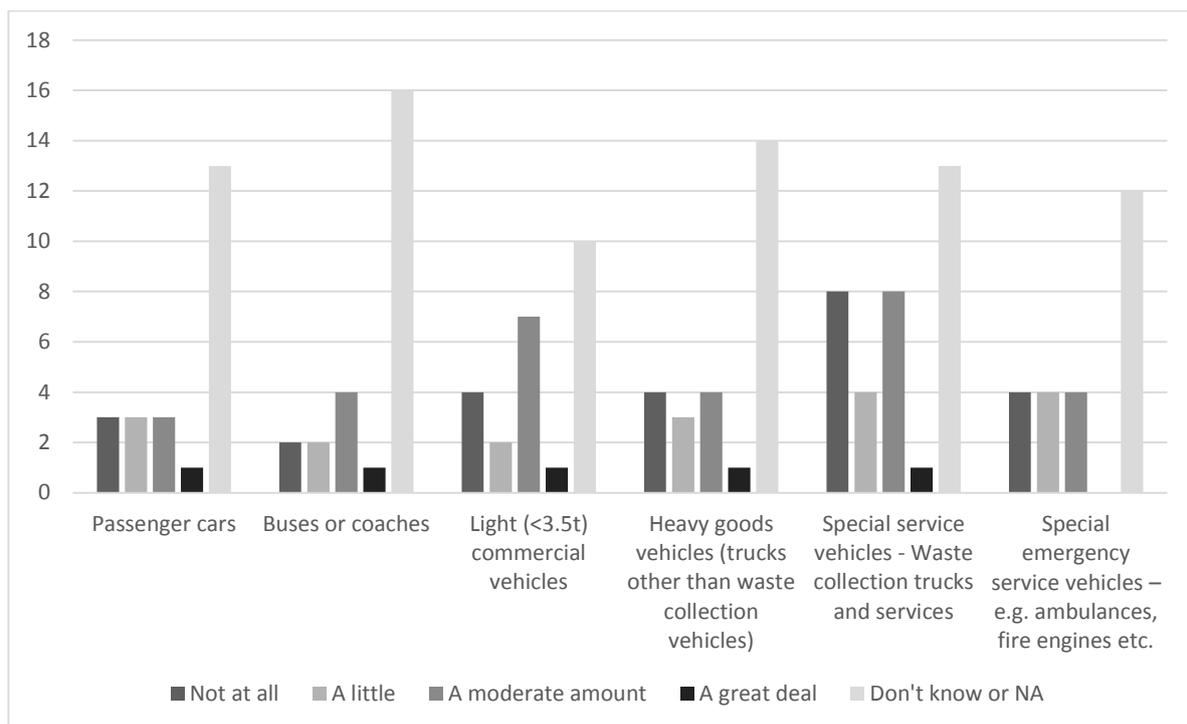
Heavy goods vehicles (trucks other than waste collection vehicles): Most of the survey respondents (7) believe that implementation of CVD has had little or no impact on

their strategic/investment decisions in clean and energy efficient vehicles in the heavy goods vehicles market whereas 5 of them believe it has had a moderate to high level of influence. The rest have no opinion on this matter.

Special service vehicles - Waste collection trucks and services: Most of the survey respondents (12) believe that implementation of CVD has had little or no impact on their strategic/investment decisions in clean and energy efficient vehicles in the special service vehicles market whereas 9 of the survey respondents believe that implementation of CVD has had a moderate to high level of influence. The rest have no opinion on this matter.

Special emergency service vehicles – e.g. ambulances, fire engines etc.: Most of the survey respondents (8) believe that implementation of CVD has had little or no impact on their strategic/investment decisions in clean and energy efficient vehicles in the special emergency service vehicles market whereas 4 of the survey respondents believe that implementation of CVD has had a moderate to high level of influence. The rest have no opinion on this matter.

Figure 15-6: Significance of implementation of CVD on respondents’ strategic/investment decisions in clean and energy efficient vehicles in different markets



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

In your opinion, has the Clean Vehicles Directive had an impact on your sales/deliveries of clean vehicles?

In order to understand the contractors’ view on the impact of clean vehicles directive, both manufactures and contractors who sell/lease vehicles were asked their opinion of the impact of CVD on their sales/deliveries of clean vehicles.

Passenger cars: Most of the survey respondents (9) believe that implementation of CVD has had little or no of influence on their sales/deliveries of clean vehicles in the passenger

cars market whereas 2 of them believe it has had a moderate to high level of influence. The rest (12) have no opinion on this matter.

Buses and Coaches: Most of the survey respondents (8) believe that implementation of CVD has had little or no of influence on their sales/deliveries of clean vehicles in the bus and coach market whereas 2 of them believe it has had a moderate to high level of influence. The rest (15) have no opinion on this matter.

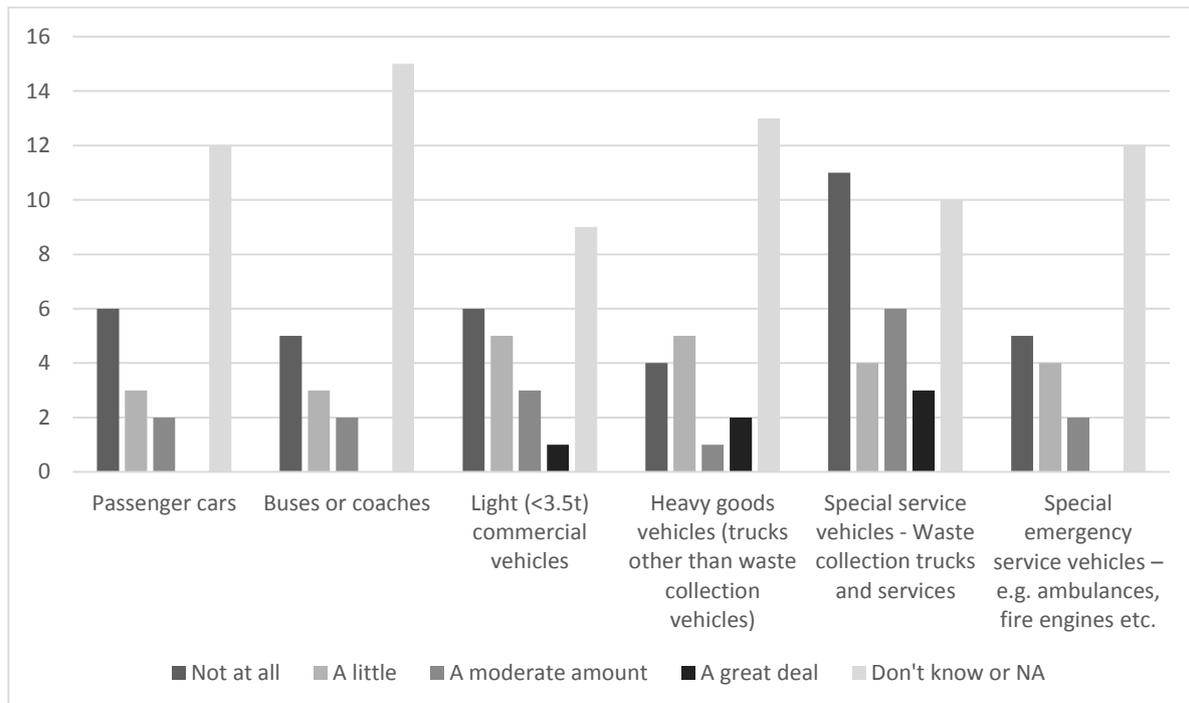
Light (<3.5t) commercial vehicles: Most of the survey respondents (11) believe that implementation of CVD has had little or no of influence on their sales/deliveries of clean vehicles in the Light (<3.5t) commercial vehicles market whereas 4 of them believe it has had a moderate to high level of influence. The rest (9) have no opinion on this matter.

Heavy goods vehicles (trucks other than waste collection vehicles): Most of the survey respondents (9) believe that implementation of CVD has had little or no of influence on their sales/deliveries of clean vehicles in the heavy goods vehicles market whereas 3 of them believe it has had a moderate to high level of influence. The rest (13) have no opinion on this matter.

Special service vehicles - Waste collection trucks and services: Most of the survey respondents (15) believe that implementation of CVD has had little or no of influence on their sales/deliveries of clean vehicles in the special service vehicles market whereas 9 of them believe it has had a moderate to high level of influence. The rest (10) have no opinion on this matter.

Special emergency service vehicles – e.g. ambulances, fire engines etc.: Most of the survey respondents (9) believe that implementation of CVD has had little or no of influence on their sales/deliveries of clean vehicles in the special emergency service vehicles market whereas 2 of them believe it has had a moderate to high level of influence. The rest (12) have no opinion on this matter

Figure 15-7: Impact of CVD on respondents’ sales/deliveries of clean vehicles



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

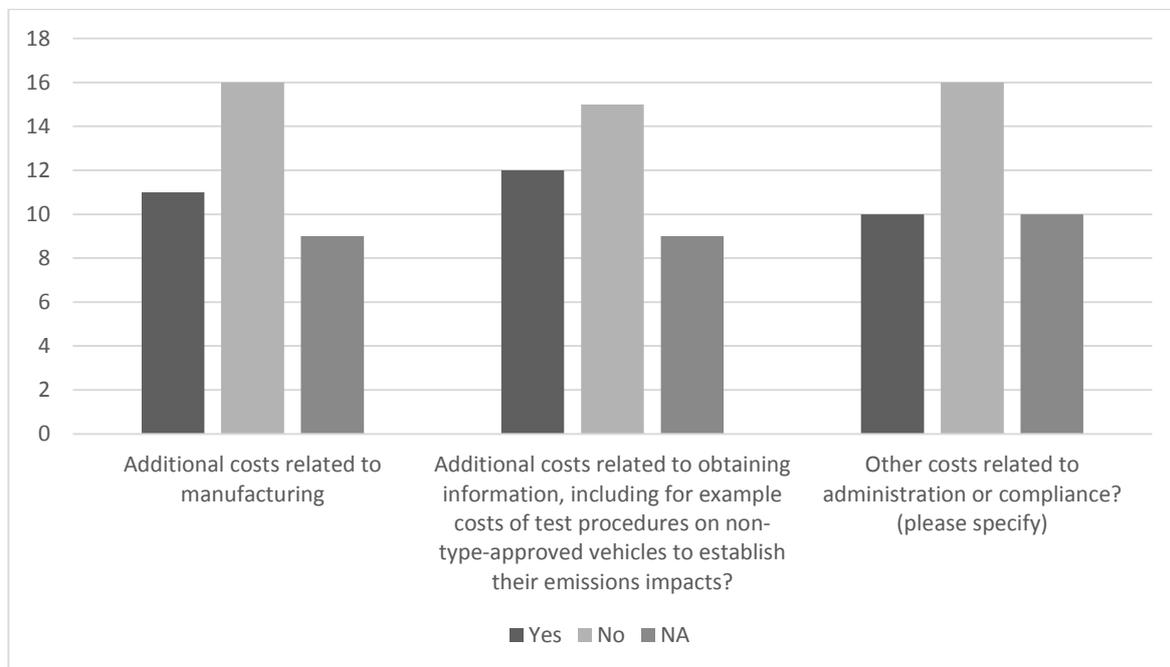
Have you incurred any costs (€) as a result of the implementation of the Clean Vehicles Directive (e.g. through providing information on your vehicles' total lifetime energy consumption, CO₂ emissions and pollutant emissions etc.)?

Most (16) of the respondents did not incur additional costs related to manufacturing whereas 11 of them incurred these costs. The rest (9) did not have an opinion on this matter.

Most (15) of the respondents did not incur additional costs related to obtaining information, including for example costs of test procedures on non-type-approved vehicles to establish their emissions impacts whereas 12 of them incurred these costs. The rest (9) did not have an opinion on this matter

Most (16) of the respondents did not incur additional costs related to administration or compliance whereas 10 of them incurred these costs. The rest (10) did not have an opinion on this matter.

Figure 15-8: Costs incurred due to the implementation of CVD (38 out of 66)

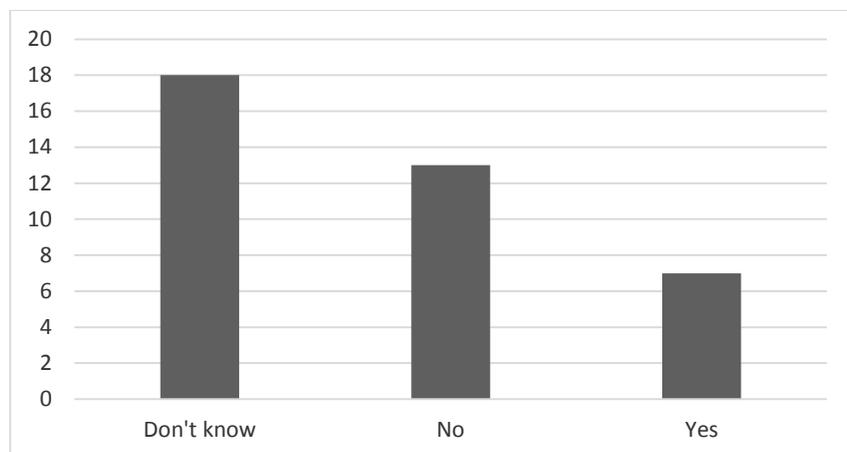


Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

In your opinion, does the monetisation method and associated parameters set out in the Directive provide a good evaluation of the energy and environmental impacts?

Out of the 38 respondents, Most (18) of them did not have an opinion on the monetisation method and associated parameters. 13 of them believed that monetisation method and associated parameters set out in the Directive was not a good evaluation of the energy and environmental impacts, whereas 7 respondents believed that it was a good evaluation method.

Figure 15-9: Opinion on the monetisation method and associated parameters set out in the Directive as a good evaluation of the energy and environmental impacts (38 out of 66)



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

ALTERNATIVE APPROACHES TO ACHIEVING THE AIMS OF THE CVD AND CHANGES TO THE DIRECTIVE

In your opinion, how effective are each of the following alternative policies/measures in achieving the Directive's aim to 'increase the market share of clean vehicles' compared to the CVD?

In order to understand the contractors' view on the alternative approaches to achieving the aims of the CVD and changes to the Directive, the respondents were asked their opinion of the effectiveness of the following alternative policies/measures to 'increase the market share of clean vehicles' compared to the CVD.

R&D support (e.g. grants/tax credits for research by public/private institutions): Most of the respondents (15) were of the opinion that R&D support is more effective than CVD to 'increase the market share of clean vehicles'. 7 believed that it has about the same effect whereas 1 believed that it was less effective. The rest (8) had no opinion on that matter.

Demonstration and verification (e.g. supporting testing of first time/early stage technologies): Most of the respondents (12) were of the opinion that demonstration and verification measures are more effective than CVD to 'increase the market share of clean vehicles'. 5 believed that it has about the same effect whereas 4 believed that it was less effective. The rest (10) had no opinion on that matter.

Performance based regulations and standards (e.g. improvement in environmental performance of vehicles): Most of the respondents (14) were of the opinion that performance based regulations and standards are more effective than CVD to 'increase the market share of clean vehicles'. 9 believed that it has about the same effect whereas 2 believed that it was less effective. The rest (6) had no opinion on that matter.

Technology-based regulations and standards (e.g. specific characteristics, such as size, shape, design etc.): Most of the respondents (10) were of the opinion that technology-based regulations and standards are less effective than CVD to 'increase the market share of clean vehicles'. 8 believed that it has about the same effect whereas 7 believed that it was more effective. The rest (6) had no opinion on that matter.

Price-based measures (e.g. taxation or tax credits/direct subsidies): Most of the respondents (18) were of the opinion that price-based measures are more effective than

CVD to 'increase the market share of clean vehicles'. 5 believed that it has about the same effect whereas 1 believed that it was less effective. The rest (7) had no opinion on that matter.

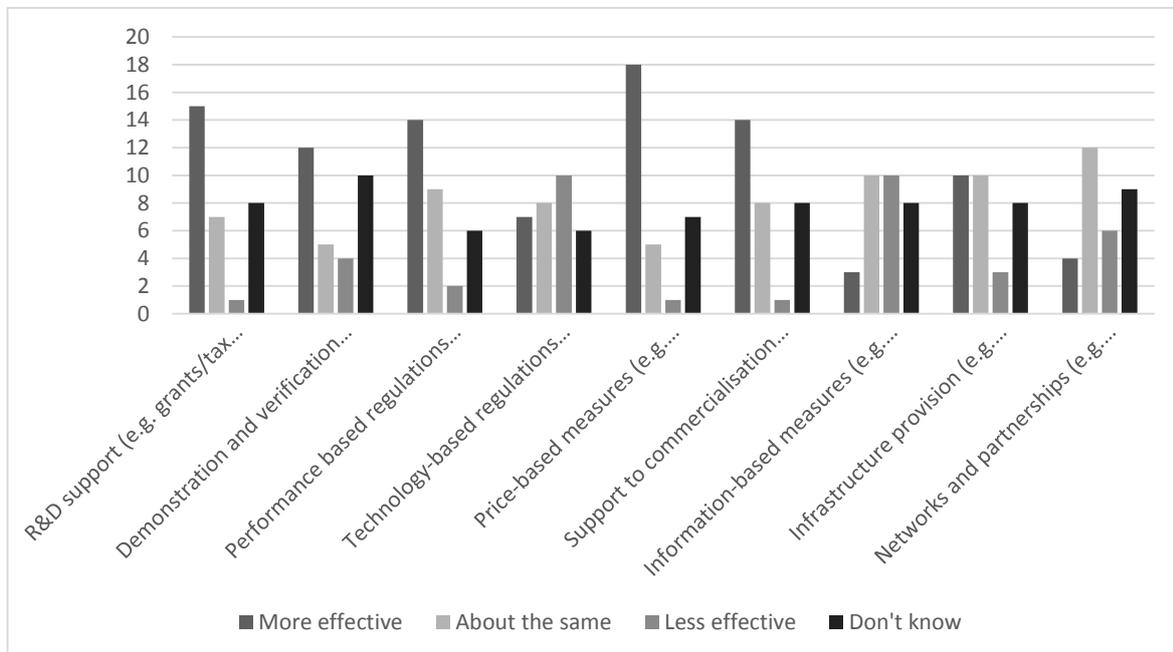
Support to commercialisation (e.g. financial support): Most of the respondents (14) were of the opinion that support to commercialisation is more effective than CVD to 'increase the market share of clean vehicles'. 8 believed that it has about the same effect whereas 1 believed that it was less effective. The rest (8) had no opinion on that matter.

Information-based measures (e.g. vehicle labelling, information awareness raising etc.): Most of the respondents (10) were of the opinion that information-based measures are less effective than CVD to 'increase the market share of clean vehicles'. 10 believed that it has about the same effect whereas 3 believed that it was more effective. The rest (8) had no opinion on that matter.

Infrastructure provision (e.g. refuelling infrastructure): Most of the respondents (10) were of the opinion that infrastructure provisions are more effective than CVD to 'increase the market share of clean vehicles'. 10 believed that it has about the same effect whereas 3 believed that it was less effective. The rest (8) had no opinion on that matter.

Networks and partnerships (e.g. facilitating industry coordination): Most of the respondents (12) were of the opinion that networks and partnerships has about the same effect as CVD to 'increase the market share of clean vehicles'. 4 believed that it was more effective whereas 6 believed that it was less effective. The rest (9) had no opinion on that matter.

Figure 15-10: Effectiveness of the alternative policies/measures in achieving the Directive's aim to 'increase the market share of clean vehicles' compared to the CVD (32 out of 66)



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

In your opinion, how effective are each of the following alternative policies/measures in achieving the Directive's aim to 'reduce road transport's CO₂ and pollutant emissions' compared to the CVD?

In order to understand the contractors' view on the alternative approaches to achieving the aims of the CVD and changes to the Directive, the respondents were asked their opinion of the effectiveness of the each of the following alternative policies/measures in achieving the Directive's aim to 'reduce road transport's CO₂ and pollutant emissions' compared to the CVD.

R&D support (e.g. grants/tax credits for research by public/private institutions): Most of the respondents (14) were of the opinion that R&D support is more effective than CVD to 'reduce road transport's CO₂ and pollutant emissions'. 6 believed that it has about the same effect whereas 2 believed that it was less effective. The rest (9) had no opinion on that matter.

Demonstration and verification (e.g. supporting testing of first time/early stage technologies): Most of the respondents (13) were of the opinion that demonstration and verification measures are more effective than CVD to reduce road transport's CO₂ and pollutant emissions'. 7 believed that it has about the same effect whereas 3 believed that it was less effective. The rest (8) had no opinion on that matter.

Performance based regulations and standards (e.g. improvement in environmental performance of vehicles): Most of the respondents (13) were of the opinion that performance based regulations and standards are more effective than CVD to 'reduce road transport's CO₂ and pollutant emissions'. 10 believed that it has about the same effect whereas 2 believed that it was less effective. The rest (6) had no opinion on that matter.

Technology-based regulations and standards (e.g. specific characteristics, such as size, shape, design etc.): Most of the respondents (12) were of the opinion that Technology-based regulations and standards has about the same effect as CVD to 'reduce road transport's CO₂ and pollutant emissions'. 8 believed that it was more effective whereas 4 believed that it was less effective. The rest (7) had no opinion on that matter.

Price-based measures (e.g. taxation or tax credits/direct subsidies): Most of the respondents (16) were of the opinion that price-based measures are more effective than CVD to 'reduce road transport's CO₂ and pollutant emissions. 7 believed that it has about the same effect whereas 1 believed that it was less effective. The rest (7) had no opinion on that matter.

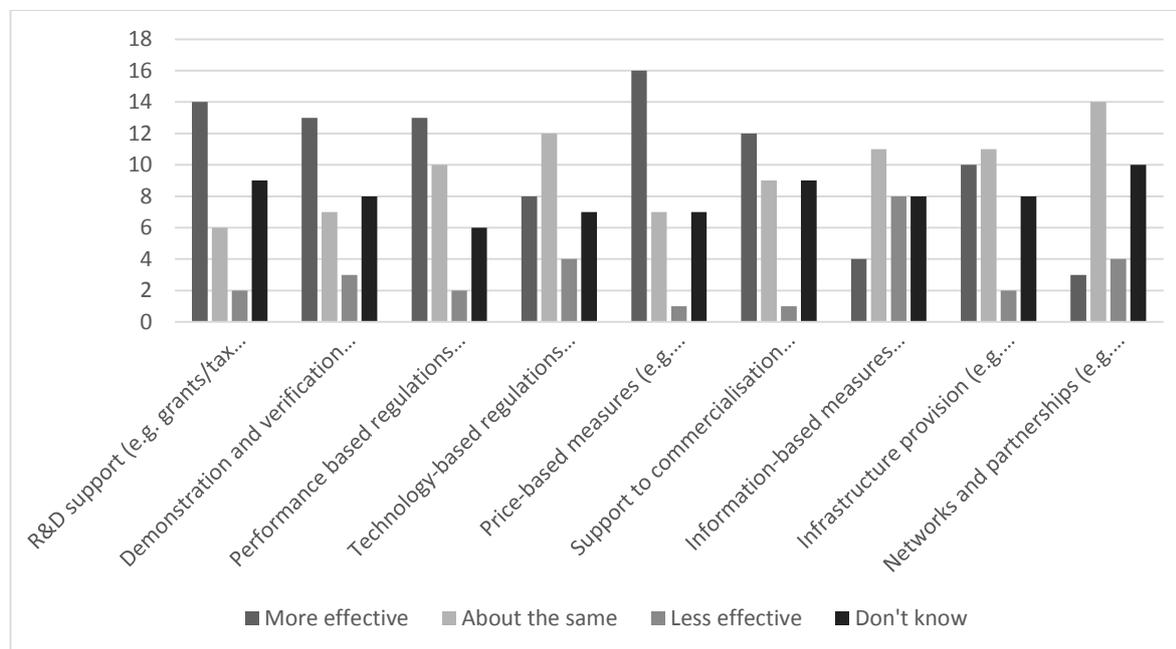
Support to commercialisation (e.g. financial support): Most of the respondents (12) were of the opinion that support to commercialisation is more effective than CVD to 'reduce road transport's CO₂ and pollutant emissions. 9 believed that it has about the same effect whereas 1 believed that it was less effective. The rest (9) had no opinion on that matter.

Information-based measures (e.g. vehicle labelling, information awareness raising etc.): Most of the respondents (11) were of the opinion that Information-based measures has about the same effect as CVD to 'reduce road transport's CO₂ and pollutant emissions'. 4 believed that it was more effective whereas 8 believed that it was less effective. The rest (8) had no opinion on that matter.

Infrastructure provision (e.g. refuelling infrastructure): Most of the respondents (11) were of the opinion that Infrastructure provision has about the same effect as CVD to 'reduce road transport's CO₂ and pollutant emissions'. 10 believed that it was more effective whereas 2 believed that it was less effective. The rest (8) had no opinion on that matter.

Networks and partnerships (e.g. facilitating industry coordination): Most of the respondents (14) were of the opinion that networks and partnerships has about the same effect as CVD to 'reduce road transport's CO₂ and pollutant emissions'. 3 believed that it was more effective whereas 4 believed that it was less effective. The rest (10) had no opinion on that matter.

Figure 15-11: Effectiveness of the alternative policies/measures in achieving the Directive's aim to 'reduce road transport's CO₂ and pollutant emissions' compared to the CVD



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

In your opinion, how significant has the influence of each of the following factors been in determining your strategic decisions since 2012 on investment in clean and/or energy efficient vehicles?

In order to understand the contractors' view on the alternative approaches to achieving the aims of the CVD and changes to the Directive, the respondents were asked their opinion of how significant has the influence of each of the following factors been in determining their strategic decisions since 2012 on investment in clean and/or energy efficient vehicles.

Requirements for contracting authorities to take energy and environmental criteria into account (CVD): Most of the respondents (13) were of the opinion that Requirements for contracting authorities to take energy and environmental criteria into account (CVD) had a moderate or great deal of influence in determining their strategic decisions since 2012 on investment in clean and/or energy efficient vehicles while 12 believed that it had little or no influence. The rest (6) had no opinion on that matter.

EU Car and Van CO₂ Regulations: Most of the respondents (10) were of the opinion that EU Car and Van CO₂ regulations had a moderate or great deal of influence in determining their strategic decisions since 2012 on investment in clean and/or energy efficient vehicles while 8 believed that it had little or no influence. The rest (13) had no opinion on that matter.

EURO Emission Standards: Most of the respondents (21) were of the opinion that EURO emission standards had a moderate or great deal of influence in determining their strategic decisions since 2012 on investment in clean and/or energy efficient vehicles while 5 believed that it had little or no influence. The rest (5) had no opinion on that matter.

Vehicle taxation and subsidy in favour of energy efficiency vehicles: Most of the respondents (12) were of the opinion that Vehicle taxation and subsidy in favour of energy efficiency vehicles had a moderate or great deal of influence in determining their strategic

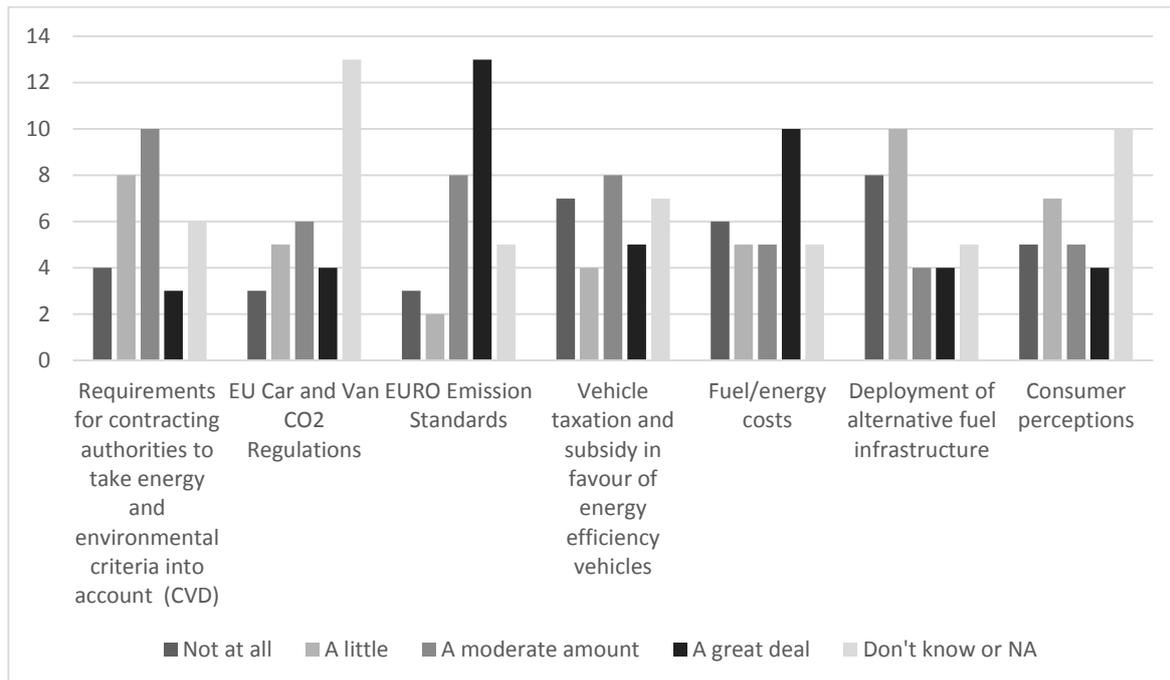
decisions since 2012 on investment in clean and/or energy efficient vehicles while 11 believed that it had little or no influence. The rest (7) had no opinion on that matter.

Fuel/energy costs: Most of the respondents (15) were of the opinion that fuel/energy costs had a moderate or great deal of influence in determining their strategic decisions since 2012 on investment in clean and/or energy efficient vehicles while 11 believed that it had little or no influence. The rest (5) had no opinion on that matter.

Deployment of alternative fuel infrastructure: Most of the respondents (18) were of the opinion that deployment of alternative fuel infrastructure had a little or no influence in determining their strategic decisions since 2012 on investment in clean and/or energy efficient vehicles while 8 believed that it had moderate or great deal of influence. The rest (5) had no opinion on that matter.

Consumer perceptions: Most of the respondents (11) were of the opinion that consumer perceptions had a little or no influence in determining their strategic decisions since 2012 on investment in clean and/or energy efficient vehicles while 9 believed that it had moderate or great deal of influence. The rest (10) had no opinion on that matter.

Figure 15-12: Influence of the factors in determining your strategic decisions since 2012 on investment in clean and/or energy efficient vehicles (32 out of 66)

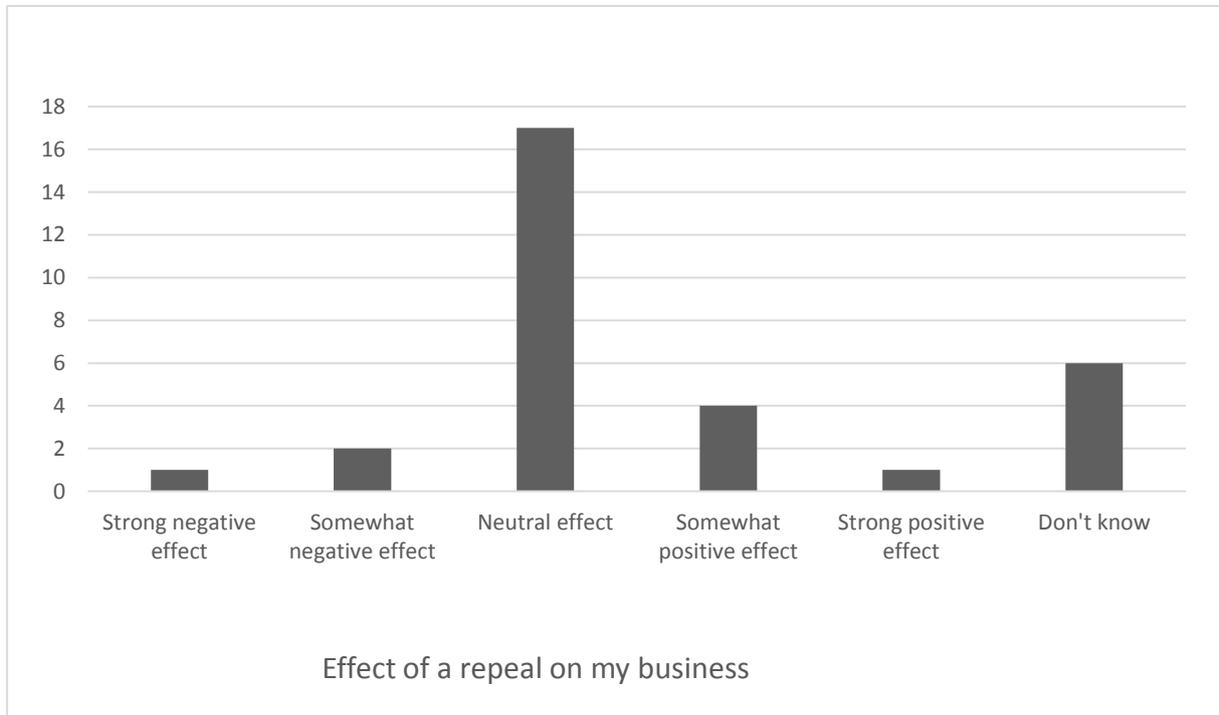


Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

In your opinion, what would be the effect on your business if the Clean Vehicles Directive were repealed?

Most (17) of them believed if the CVD were repealed, there would be a neutral effect while 5 of the respondents believed it would have a strong or somewhat positive effect. 3 of the respondents believed that it would have a strong or somewhat negative effect on their business. The rest had no opinion on that matter.

Figure 15-13: Effect on respondent's business if the Clean Vehicles Directive were repealed (32 out of 66)



Source: Online Survey of Contractors – March-April 2015, Ricardo Energy & Environment

16. ANNEX 8 - MEMBER STATE REPRESENTATIVE'S WORKSHOP – AGENDA

The study team organised and delivered a half-day stakeholder workshop on Friday 17th April 2015 in Brussels aimed at Member State representatives (morning session). A background paper was circulated including details of the study, the methodology, summary of the tasks (including progress to date) and key questions (where appropriate).

Representatives from 8 Member States attended the workshop, including those from Finland, France, Germany, Hungary, Romania, Spain, Sweden, and United Kingdom.

Please see below for the agenda.

Agenda

Wider EU Stakeholder Workshop Agenda

- Introduction to the purpose of the meeting and the evaluation (EC)
- Presentation on the external study being conducted, first findings and suggestions, background information in the discussion paper (Ricardo-AEA/TEPR)
- *Tour de Table, discussion on the paper and presentation prepared by the consultants and general discussion*
- Summary and outlook (EC)

17. ANNEX 9: ASSESSMENT OF THE METHODOLOGY FOR MONETISATION OF COSTS

17.1. Introduction

Task 9 of this study was to undertake an assessment of the monetisation methodology as set out in Article 6 of the Directive in terms of its relevance and effectiveness.

The use of the monetisation methodology requires contracting authorities to calculate operational lifetime costs of energy consumption, CO₂ emissions, and air pollutant emissions associated with operating a vehicle. Once calculated, these external costs are then *internalised* (included) in the purchasing decision. Executing the methodology requires the contracting authority to acquire, for each vehicle under consideration, data on:

- The vehicle's **fuel consumption** (or, in the case of electricity, energy consumption) per kilometre
- **CO₂ emissions** per kilometre, and
- **Air pollutant emissions** per kilometre (including, at a minimum, NO_x, particulate matter, and non-methane hydrocarbons).

Article 6(2) states that this information should, in the first instance, come from the results of the standardised Community test procedures used for type approval. But for those vehicles for which there are no such official tests, the data should come from "widely recognised test procedures," the results of tests for the contracting authority, or information supplied by manufacturers.

This information is then combined with various parameters in the Directive to compute the lifetime operational costs. Specifically, the following calculations must be followed:

CO₂ and pollutant emissions costs:

The operational lifetime CO₂ costs are calculated as:

$$CO_2 \text{ emissions (kg/km)} \times CO_2 \text{ emissions cost factor (€/kg)} \times \text{Lifetime mileage of vehicle (km)}$$

The Directive states that the CO₂ emissions cost factor should be between 0.03 €/kg and 0.04 €/kg, but also gives contracting authorities the option of applying a value up to twice this amount (i.e. up to 0.08 €/kg). The Directive also sets out assumptions on the lifetime mileages of passenger cars, light commercial vehicles, buses, and heavy duty vehicles. These should form the basis for the calculation if the mileage is "not otherwise specified".

For air pollutant emissions, the methodology is essentially the same, but the Directive specifies different emissions cost factors for NO_x, particulate matter, and non-methane hydrocarbons.

Energy costs:

Energy costs are calculated as follows:

$$\text{Energy consumption (MJ/km)} \times \text{Price of energy (€/MJ)} \times \text{Lifetime mileage of vehicle (km)}$$

If the energy consumption of the vehicle is not "given directly", but instead specified in units of volume or mass of fuel consumed per kilometre, this should be converted to units of MJ/km by multiplying the fuel consumption by the energy content of the fuel (MJ per unit of volume or mass). The energy contents of different fuels are specified in an annex to the Directive.

Notably, the Directive states that "**a single monetary value per unit of energy shall be used**. This single value shall be the lower of the cost per unit of energy of petrol or

diesel before tax when used as a transport fuel". Therefore the actual market prices of alternative fuels such as natural gas or bioethanol are not used in the calculations.

Flexibility and specificity to local circumstances:

The Directive allows contracting authorities to make the emissions cost factors in the Directive up to 100% larger, and permits discretion in specifying the lifetime mileage of vehicles. Since all the external costs are proportional to mileage, this factor effectively determines the weight given to the external costs versus any other costs included in the purchasing decision.

17.2. Assessment – overview of effects and issues

Our assessment of the relevance and effectiveness of the monetisation methodology is based mainly on: a review of the intervention logic, consultation with stakeholders (including contracting authorities, suppliers, manufacturers, and Member States), and a case study approach to understanding what results the methodology tends to generate and the reasons for these tendencies.

The main positive effects of the methodology can be summarised as follows:

- Because the monetisation methodology requires contracting authorities to gather data on lifetime energy and environmental impacts of vehicles, use this data, and let it guide their decisions, it forces some degree of awareness of these impacts among contracting authorities.
- The methodology also has the effect of internalising lifetime operational costs. The representatives of the Belgian and Italian governments both agreed in principle that the methodology was appropriate for internalising operational costs. However, each stated that there were significant issues with the details of the methodology. Many other stakeholders agreed that these issues were significant, and one international network of city governments stated that if the methodology is to be retained, it needs to be substantially revised if it is to be made effective.

There are, however, a number of issues with the monetisation methodology which have hindered its effectiveness as a tool for internalisation of external costs. These are explained in detail in the remainder of this section, with reference to feedback from stakeholders as well as reference to our case study analyses where appropriate.

Some stakeholders made targeted technical criticisms of the methodology, and we were able to confirm the existence of these issues with our case study analyses. Other stakeholders expressed scepticism about the utility of having a monetisation methodology in general. We have considered the merits of these arguments as well, also in the context of the insights gained from the case studies.

Issue 1: The methodology is perceived to be overly complex, and appears to be very rarely applied in practice.

Executing the monetisation methodology requires contracting authorities to gather data and then perform several mathematical calculations on that data. Furthermore, vehicle performance, environmental impacts, and the internalisation of external costs are also technical topics procurers may have very limited knowledge of.

Several stakeholders suggested that the monetisation methodology was too complex for contracting authorities to use. Indeed, available evidence suggests that it is applied in practice very rarely. The Polish government found that no contracting authorities it investigated had used it; an international network of cities discovered only two examples of it ever being used. The survey of procurers for this project showed that approximately 14% of them claimed to have used it, which may overstate the true extent of its use, as it might be the case that the contracting authorities who did *not* respond to our survey are generally less engaged with the Directive and therefore even less likely to go to the effort of applying the monetisation methodology to their procurement processes.

Issue 2: The guidance the legislation provides on the monetisation methodology is unclear or insufficient in some respects.

Some nuances of the methodology were felt to be insufficiently explained in the legislation by some stakeholders.

A technical research institute with good knowledge of the Directive stated that the monetisation methodology fails to specify how the CO₂ emissions of biofuels should be treated. From one perspective, the lack of prescriptive guidance offers contracting authorities flexibility in their approach. However, for uninformed contracting authorities, the lack of guidance may simply lead to doubts over how to proceed, and discourage use of the methodology.

Issue 3: Differences in the market prices of different fuels are effectively ignored.

The monetisation methodology effectively instructs contracting authorities to assume that all vehicle fuel (or electricity) has the same per-megajoule cost. (This cost is based on the pre-tax cost of either diesel or petrol fuel, whichever is cheaper at the time.) In reality, there are significant differences in the market prices of different fuels, and these differences have significant effects on operating costs. The monetisation methodology therefore obscures operating cost benefits or disadvantages of certain fuels. The case studies in section 17.3 demonstrate that this is a very significant issue for the methodology.

Issue 4: Local differences in the external cost of pollutant emissions are ignored.

Local costs of pollution can vary significantly with population density, geography, climate etc. For example, the same amount of pollution will cause fewer adverse health impacts in sparsely populated rural areas than in urban centres where more people are affected. Moreover, stakeholders have pointed out that authorities operating vehicles in areas which are already struggling to meet EU air quality threshold values may feel the need to weigh air pollutant emissions more strongly than those authorities experiencing few issues with air quality.

Issue 5: Monetised energy costs are far higher than pollutant emissions costs.

In general, application of the monetisation methodology results in estimates of energy costs that are far greater than the estimated costs of pollutant emissions. This leads to results that some stakeholders view as problematic. For example, in comparisons between diesel vehicles and gas vehicles, typically the monetised pollutant emissions benefits of gas technology are insufficient to compensate for the fact that it is less energy-efficient than diesel. One research institute commented that even a EURO I bus would outperform a CNG bus when the two are compared with the monetisation methodology (our own analysis indicated that this was the case if the value chosen for the energy content of gas was from the high end of the range, but not if the value was chosen from the low end of the range. See case study 1, below, for our comparison of CNG and EURO I diesel buses). Stakeholders representing city governments have expressed their concern at this result – since many of Europe’s cities face air quality problems and governments often seek to address these problems partly with their own vehicle fleet.

Some government stakeholders have recommended giving local air pollutant emissions a greater “weight” in the calculations relative to monetised energy impacts. Since the point of monetisation is to weight different impacts according to their actual economic costs, the calls to add more “weight” to pollutant emissions have to be understood either as (1) arguments that the energy cost and/or local air pollutant emissions cost factors are inaccurate, or (2) a complete rejection of monetisation.

Other stakeholders have challenged the entire idea of including energy costs alongside emissions costs in the monetised impacts. Energy efficiency, it has been argued, is “a means to an end, not an end in itself” – i.e. according to this argument, energy efficiency should be valued only insofar as it results in lower carbon emissions. However, EU policy

acknowledges that the impacts of energy consumption go beyond carbon emissions, and include (for example) energy security impacts.

Issue 6: Emissions costs (based on 2007 prices) have not been indexed to inflation.

The emissions cost factors in the Directive were specified in 2007 prices and have not been updated since the Directive was written. Therefore the importance of emissions costs relative to other costs, including energy costs, is being eroded over time. The Eurozone GDP deflator index increased by approximately 9% between 2007 and 2014. Therefore emissions costs are arguably already being undervalued by around 9% just due to inflation.

Issue 7: The emissions costs factors in the Directive need to be updated in light of technical progress.

Stakeholders including national governments have acknowledged that the state-of-the-art on valuing emissions has moved on since the Directive was written. In particular, new evidence and analysis has been used to put forward new estimates of the societal costs of carbon emissions and local air pollutant emissions.

Issue 8: Well-to-tank emissions are ignored

At present, the text of the monetisation methodology seems to imply that electric vehicles should be assumed to be CO₂-neutral, but that if the electricity powering these vehicles is produced from coal, the CO₂ emissions of these vehicles would in fact be comparable to diesel vehicles. Some stakeholders have suggested that CO₂ emissions should be considered on a well-to-wheel basis, although this would probably add to the complexity of the methodology. Adding to the difficulty of implementing this is the fact that CO₂ emissions certification procedures for new vehicles are currently based on tank-to-wheel emissions only, and well-to-wheel emissions have not been addressed at this level.

Issue 9: There is no harmonised community standard for measuring the CO₂ emissions of heavy duty vehicles

One of the most frequently-occurring comments from stakeholders was that there is not, at present, any harmonised community standard for measuring the fuel consumption or CO₂ emissions of heavy duty vehicles. Some calculation models are under development such as VECTO⁴² [...] but these models and their usage aren't validated and regulated yet.

The Polish government stated that this meant the monetisation methodology cannot be applied to heavy duty vehicles. Others suggested that the lack of a harmonised test procedure had *weakened* the methodology (implying it was not completely impossible to apply it) because contracting authorities would be reliant on whatever data manufacturers provided – data which might not be comparable across vehicles, or even accurate. Finally, one research institute noted that it had managed to make comparisons between heavy duty vehicles using the monetisation methodology because it had built up its own dataset on the CO₂ performance of various buses by subjecting them to a common test procedure.

Issue 10: it may not be desirable to model the energy and environmental impacts of vehicles in diverse situations with "a single formula".

One employee of a major city government was sceptical about the possibility of specifying a single monetisation methodology that was appropriate to all circumstances. This stakeholder felt that harmonisation in determining costs may be problematic because there needs to be sufficient flexibility to take into account local demands, and also to allow experimentation. Vehicles running on flat routes perform quite differently to vehicles

⁴² "The Commission has developed a computer simulation tool, VECTO, to measure CO₂ emissions from new [heavy duty] vehicles. With the support of this tool the Commission intends in 2015 to propose legislation which would require CO₂ emissions from new HDVs to be certified, reported and monitored." European Commission. (2015). "Reducing CO₂ emissions from Heavy-Duty Vehicles." from http://ec.europa.eu/clima/policies/transport/vehicles/heavy/index_en.htm.

running on routes with hills, for example, and so local circumstances may dictate that a variety of different approaches are needed to quantify environmental impacts accurately. This issue is a common one for vehicle emissions (or fuel consumption) test procedures, including the standard New European Driving Cycle used for certifying CO₂ and air pollutant emissions performance for new cars and vans.

17.3. Assessment – case studies

Several case studies – worked examples of comparisons between vehicles on the basis of monetised costs – were undertaken in order to aid the assessment of the methodology.

The case studies were designed so as to illustrate the working of the methodology, provide evidence as to the results it typically generates, and substantiate (or not) claims made by stakeholders about limitations and issues associated with the methodology as it currently stands. Some of the case studies also demonstrate what would happen if the methodology were altered in specific ways, in order to substantiate our recommendations on how specific flaws in the methodology could be mitigated.

Case study 1: A comparison between buses using various fuels and powertrains

This case study presents some of the typical consequences of using the monetisation methodology to estimate operational costs and makes comparisons between vehicles using different fuels and powertrains. In this case study, the monetisation methodology was applied in exactly the way specified in Article 6 of the Directive.

The case study compares various types of buses. The emissions data for these bus types comes from VTT Technical Research Centre of Finland, who have built up a dataset (VTT 2015) describing typical performance of different types of buses by subjecting multiple vehicles to the Braunschweig City Driving Cycle, averaging results from these tests across vehicles of the same type.

Two types of diesel vehicle are included in this comparison: one EURO I and one Enhanced Environmentally Friendly Vehicle ("EEV", a standard which lies between EURO V and EURO VI). Various other types of buses with alternative fuels and powertrains were also included.

The main point demonstrated by the results of this case study is the advantage diesel enjoys over other technologies due to its greater energy efficiency.

Calculations

The standard parameters and mileages stated in the Directive were used. Where the CVD parameters have been stated in terms of ranges, we used the average value within the range.

Energy costs, costs of CO₂ emissions, and costs of air pollutant emissions were calculated using the formulae laid out in the introduction to this annex (section 17.1). For most vehicles, the available data described vehicles' *fuel* consumption rather than *energy* consumption per kilometre. Therefore, in accordance with the instructions in Article 6(1)(a), each vehicle's energy consumption in MJ/km was calculated by multiplying per-kilometre fuel consumption by the energy content of each fuel.

For completeness, the energy content parameters (which are prescribed in the Directive) are reproduced here: ⁴³

Table 17-1 Energy content of fuels used in case studies

Energy content of fuels

⁴³ Note that for natural gas and biogas, the Directive specifies a permissible range for the energy content. For the case studies, the mean value of that range was used, i.e. 35.5 MJ/Nm³.

Fuel	Energy content
Diesel	36 MJ/litre
Petrol	32 MJ/litre
Natural Gas / Biogas	33 – 38 MJ/Nm ³
Liquefied Petroleum Gas (LPG)	24 MJ/litre
Ethanol	21 MJ/litre
Bioethanol	21 MJ/litre
Biodiesel	33 MJ/litre
Emulsion fuel	32 MJ/litre
Hydrogen	11 MJ/Nm ³

Article 6(1)(a), second indent, states that the price of energy should be the lower of the cost per unit of energy of petrol or diesel when used as a transport fuel. At the time of the calculation, the pre-tax cost of diesel was lower than the cost of petrol.⁴⁴

Table 17-2 Monetary value of energy used in case studies

Monetary value of energy	
Lower of: pre-tax petrol price, pre-tax diesel price	0.0214 €/MJ

Emissions cost factors and assumed lifetime mileages of vehicles were also taken from the Directive. Note that for CO₂, the case studies assume a cost of 0.035 €/kg (i.e. the mean value of the range specified in the Directive).

Table 17-3 CO₂ and pollutant emissions cost factors used in case studies

CO ₂ and pollutant emissions cost factors	
Pollutant	Cost per unit mass
NO _x	0.004 €/g
Non-methane hydrocarbons (NMHCs)	0.001 €/g
Particulate matter	0.087 €/g
CO ₂	0.03 – 0.04 €/kg

Table 17-4 Lifetime mileages of vehicles used in case studies

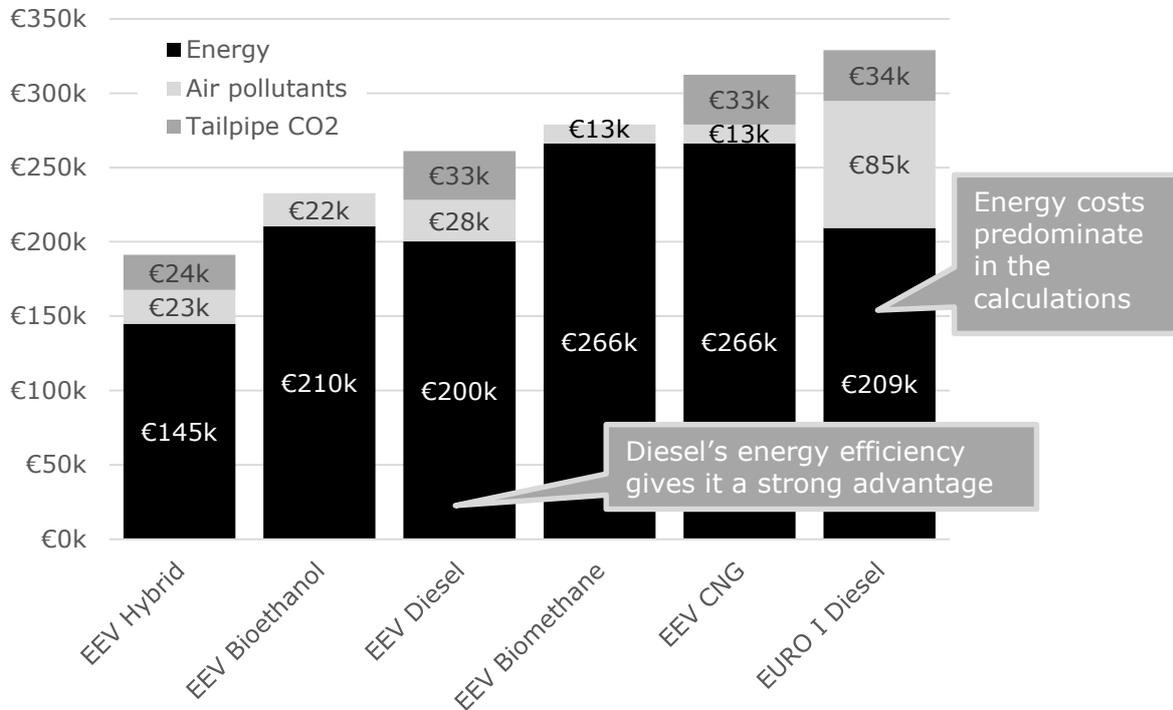
Lifetime mileages of vehicles	
Vehicle category	Lifetime mileage (km)
Passenger cars (M ₁)	200,000
Light commercial vehicles (N ₁)	250,000
Heavy goods vehicles (N ₂ , N ₃)	1,000,000
Buses (M ₂ , M ₃)	800,000

Results and interpretation

The results of the case study – the total monetised operational costs of each vehicle, broken down into energy costs, costs of CO₂, and costs of local air pollutant emissions - are shown in Figure 17-1.

⁴⁴ Petrol and diesel prices were based on EU average values over 2012, as reported in DG ENER's weekly Oil Bulletin European Commission. (2015). "DG ENER: Weekly Oil Bulletin." from <http://ec.europa.eu/energy/en/statistics/weekly-oil-bulletin..> Diesel prices (in €/litre) were therefore converted into an energy price in €/MJ with reference to the energy content of Diesel.

Figure 17-1: Comparison of bus operational costs for different powertrain technologies using the monetisation methodology as specified in the Directive



Source: Ricardo Energy & Environment calculations, incorporating emissions data from (VTT 2015)

One of the notable results of this comparison was that the monetised operational costs of the relatively advanced EEV CNG bus were only marginally lower than that of the EURO I diesel bus. This was because despite the huge pollutant emissions benefits of gas over EURO I diesel buses, energy costs as quantified using the monetisation methodology tend to account for the majority of operational costs and diesel vehicles have a strong advantage on energy costs because of the high combustion efficiency of diesel engines. Only diesel-electric hybrid technology outperforms diesel in terms of energy costs.

When comparing the EEVs powered by CNG versus EEV diesel buses, diesel has the lowest lifecycle cost, despite the monetised pollutant emissions of the diesel bus being twice as great as the emissions of the CNG bus. Again, this is due to low energy costs of diesel as measured by the monetisation methodology.

Diesel's advantage over gas is strong enough that even a biomethane bus - which is assumed to have zero CO₂ emissions and therefore zero monetised costs of CO₂ - is outperformed in terms of total costs.

The EEV bioethanol bus performs relatively well, again because biofuels are assumed to have zero CO₂ costs, and because the performance of bioethanol buses in terms of *energy consumed* is closer to diesel buses than gas buses.⁴⁵

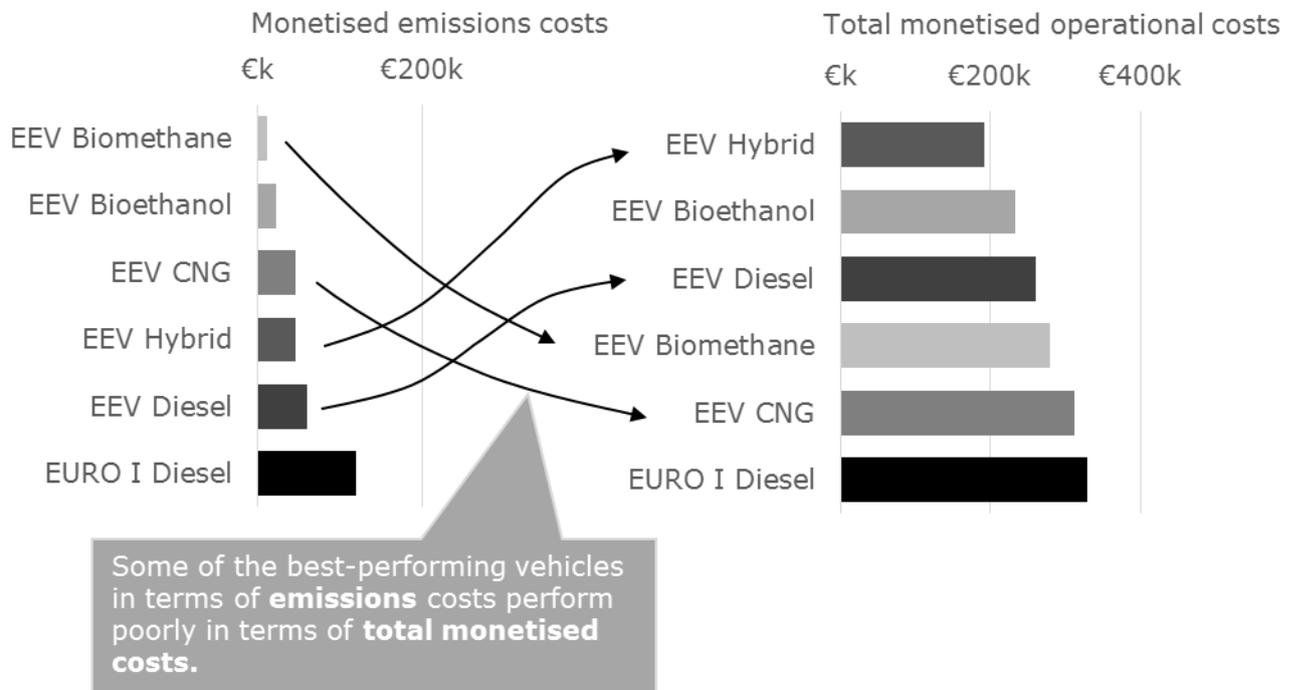
In sum, this case study clearly illustrates the dominance of energy efficiency considerations in the calculations, and the consequent dominance of diesel technology. Rather than

⁴⁵ In terms of *volume of fuel* consumed per kilometre, ethanol buses compare poorly with diesel buses, but this ultimately has no bearing on the results of the methodology, because it is assumed that all energy will cost the same amount per megajoule used, regardless of the fuel it comes from.

offsetting the higher initial (purchase) costs of some cleaner vehicles such as CNG-powered buses, the monetisation methodology makes them appear less competitive. For this reason, cities with air quality concerns may decline to use the monetisation methodology, and some have even challenged the validity of its workings.

To underline this point, Figure 17-2 shows how buses using different powertrains compare in terms of total monetised costs, but also how they compare just in terms of monetised emissions. The diesel and hybrid diesel buses, which do not perform particularly well relative to alternative powertrains in terms of emissions, come near the top of the league table for total monetised operational costs. The vehicle with the lowest monetised emissions, i.e. the biomethane bus, ranks below three other powertrains in terms of total monetised operational costs. In this sense, the methodology does generally promote procurement of powertrain technology associated with low emissions.

Figure 17-2 Rankings of bus powertrains on the basis of monetised emissions costs (left bar chart) and total monetised operational costs (right bar chart)



Case study 2: Use of actual market prices of fuels

Different sources of energy for road transport, such as diesel, petrol, gas, and electricity, have different market prices – the price of one megajoule of energy depends on the source chosen. However, as explained in the introduction to this annex, the methodology prescribes use of a single monetary value for one megajoule of energy regardless of the type of energy being used.

Case study two explains the effect this has on the results of monetisation, by illustrating what would happen if the procurer *did not* use this hypothetical price of energy, and instead took into account the different market prices of different fuels.

This case study relies on largely the same set of calculations and parameters as the first case study. The only exception is to make use of the actual prices for each of the fuels considered. The energy prices set out in Table 17-5 have been used when calculating energy consumption costs with the following equation:

$$\text{Energy consumption (MJ/km)} \times \text{Price of energy (€/MJ)} \times \text{Lifetime mileage of vehicle (km)}$$

Table 17-5 Costs of energy from different fuels used in case study 2

Costs of energy from different fuels	
Fuel	Cost per megajoule
Diesel	0.0214 €/MJ
Petrol	0.0226 €/MJ
Natural Gas	0.0092 €/MJ
Biogas	0.0125 €/MJ
Biodiesel	0.0362 €/MJ
Bioethanol	0.0392 €/MJ
Electricity	0.0333 €/MJ

These prices were based on information from the following sources:

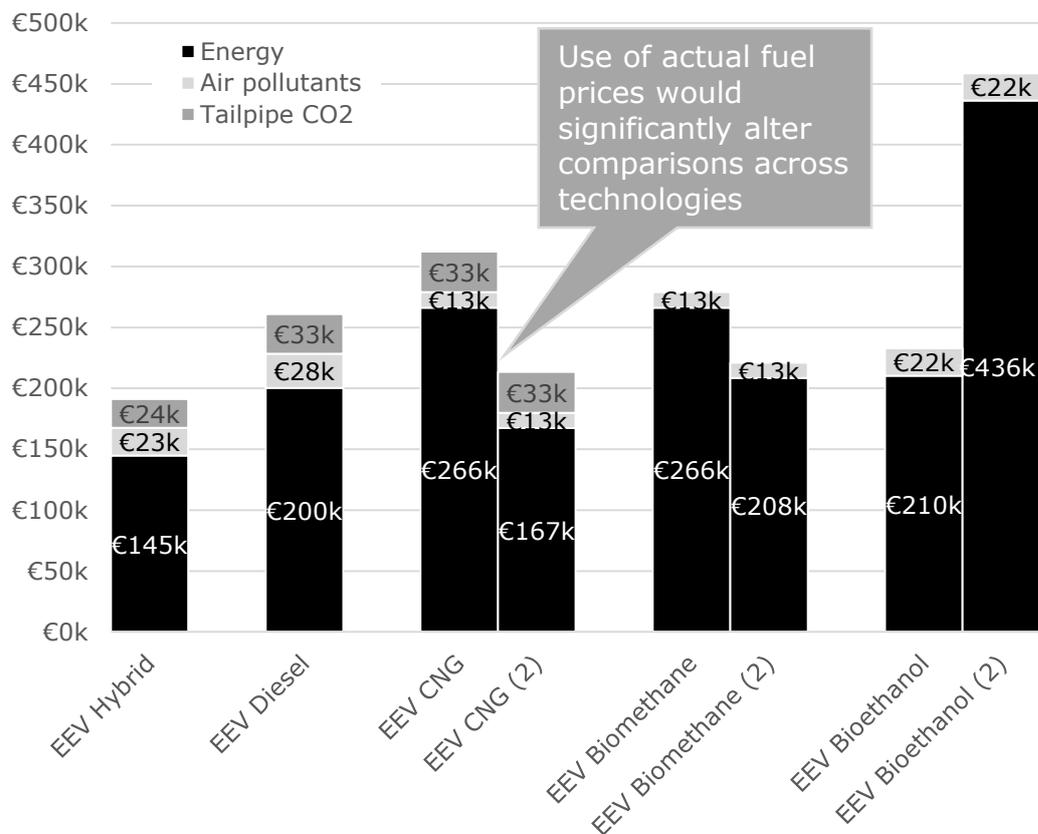
Natural gas price and electricity price: based on average 2015 industrial energy prices excluding taxes from the DG ENER quarterly market reports (European Commission 2015, European Commission 2015) – industrial prices are used as recharging facilities for contracting authorities are likely to be at their premises, where they will pay industrial (not consumer) rates for energy, and because industrial prices are likely to be closer the marginal opportunity cost of providing the energy;

- Bioethanol and biodiesel price: approximated on the basis of an International Institute for Sustainable Development estimate of the cost spread between biofuels and mineral fuels (IISD, 2012);
- Biogas price: based on the lowest UK Ofgem Renewable Heat Incentive feed-in tariff per kWh for biomethane injection (Ofgem, 2015).
- Petrol and Diesel price: as before, based on EU average values over 2015, as reported in DG ENER's weekly Oil Bulletin (*European Commission 2015*)
- *Results and interpretation*

The results are illustrated in Figure 17-3.

Figure 17-3 Bus costs calculated with and without use of actual fuel prices

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles



(2) = calculated using actual market prices of fuel

Source: Ricardo Energy & Environment calculations

This adjustment to the methodology has a significant effect on comparisons across technologies. With market prices of the fuels taken into account, the operational costs of an EEV CNG bus are lower than the operational costs of an EEV diesel, mainly due to significantly lower energy costs. CNG is still made to look more costly than diesel hybrid technology on an operational costs basis, although the gap has been reduced significantly.

The biogas price data used for this case study (taken from the UK energy regulator) suggested that biomethane is slightly more expensive than fossil natural gas, which makes the biomethane bus slightly less attractive than the fossil natural gas bus. The effect is offset somewhat by the assumption that biomethane has zero CO₂ cost.

According to the data chosen for this case study, the adjustment to the methodology would also have a radical (negative) effect on the competitiveness of bioethanol. Actual market prices of fuels vary over time and across markets (for example the price of bioethanol may depend greatly on feedstock), so this specific result should just be understood as just an illustration of the potential importance of variation in the cost of energy across different fuels.

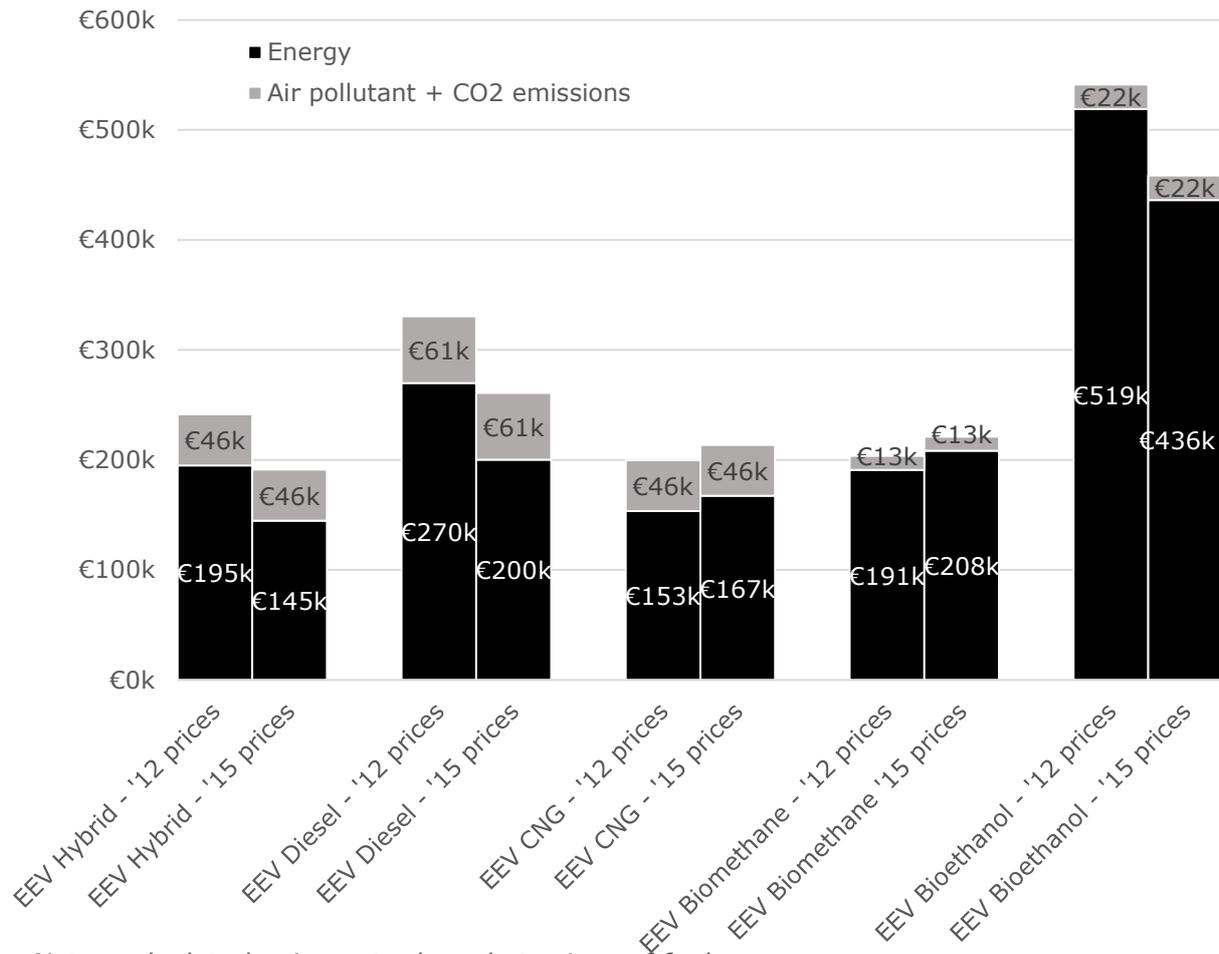
Most importantly, this case study illustrates that the dominance of diesel might be overturned if the methodology were to take into account the actual price of fuels. In particular, the operational cost benefits of gas in comparison to diesel would be made more apparent.

It is also important to note that energy costs remain very dominant in the alternative methodology explored here, which is why the CO₂ benefits of biomethane are insufficient to make it more attractive than fossil natural gas or hybrid diesel buses.

Sensitivity to high and low fuel prices

Energy prices vary from country to country and are constantly in flux. The results of making comparisons on the basis of actual market prices would therefore vary over time, as fuel prices change. To illustrate this, we made comparisons between vehicles on the basis of actual fuel prices both in 2012 (when oil prices were relatively high) and during January-May 2015 (when oil prices had fallen dramatically). Figure 17-4 illustrates the results: it is apparent that alternatively-fuelled vehicles would have fared worse in the comparison against conventionally-fuelled vehicles during the period of low oil prices.

Figure 17-4: Bus total costs using 2012 and 2015 energy prices



Note: calculated using actual market prices of fuel

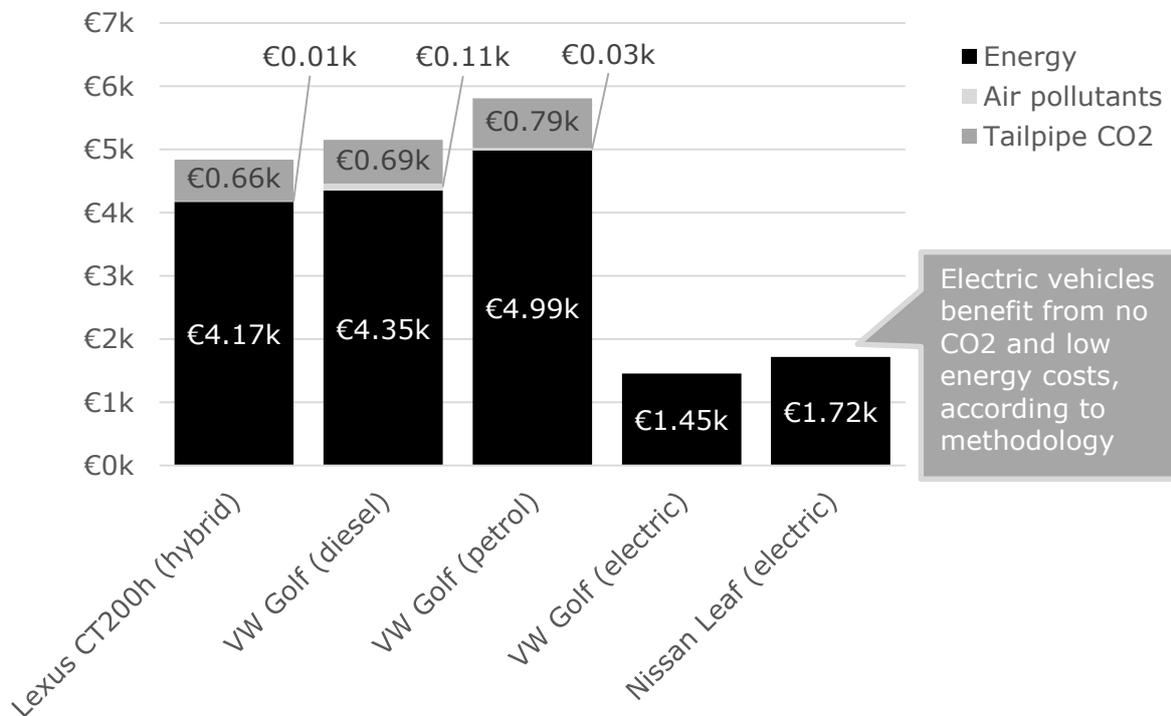
Case study 3: Passenger car comparisons including fully-electric vehicles

This case study extends the analysis of the monetisation methodology to passenger cars, and also serves the purpose of illustrating some of the issues surrounding the apparent competitiveness of electric vehicles when using monetisation. Fully-electric vehicles are, according to some stakeholders’ observations, on the cusp of becoming competitive with conventionally fuelled vehicles within the framework of the monetisation methodology.

Comparisons were made between passenger cars using different fuels and powertrains. Specifically, the vehicles chosen were medium-sized family cars and include a petrol hybrid and a fully-electric vehicle. Emissions factors and energy consumption figures for these vehicles were taken from publically available manufacturer data.

In this example (see Figure 17-5), the monetised operational costs of the fully-electric car are considerably lower than the conventionally fuelled vehicles’ costs. It is assisted by the fact that no emissions are attributed to it, but energy efficiency is still the largest contributing factor in its competitiveness within the framework of the methodology.

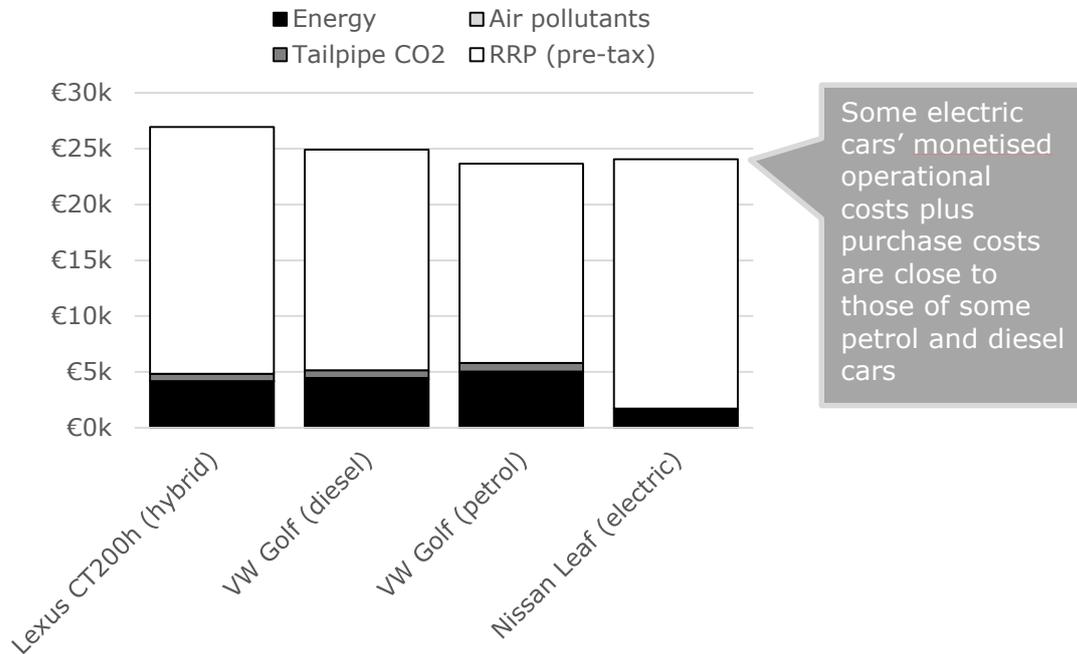
Figure 17-5 Comparison of passenger cars' operational costs



Source: Ricardo Energy & Environment calculations

As a next step in this case study, indicative purchase costs were added on to the monetised operational costs (see Figure 17-6). Purchase costs will obviously be included within the purchasing decision, alongside operational costs, and the most straightforward approach to procurement would probably be to just add the two together as has been done in this case study. The purchase costs used here are only for illustration, as they are based on (pre-tax) recommended retail prices, and contracting authorities may be able to secure discounts on these prices.

Figure 17-6 Comparison of passenger cars' operational costs and purchase costs



Source: Ricardo Energy & Environment calculations

The results suggest that electric vehicles might be approaching competitiveness with conventionally fuelled vehicles using this approach to procurement.

Also note that one of the key assumptions in this comparison is the total lifetime mileage of the vehicle – this case study uses the default value from the Directive, but contracting authorities specifying a higher (or lower) mileage would find electricity more (or less) competitive.

Case study 4: Updating the emissions cost factors

A number of stakeholders indicated that they believed the emissions factors in the Directive to be erroneously small, or outdated. This case study shows what the effect would be of updating the emissions cost factors to technical progress.

The emissions cost factors in the Directive were specified in 2007 on the basis of evidence available at that time. Since then, new evidence and analysis has led to new estimates of the social costs of emissions, and some of these estimates are effectively endorsed in EU policy. In this particular case study, the emissions cost factors in the Directive were replaced with newer estimates, taken from the 2014 update to the European Commission's Handbook on the External Costs of Transport. Several buses are compared using each set of emissions cost factors.

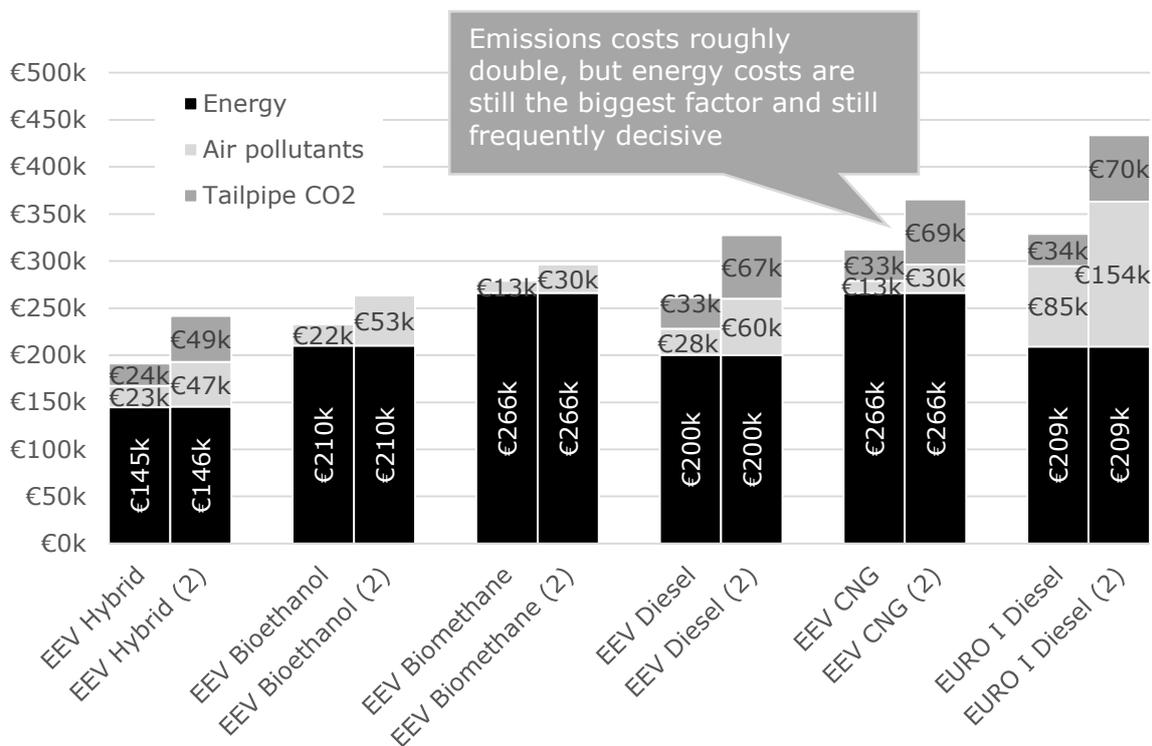
Table 117-6 Updated CO₂ and pollutant emissions costs used in case study 4

Case study 4: updated CO ₂ and pollutant emissions costs		
Pollutant	Cost per unit mass – values specified in Directive	Cost per unit mass – updated values used in case study 4
NO _x	0.0044 €/g	0.011 €/g
Non-methane hydrocarbons (NMHCs)	0.001 €/g	0.002 €/g
Particulate matter	0.087 €/g	0.041 €/g
CO ₂	0.03 – 0.04 €/g	0.072 €/kg

Results and interpretation

In general, the factors in the Handbook are substantially higher than those used in the Directive. Therefore the result of putting them to use (Figure 17-7) is that emissions costs become much more significant (roughly doubling) in absolute terms. But despite this large increase, energy costs still constitute the majority of total operational costs for all but the most polluting of vehicles (i.e. the EURO I). This example shows that if the methodology for calculating energy costs is not altered, an EEV CNG bus would still be outperformed by an EEV diesel bus using the new emission cost factors.

Figure 17-7 Buses’ costs calculated with and without updating emissions costs factors



(2) = Calculated using new emissions costs factors based on 2014 Handbook on External Costs of Transport

Source: Ricardo Energy & Environment calculations

Case study 5: Refinement to the method for internalising air pollutant costs

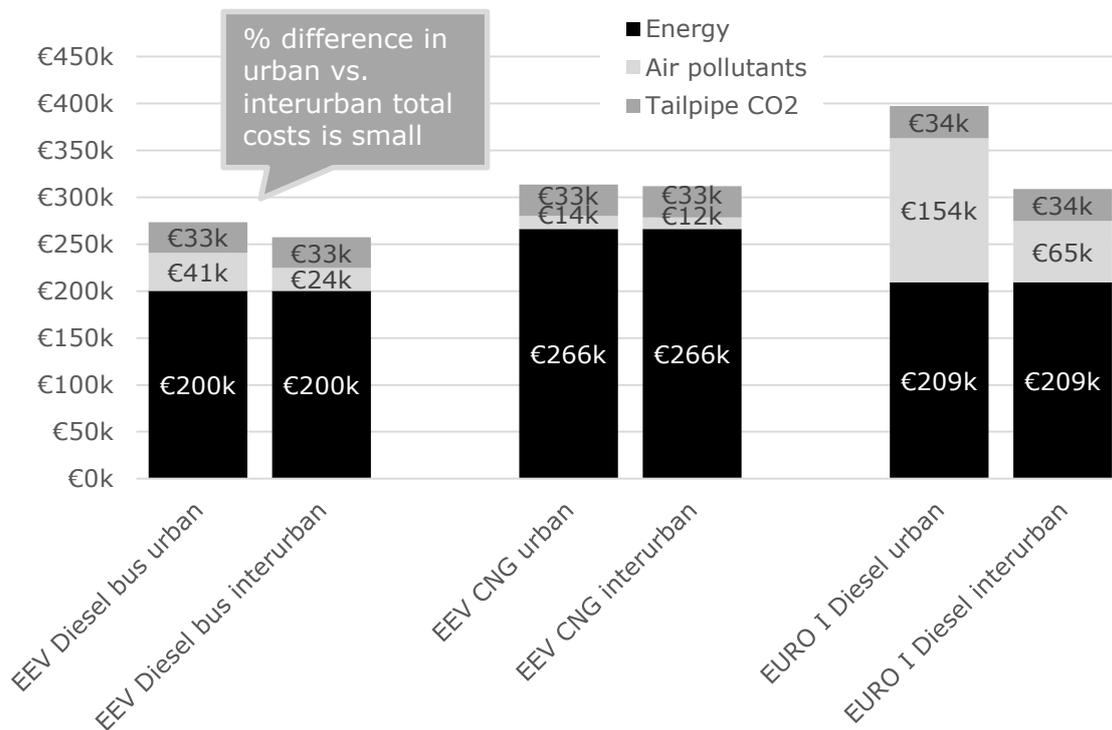
One strand of criticism of the monetisation methodology states that it is not sufficiently sensitive to local conditions, and especially poor at supporting contracting authorities that may be particularly concerned about local air pollution. The Directive provides a single emissions cost factor for all particulate matter emissions, whereas recent thinking would attribute a much higher social cost to particulate matter in urban areas than in less-populated areas.

In this case study, the single emissions factor specified in the Directive has been substituted, firstly with a factor representing the damage cost of particulate matter in urban areas, and then with another factor representing the damage cost of particulate matter in interurban areas (both are taken from the 2014 Handbook on External Costs of Transport). The cost factor for urban areas is roughly ten times larger than the factor for interurban areas.

Table 17-7 Urban and interurban particulate matter costs used in case study 5

Case study 5: Use of urban and interurban particulate matter costs	
Pollutant	Cost per unit mass
Particulate matter (urban vehicles)	0.283 €/g
Particulate matter (interurban vehicles)	0.029 €/g

Figure 17-8 Bus costs calculated using urban and interurban particulate matter emissions cost factors



Source: Ricardo Energy & Environment calculations

Comparing the results from use of each factor shows to what extent this creates significant differences. With the exception of the EURO I bus, the difference this makes to total costs is rather mild, despite the huge difference in the emissions cost factor. This is because particulate matter costs make up just one part of air pollutant costs, which are in turn a small proportion of total monetised operational costs.

Therefore this elaboration to the methodology (i.e. allowing contracting authorities a choice of two particulate matter emissions factors) might not often yield different results in terms of comparisons between vehicles of different technologies.

It should be noted that the Directive currently allows some degree of flexibility in the choice of emissions cost factors anyway, but this flexibility is not commensurate with the difference in emissions factors tested here: the Directive only allows for a doubling of any one cost factor, not a ten-fold increase.

17.4. Assessment – conclusions on relevance and effectiveness

The recitals of the Directive note that clean vehicles have a higher initial cost. Several years after the Directive was written, this is still the case. The recitals also provide the rationale for including energy and environmental impacts of vehicles in award criteria,

which is that doing so “does not impose higher total costs, but rather anticipates operational lifetime costs”. Clean and energy-efficient vehicles can have lower operational lifetime costs than non-clean and less-energy-efficient vehicles. This is why monetisation is on the face of it a relevant means of increasing the uptake of clean and energy-efficient vehicles.

There are, however, two major respects in which the methodology can either be considered to be inconsistent with EU environmental policy or inappropriate to the requirements of the intended beneficiaries, discussed in turn below.

Firstly, one of the objectives in setting out the methodology was to ensure “an appropriate degree of harmonisation” in the way costs are determined. However, the degree of harmonisation imposed by the monetisation methodology may not be consistent with the requirements of contracting authorities. In particular, their requirement for enough flexibility to take the local situation into account (especially concerns over acute local air pollution), and their requirement for enough flexibility to “experiment” at a local level.

Secondly, the objectives associated with the monetisation methodology included stimulating the market for clean and energy-efficient vehicles, with an implicit emphasis on energy-efficiency. This emphasis is apparent in the results of the methodology (as demonstrated by the case studies) and rationalised in recital 10, which states: “The High Level Group on competitiveness, energy and the environment, in its report of 27 February 2007, recommended that private and public procurement should take account of full lifetime costs with emphasis on energy efficiency. [...]”

However, because some vehicles, notably diesel vehicles, are associated with relatively high energy efficiency but also relatively high pollutant emissions, “emphasis on energy efficiency” is in tension with the need to provide support to clean vehicles (especially low pollutant emissions vehicles) in procurement decisions and thereby stimulate their uptake.

We have provided recommendations on how to mitigate the second issue in section 17.5. In brief, our recommendation is not to arbitrarily add more “weight” to air pollutant emissions, but to address certain issues with the calculation of energy costs. Addressing the other challenge to the methodology’s relevance, i.e. the lack of flexibility, would require adding to its complexity and therefore detract from its effectiveness.

In terms of effectiveness, the case studies and stakeholder feedback highlight that the effectiveness of the methodology in achieving its chief objective, the internalisation of external costs, is limited, because of flaws in its design, especially its failure to incorporate differences in the costs of different fuels.

Furthermore, as documented in the main text of this report, the methodology is very rarely used in practice, which obviously places a serious limit on its effectiveness. The widespread non-use of the methodology can be attributed to the fact that it is perceived to be difficult for most contracting authorities to follow, whereas the other options in the Directive are relatively simple to apply. Finally, those procurers who *do* understand the methodology are *also* unlikely to apply it, for another reason: they are likely to have good awareness of the external costs of transport and an existing desire to purchase vehicles with alternative fuels and powertrains – vehicles which the methodology tends not to favour, at least when compared with diesel vehicles.

We have provided recommendations on how to mitigate these problems with effectiveness in 17.5.

17.5. Possible solutions/improvements

Some of the criticisms made of the methodology are in tension with each other; it is considered to be both too complex to apply, and too simplistic to capture relevant details. Therefore it may not be possible to solve every problem with the methodology

simultaneously. However, if the methodology is to be retained, a few relatively straightforward changes could greatly improve its effectiveness. Box 1 provides details of potential changes to the legislation that would improve it in that regard.

Box 1: Potential changes to the methodology

Potential change 1: Take into account the different market prices of different fuels

The methodology currently directs contracting authorities to use a hypothetical price of energy all for non-petrol and non-diesel fuels, which is often grossly out of line with actual prices. It is not obvious that this hypothetical price of energy is a better tool for internalising costs than market prices, which reflect real conditions of supply and demand. The use of the hypothetical energy price actually obscures the operating cost savings that contracting authorities can make by purchasing alternatively-fuelled vehicles, and provides artificial and unnecessary support for diesel. Addressing this will go some way towards preventing results which many stakeholders regard as contrary to the objectives of the Directive.

Market prices of diesel and petrol are relatively easy to obtain, but the prices of alternative fuels often require investigation. Contracting authorities should not be made to expend time and energy on investigating the prices of alternative fuels. Therefore it may be prudent for the Commission or the Member States to supply contracting authorities with a bulletin of indicative prices of different fuels (either averaged across the EU, or specified at the level of Member States) for use in the monetisation calculations.

Potential change 2: Update the emissions cost factors in light of technical progress

There is a clear case for updating the emissions cost factors in the monetisation methodology to take account of technical progress. Estimates of the societal costs of emissions – estimates that have effectively been given the Commission's endorsement in other policy areas – have changed substantially since the Directive was written.

Doing this will also help to address the "predominance" of energy efficiency in the monetisation methodology, because today's estimates of the costs of pollutant emissions are higher than the estimates used at the time the Directive was written.

Potential change 3: Index emissions costs to inflation

It is important to ensure that the relative importance of emissions costs is not erroneously undermined over time by increases in the general price level of goods and services, i.e. inflation. This could be tackled by rebasing all other costs to the same price base as the emissions cost factors, or indexing the emissions cost factors to inflation.

Potential change 4: Clear up remaining areas of ambiguity in the methodology

As noted above, the legislative text describing the monetisation methodology is felt to be insufficiently clear in certain areas, including the treatment of CO₂ emissions from vehicles powered by biofuels.

EU policy on accounting for CO₂ emissions of biofuels in road transport is set out in other legislation (namely the Fuel Quality Directive). Therefore, one option is for the Clean Vehicles Directive to make reference to the relevant accounting rules in that legislation. Another option would be to make a singular recommendation on how all biofuels should be treated for the purposes of the monetisation methodology. This

would result in some loss of flexibility for contracting authorities, but on the other hand it would enhance its clarity.

Potential change 5: The monetisation methodology should not be the only option

The monetisation methodology has to be sufficiently simple for contracting authorities to be able to apply it *without* significant prior knowledge of vehicle emissions and internalisation of costs. This places very significant constraints on the level of nuance that we can expect to include in the methodology. However, a minority of contracting authorities will have a very good knowledge of the energy and environmental impacts of vehicles, and attach high priority to those impacts, and these authorities should not be prevented from applying a more exacting methodology for internalisation of costs. Therefore, if the methodology is to be retained, it should not be made into the sole option for taking energy and environmental impacts into account in procurement decisions.

There are a number of other steps that could be taken, in addition to revising the text of the legislation, to improve the effectiveness of the monetisation methodology. These possible additional supporting measures (see Box 2), other than amending the Directive, would provide authorities using the methodology with more support.

Box 2: Possible additional supporting measures

Potential supporting measure 1: Ensure that contracting authorities are equipped with a user-friendly tool for performing the calculations

Many stakeholders suggested that the monetisation methodology was too complicated for most contracting authorities to be able to follow. Contracting authorities might find it much easier to apply the methodology correctly and quickly if they made use of a tool that guides them through each stage in the process. The Clean Fleets Lifecycle Costing Tool (Clean Fleets Project 2014) is an existing spreadsheet tool capable of performing the monetisation calculations, but its effectiveness might be substantially increased if it were converted into a web-based tool and then widely publicised (potentially even referenced in the legislation itself).

Potential supporting measure 2: Create a harmonised community standard for quantifying the CO₂ impacts of heavy duty vehicles

If the monetisation methodology is to be applied to heavy duty vehicles in a meaningful way, it is essential that objective, comparable information is available on the CO₂ impacts and energy efficiency of these vehicles.

Potential supporting measure 3: Ensure that more comprehensive data on vehicle emissions is made available in a one-stop-shop

Contracting authorities should be able to find emissions data for different vehicles on a comprehensive and up-to-date portal. Centralising information in this way may not be an easy or cheap task, but if the monetisation methodology is to be retained, its effectiveness will be linked to the ease with which contracting authorities can find the appropriate information to input into it.

18. ANNEX 10 – ASSESSMENT OF THE COMMISSION INITIATIVES AIMED AT THE PROMOTION OF THE DIRECTIVE

The assessment presented in this Annex contributes to a number of evaluation questions, including:

- Question 5: To what extent has the Directive promoted an increased awareness among the different stakeholders of the operational lifetime environmental and energy impacts of vehicles? (see Section 6.4 of the main report).
- Question 7: Could the effects have been achieved in a more efficient way (e.g. through other or additional (legislative) measures)? (see Section 6.7.1).
- Question 9: To what extent have the Directive and the associated Commission initiatives (e.g. Clean Vehicle Portal, Clean Fleets Project) initiated and/or supported a recognised exchange of good practices between contracting authorities in different Member States? (see Section 6.10).

Approach taken

An assessment was undertaken to identify whether selected complementary Commission initiatives had had measurable impacts with regards to the objectives of the Directive and whether this might be improved. This assessment had a particular focus on exploring the role of, and potential for, cross-border joint procurement in contributing to the objectives. In order to cover all of these potential elements, the assessment explored the extent to which the complementary initiatives have:

- Had measurable impacts with respect to the main aims of the Directive, i.e. with respect to:
 - Promoting and stimulating the market for clean and energy efficient vehicles;
 - Increasing the market share of clean vehicles;
 - Contributing to reducing CO₂ and pollutant emissions from the transport sector (and improving energy efficiency);
 - Internalising operating costs in procurement decisions;
 - Harmonising the determination of operating costs; and
 - Increasing the awareness amongst stakeholders of the operational lifetime environmental and energy impacts of vehicles.
- Encouraged and/or facilitated (cross-border) joint procurement.
- Initiated and/or supported an exchange of good practice between contracting authorities in the Member States.
- Contributed to promoting the Directive.

A particular focus of the task was on the **Clean Vehicle Portal** and the **Clean Fleets project** (see Box 3), which had been developed to specifically complement the Directive. Additionally, up to three other initiatives were to be covered.



Clean Vehicle Portal (2011-ongoing)

Objective: The Clean Vehicles Directive calls for the dissemination of information about the Directive and about relevant financial instruments available in Member States. The portal was developed to deliver these requirements. In addition, the Portal aimed to promote the exchange of knowledge and good practice and to provide further explanation on the implementation of the Directive's requirements. There have been two projects related to the Portal: the first was to develop the Portal and put it online; the second, which is ongoing at the time of writing, aimed to enhance the Portal and to migrate it to the europa.eu website, so that it is effectively hosted by the European Commission. Both projects have been led by TUV Nord.

The Portal's primary target audience is the bodies targeted by the Clean Vehicles Directive (i.e. public contracting authorities, contracting entities as well as certain operators for the discharge of public service obligations). It also aimed to engage other key stakeholders, such as vehicle manufacturers and relevant national and regional support bodies/regulators by providing tendering information and services.

Geographically, the portals cover all of the countries that participated in the IEE programme, namely all the 28 EU Member States, Norway, Iceland, Liechtenstein, and the Former Yugoslav Republic of Macedonia. The Portal contains a vehicle database, information on procurement rules/incentive schemes, and provides a calculator to help users to identify the most energy-efficient road vehicles. It also links to other web resources, including the online EU Official Journal supplement TED (Tenders Electronic Daily). In addition, the Portal has an internet forum aims to facilitate joint procurement.

In the second phase of the project, the aim was to relaunch the website and to transfer it to the Commission's 'europa' website. However, the project has been delayed and at the time of writing the relaunch is scheduled for the second half of 2015. In the course of the second phase of the project, prior to the relaunch, no updates were made to the information on the Portal.



Clean Fleets Project (2012-ongoing)

Objective: The Clean Fleets Project aimed to provide direct support and build capacity for the implementation of higher standards of energy and environmental performance in road transport vehicles. The project was led by ICLEI and involved city authorities or public transport operators from eight EU cities (the German cities of Bremen and Freiburg, London, Rotterdam, Sofia, Stockholm, Vitoria-Gasteiz in Spain and the Croatian capital, Zagreb), plus the Romanian public transport union (URTP), as well as a number of consultancies.

The project supported specific procurement actions, including market consultation, the development of specifications, competitive tendering and contract management. It also included the development of a guide on how to procure clean and energy-efficient vehicles in practice, which was consistent with the Directive. The project was based on modular training, information exchange and specific advice to regulated organisations. The project aimed to deliver:

- An online exchange and help desk functions on the Clean Vehicle Portal;
- Workshops and training reaching 350 people from public authorities, fleet operators and suppliers;

- A CVD toolkit and adaptable training modules; and for
- 20 public authorities and/or fleet operators commit themselves to develop a tender that goes further than the current legislation requires

Sources: Respective project websites (www.cleanvehicle.eu and www.clean-fleets.eu) and interviews undertaken with the project coordinators for this report.

The identification of the other potential Commission initiatives that it might be appropriate to assess was undertaken using searches of the main EU project databases of relevance, i.e. the CORDIS website for FP7 projects (European Commission 2015), the Commission's database of projects supported by Intelligent Energy for Europe (European Commission 2015) and DG MOVE's Transport Research and Innovation Portal (TRIP Consortium 2015). Searches were made for projects that focused on 'clean vehicle procurement', but also for projects that had a wider focus on 'green', 'clean' or 'low carbon procurement' and which also covered road transport vehicles.

Those projects that were considered to be most appropriate for further consideration within this task were:

- **GPP 2020:** The project was supported by IEE; it began in 2013 and was due to finish in 2016. It was led by ICLEI and involved various national and regional government departments. It aimed to mainstream low carbon procurement across Europe and covered a range of products, including road transport vehicles, through the implementation of more than 100 low carbon tenders. Of particular interest, from the perspective of identifying the impacts of Commission initiatives, is that it estimated the amount of CO₂ emissions and energy saved as a result of the project.
- **COMPRO** (COMmon PROcurement of collective and public service transport clean vehicles): The project was supported by IEE; it began in 2007 and finished in 2009. It was led by ISIS (Italy) and brought together four local authorities (Nantes, Bremen, Gothenburg and Emilio-Romagna). The aim was to create an international buyers' consortium for the joint procurement of clean public transport services. Even though the project is relatively old, it did focus on joint procurement, which is covered by this evaluation. Furthermore, early engagement with stakeholders, including those involved with the Portal and Clean Fleets, suggested that joint procurement, particularly of the cross-border kind, remains problematic. Hence, it was considered worthwhile to identify the project's experience in this respect.
- **PROCURA** (Green Fleet Procurement Models): The project was supported by IEE; it began in 2006 and finished in 2008. It was led by Ecofys and involved various technical organisations, as well as a manufacturer. It aimed to test models of "centralised AFV procurement" and claimed to have led to the purchase of 135 alternatively fuelled vehicles (AFVs). Again, the project is of interest as it focuses specifically on the creation of 'buyer pools' for clean vehicles⁴⁶.

There were two main sources of evidence for the assessment presented here. The first was a review of the documentation associated with the respective projects, including their websites and, where relevant, reports obtained directly from the respective project coordinators or Commission desk officers. The second was direct engagement with the respective project coordinators, respective Commission desk officers and other relevant

⁴⁶ Information for these three projects was taken from the entries on the respective project pages of the IEE database (European Commission, 2015c) and from the GPP 2020 project website (www.gpp2020.eu).

project partners, as appropriate⁴⁷. The engagement with the project coordinators and project partners was based on a brief questionnaire that was designed to explore the issues that were the focus of this task, as set out in Section 6.3.1. For the older projects, this was more challenging as those involved had often left the organisations that they represented at the time. Additionally, for Clean Fleets, engagement was undertaken with selected cities that had been part of the project in an attempt to obtain further information about the project, as well as to seek these cities' broader views on the Directive in order to contribute directly to answering some of the evaluation questions.

In the following sections, our findings are presented in relation to the four different parts of the assessment, as listed at the beginning of this Annex.

Have the initiatives had measurable impacts with respect to the main aims of the Directive?

The analysis revealed that there has been little in the way of measurable impacts – of the type of interest to this evaluation – in the course of the five complementary initiatives that were assessed. However, this is largely as a result of the fact that most of the initiatives were not designed to specifically deliver such measurable impacts, with the exception being GPP 2020. As described in Box 3, the main focus of the Clean Vehicle Portal and the Clean Fleets project were on the dissemination of information and on capacity building, respectively. While both projects had the intention of assessing some quantifiable impacts, this has not happened in practice. In the ongoing second phase of the Portal, the intention was to include a pop-up survey that would ask users questions that might be used to identify and quantify the experience with the Portal. However, the project has been delayed, so this survey has not yet been put in place and it is not clear whether it will be in the time left in the project.

One of the elements of the Clean Fleets project was to provide procurers with support in the preparation of tenders; the intention was to collect data on the impacts of these tenders. However, there have been few requests for support within the project and, where support has been given, it has subsequently proved to be difficult to obtain useful numbers⁴⁸. A couple of the cities that have been involved in the Clean Fleets project noted that their involvement in the project had led to the promotion of the market for clean vehicles in their respective countries while one noted that involvement in the project had influenced a purchasing decision that will lead to reduced CO₂ and pollutant emissions.

As the main reason for the inclusion of both the PROCURA and COMPRO projects in this assessment was their focus on joint procurement, it is not surprising that neither delivered much in the way of relevant measurable impacts. However, 135 alternatively-fuelled vehicles were procured as a result of PROCURA, with more anticipated after the end of the project. This information was provided on the project's entry on the IEE database, but it was not possible to obtain further information on what these vehicles were, let alone their impacts, from the project documentation (European Commission 2015).

⁴⁷ In this context, we would like to thank the following people for their support in providing information for this assessment: Kai Sporckmann (TUV Nord, project manager of the ongoing project relating to the Clean Vehicle Portal), Simon Clement (ICLEI, project manager of the Clean Fleets project), Olav Luyckx (EASME's desk officer for both the Clean Vehicle Portal and the Clean Fleets project), Philipp Tepper (ICLEI, project manager of the GPP 2020 project), Angelika Tisch (IFZ, partner in the GPP 2020 project), Rob Winkel (Ecofys, lead on the Procura project) and Silvia Gaggi (ISIS, lead on the COMPRO project).

⁴⁸ Based on interviews with the respective project leads

As noted above, one of the reasons for including the GPP 2020 project in this assessment was because the project does quantify the CO₂ emissions reductions and energy savings resulting from the low carbon tenders that are implemented in the course of the project for road transport vehicles and other low carbon products. At the time of writing, there have been five relevant tenders relating to the procurement (either the purchase or lease) of over 5,000 road transport vehicles, which will deliver savings of 22,930 tonnes of CO₂e emissions and energy savings equivalent to 6,935 tonnes of oil over the lifetime of vehicles (or of the respective contracts where the vehicles were not purchased; see Table 18-1).

Table 18-1: CO₂e and energy savings as a result of tenders implemented for road transport vehicles within the GPP 2020 project (as of May 2015)

Procurer	Vehicles procured		CO ₂ saved (tCO ₂ e)	Energy saved (toe)
	Type of contract	Number		
Consip SpA, Italy	Joint leasing of green vehicles	4,075	19,303	5,616
Ministry of Territory and Sustainability, Catalonia	Lease-purchase of low C cars	37	120	31
HEP Ltd (Croatian Energy Company), Croatia	Electric vehicles	20	379	99
Ministry of Home Affairs, Catalonia	Lease-buy of low C cars	175	1,597	696
Federal Procurement Agency, Austria	Purchase of small diesel cars	810	1,581	493
TOTAL:		5,117	22,980	6,935

Source: Respective tender case studies at www.gpp2020.eu/low-carbon-tenders

Have the initiatives encouraged and/or facilitated (cross-border) joint procurement?

Joint procurement was in the scope of both the Clean Vehicle Portal and the Clean Fleets projects. The first project relating to the Clean Vehicle Portal, which resulted in the Portal being developed in the way in which it was present on the internet in the first half of 2015, included a forum that users could access to discuss and exchange information on potential joint procurement, but this was not well used. On the revised version of the Portal, which is due to go live in the second half of 2015, there will be a page where those interested in joint procurement can publish their needs, which can be seen by other authorities that can then contact each other about potential joint procurement. As part of the ongoing work, a database of joint procurement activities is being developed, while it is anticipated that joint procurement will be covered in the case studies that are also being developed.

In the early stages of the Clean Fleets project, a 'user needs assessment' was undertaken in collaboration with the second phase of the Clean Vehicle Portal in order to inform the work of the project. While users expressed some support for work on joint procurement, there were many other areas in which there was more interest, including implementing the requirements of the CVD in practice, methods used by European public authorities,

information on technologies and costs and using the life cycle cost calculation (TTR 2013)⁴⁹. Consequently, joint procurement was not a focus of the project. In the course of the engagement with both the Portal and the Clean Fleets project, it was mentioned that examples of joint procurement are rare, while cross-border joint procurement is even rarer⁵⁰. It is worth noting that there are two case study examples of national joint procurement – in Slovenia and Sweden – on the Clean Fleets project’s website⁵¹.

No activities on joint procurement have been undertaken, or are planned, within the GPP 2020 project.

As noted above, as a result of the early findings relating to the Clean Vehicle Portal and to Clean Fleets, two other projects were identified that appeared to have a focus on joint procurement, at least according to the information on their respective project pages on the IEE project database (European Commission 2015). Here it was noted that PROCURA would develop “buyer pools”, while COMPRO aimed to “create an international buyers’ consortium” for the purpose of joint procurement. However, in the documentation that was available on the IEE project database relating to PROCURA, there was no mention of the formation of any ‘buyer pools’ within the project; it was confirmed by someone involved in the project that it did nothing with respect to buyer pools, focusing instead on sharing information about the transition to using alternatively-fuelled vehicles and the development of tools to analyse fleets.

COMPRO, on the other hand, did focus on joint procurement and indeed two successful national examples were reported upon: the joint procurement of trams in the French cities of Brest and Dijon and the joint procurement of trains by the Italian regions of Emilia Romagna and Veneto. In spite of the project’s stated intention (see above), no cross-border joint procurement took place within the project; instead the project focused on bringing cities together and identifying the barriers to joint procurement and the definition of the elements needed for cross-border joint procurement. Issues that currently prevent cross-border joint procurement that were identified in the project included:

- The existence of different local regulatory and legal frameworks.
- Local culture and tradition, which makes defining a common product to procure difficult.
- A lack of tradition in cross-border requirement, coupled with language barriers.
- Unbalanced commercialisation of products in different countries as a result of a fragmented market and different local requirements.
- A lack of understanding about clean technologies in general (ISIS, 2009)

In its final ‘Common position’, the project partners underlined the potential for joint procurement and that the project could identify no legal barriers to cross-border joint procurement. They called for more financial support for the purchase of clean vehicles, including the exploration of the EIB’s Elena (European Local ENergy Assistance) facility, as

⁴⁹ In order to identify the needs, a survey was undertaken of the needs of potential users of the support that might be provided by the project. The results are based on online survey, to which there were more than 80 respondents, and telephone interviews with 50 representatives of relevant organisations. In order to identify on what users were interested in receiving support, a long-list of options – including joint procurement – was provided. ‘Joint procurement’ was the 10th most popular choice out of the 13 listed.

⁵⁰ Based on interviews with the respective project leads

⁵¹ www.clean-fleets.eu/case-studies/

well as future support from the Commission for common procurement in order to overcome the barriers identified.

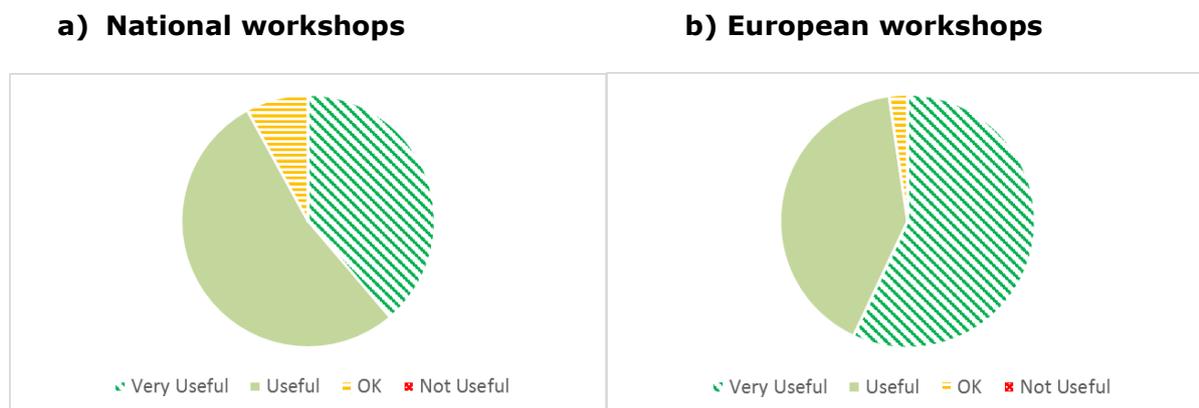
Hence, the overall conclusion is that while there are theoretical advantages of cross-border procurement, not least in shared expertise and from economies of scale and the potential to reduce administrative costs in the longer-term, these are not yet proven in practice, whereas the increased, short-term administrative costs associated with cross-border joint procurement, at least in the initial phase, are real.

Have the initiatives initiated and/or supported an exchange of good practice between contracting authorities in the Member States?

As was noted above, the Clean Fleets’ user needs assessment identified that there was interest in learning about methods used by other European public authorities. Hence, the exchange of good practice has been an important element of the Clean Fleets project. In the course of the telephone interviews undertaken for the user needs assessment, topics that were suggested for workshops, training and events included “How is procurement organised in best practice organisations?” and “Best practice examples”. The report recommended that ‘inspirational’ and ‘replicable’ case studies would be one of the best ways of expressing the European dimension within the project. As a result, nine case studies were developed in the course of the project and uploaded onto the project website, along with another 11 from the Commission’s Green Public Procurement website⁵². These case studies have been downloaded over 6300 times⁵³.

The main focus of the European-level and national workshops that have been held within the project has also been on the exchange of good practice. More than 870 people have attended (or watched videos of) the project’s European and national events, while the various presentations from these workshops have been downloaded more than 8500 times. The general level of satisfaction with the workshops has been high (see Figure 18-1). Furthermore, a project report on clean technologies for buses, which also includes case studies, has been downloaded over 3,600 times.

Figure 18-1: Feedback from attendees of Clean Fleets’ national and European workshops to the question “What was your overall assessment of the Workshop?”



Source: Developed on the basis of data provided by ICLEI

⁵² <http://www.clean-fleets.eu/case-studies/>

⁵³ This and the other data mentioned in this section has been provided by ICLEI

The exchange of good practice is also an important element of the GPP 2020 project. For each of the low carbon tenders implemented within the project, an associated “tender model” is developed, which is effectively an overview of the experience of the procurer with the tendering process. Additionally, information on good practice is exchanged in the course of the various events and training exercises undertaken within the project, including national and European meetings and webinars.

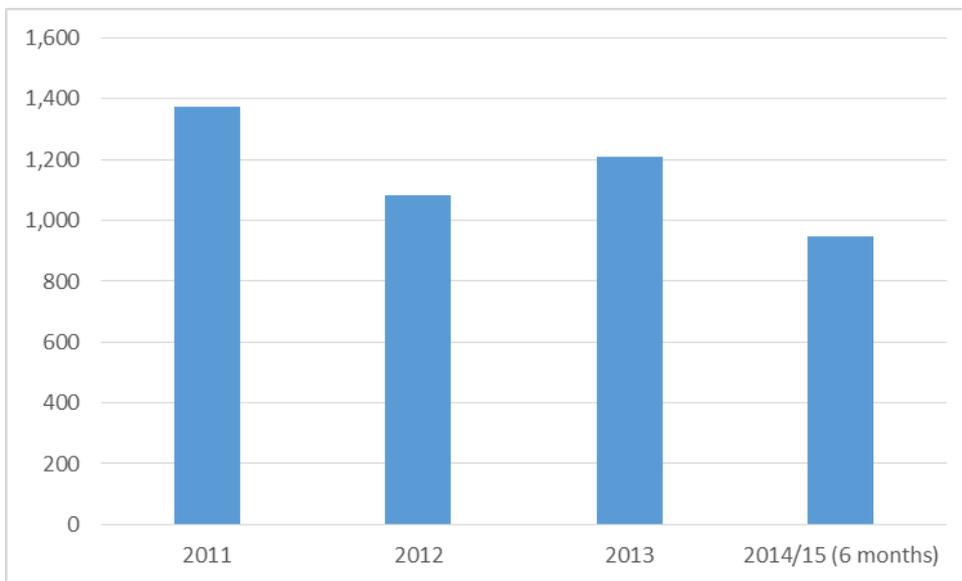
The first phase of the Clean Vehicle Portal, on the other hand, was not set up to exchange good practice, although some good practice examples are being developed for the re-launch of the Portal later in 2015. As a result of the focus of COMPRO and PROCURA, as noted above, neither focused on the exchange of good practices, even though one of recommendations of the latter’s final report was the provision of information on best practice.

Have the initiatives contributed to promoting the Directive?

Supporting the CVD was one of the aims of the Portal, while raising awareness and supporting the implementation of the Directive are aims of the Clean Fleets project.

The Portal was presented at a number of events in the course of the first project, which indirectly promoted the Directive, although there has been little in the way of promotional activity under the second project relating to the Portal. On the Portal itself, there is a link to a page about which information on the Directive can be found. This link has been accessed relatively frequently throughout the lifetime of the Portal (see Figure 18-2); if anything interest has increased in the last 6 months.

Figure 18-2: Number of times the page on the Clean Vehicle Portal about the CVD has been accessed per year

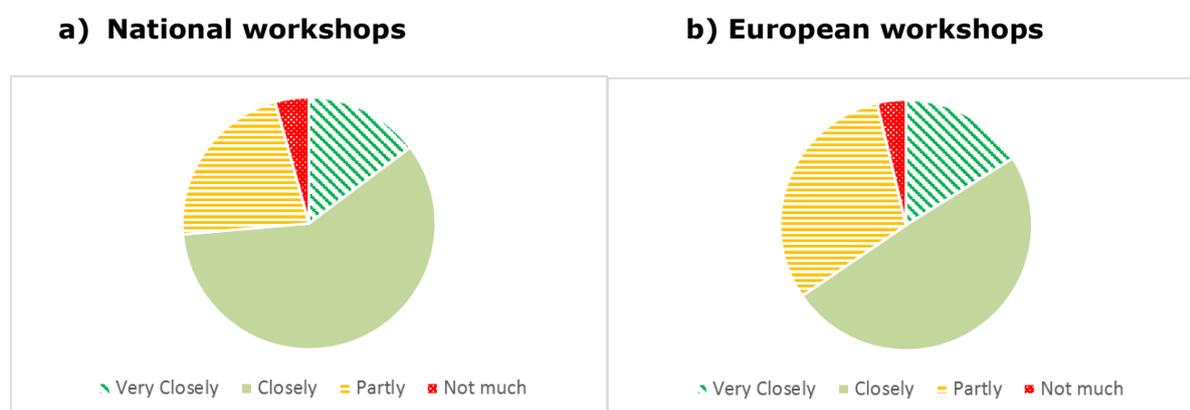


Source: Data provided by TUV Nord

As part of its initial user needs assessment, Clean Fleets asked respondents about their awareness of the Directive; only 50% of respondents were aware of the CVD’s requirements and only one in four had accessed guidance (mainly a webpage) on the Directive. However, it was noted that as the Directive has been transposed into national legislation, a greater proportion of respondents would probably have been aware of the Directive’s requirements in this way. The meetings held within the Clean Fleets project appear to have been largely beneficial in increasing attendees’ ability to apply the Directive

(see Figure 18-3). The project’s website has been visited by more than 26,000 unique visitors⁵⁴. The Clean Fleets cities contacted directly for this assessment generally thought that the national workshops in particular had gone well, while the project website was also complemented.

Figure 18-3: Feedback from attendees of Clean Fleets’ national and European workshops to the question “To what extent has the workshop helped you to better apply the CVD?”



Source: Data provided by ICLEI

The existence of the Directive was considered useful for both the Clean Vehicle Portal and the Clean Fleets projects by those involved in the projects, as it gave both a focus that would not otherwise have been there. The need to apply the provisions of the Directive also acted as a motivation for procurers to become involved in the respective projects. However, some of those that were spoken to felt that something similar to the Clean Fleets project in particular could have been successful without the Directive, as local authorities across Europe are dealing with common issues with respect to clean vehicles.

While the Directive is not the focus of the GPP 2020 project, it is one of the issues that the project covers. It is worth noting that the Directive’s lifetime operational cost monetisation methodology was used in the first GPP 2020 road transport tender model listed in Table 18-1. On the other hand, as both PROCURA and COMPRO had ended before the CVD came into force, neither focused on the promotion of the Directive, although both were aware of the proposal and its potential relevance, as it was mentioned in the final reports of both projects.

⁵⁴ Data provided by ICLEI

19. ANNEX 11: EVALUATION OF THE EXTENT TO WHICH IT IS, AND WILL CONTINUE TO BE, IMPORTANT TO INCREASE THE ENERGY EFFICIENCY AND COMPETITIVENESS OF TRANSPORT AND TO REDUCE ITS CO₂ AND POLLUTANT EMISSIONS

In order to evaluate the extent to which there is, and will continue to be, a **need to reduce transport's CO₂ emissions**, it is first worth underlining that there remains a need to reduce greenhouse gas emissions (GHGs) more generally, including CO₂ which is by far the most common GHG emitted by the transport sector. In its most recent assessment of the evidence, the Intergovernmental Panel on Climate Change (IPCC) concluded that there was a need for "substantial and sustained reductions of greenhouse gas emissions" as the evidence was more conclusive than ever that the global climate is warming as a result of increased concentrations of GHGs in the atmosphere that are the result of human activity (IPCC 2013). The EU has already committed itself to delivering significant reductions in its GHG emissions. The Commission's 2011 Low Carbon Roadmap set the framework for the development of EU policy action to meet an 80 to 95% reduction in GHG emissions by 2050 compared to 1990 levels. The Roadmap concluded that cost-effective reductions of GHG emissions of between 54% and 67% by 2050 compared to 1990 could be delivered by the transport sector (European Commission 2011, European Commission 2011). Hence, in order to meet long-term economy-wide CO₂ reduction targets, there is a need to reduce transport's CO₂ emissions.

In order to evaluate whether there is, and will continue to be, a **need to improve the energy efficiency of transport**, it is necessary to identify what the required GHG reductions above imply for transport in terms of improvements in vehicle efficiency. The Commission's 2011 Transport White Paper explored the implications of delivering such GHG emissions reductions, as it took as its starting point the need to reduce transport's GHG emissions by 60%, i.e. the midpoint in the range identified by the Roadmap (European Commission 2011). The policy option that the Impact Assessment accompanying the White Paper identified as its preferred option included action to reduce the CO₂ emissions of all transport vehicles. This assumed that the average CO₂ emissions from new cars would be only 20 g/km by 2050, compared to the target of 95 g/km in 2020, while the equivalent figure for LCVs would be 55g/km compared to the 2020 target of 135 g/km. For heavy duty vehicles a 40% improvement in energy efficiency was assumed by 2050 (European Commission 2011). Other studies have also concluded that there is a need to deliver such reductions from vehicles in order to meet the CO₂ reduction levels assumed by the White Paper. A report for the European Commission's DG Climate Action concluded that reducing transport's CO₂ emissions by 60% by 2050 compared to 1990 levels would require reductions in lifecycle CO₂ emissions of 80% for cars, buses and vans, and of between 60 and 75% for heavy goods vehicles in parallel to action to improve vehicle efficiency in other modes of transport (e.g. rail, air and water transport), improvements in operational efficiency and the decarbonisation of fuels and energy sources (Ricardo-AEA, TEPR et al. 2012).

For vehicles that use fossil fuels, reducing the CO₂ emissions of road transport will necessarily require improving the fuel efficiency, and therefore the energy efficiency, of vehicles, as the CO₂ emitted is closely linked to the energy consumed. For vehicles that use electricity and hydrogen, this link is not as direct, as in-use CO₂ emissions for these energy sources are zero (see Section 5.4). Hence, the energy efficiency of such vehicles could be relatively poor, but their in-use emissions would be unaffected. However, given the levels of investment that are required to decarbonise the electricity sector in particular (European Commission 2011), it would seem prudent to ensure that the energy consumed in transport as a result of its electrification is consumed as efficiently as possible. Hence, it can be concluded that there is a continuing need to improve the energy efficiency of the transport sector for all fuel types.

EEA (2014), which drew on the latest evidence concerning health and air quality from the World Health Organisation (WHO), underlines that there is a still a **need to reduce pollutant emissions**, generally, and those from transport in particular. The report

highlighted that transport was the largest emitter of the oxides of nitrogen (NO_x) and a significant emitter of large and fine particulate matter (PM₁₀ and PM_{2.5}, respectively). It was estimated that between 21% and 30% of the urban population of the EU-28 are exposed to concentrations of PM₁₀ above EU air quality limit values, while the equivalent figures are 10% to 14% for PM_{2.5} and 8% to 13% for NO_x. WHO has air quality guidelines (AQG) for the same pollutants that indicate the levels at which it believes health risks would be reduced to a minimum on the basis of the latest scientific evidence (WHO 2013). For some pollutants, these AQGs are tighter than the existing EU limit values. EEA (2014) demonstrates that over 91% of the EU's urban population is exposed to levels of PM_{2.5} that exceed the respective WHO AQG, while the equivalent figure for PM₁₀ is 64%⁵⁵. The role of road transport in these exceedances is clear as the daily limit value for NO_x was exceeded at 37% of 'traffic' monitoring sites⁵⁶, while the equivalent figures for PM₁₀ and PM_{2.5} were 22% and 4%, respectively. Of the transport measures suggested that would contribute to reducing the adverse of transport on air quality, a shift to the use of cleaner vehicles was mentioned.

The **need to increase the competitiveness of transport** was a theme of the 2011 Transport White Paper, including the role of transport in enhancing the competitiveness of the wider economy (European Commission 2011). The need to strengthen the competitiveness of the EU automotive sector is emphasised by the multi-stakeholder CARS 2020 process (European Commission 2012). An earlier report from the CARS 2020 process also highlighted that the competitiveness of the EU automotive industry can only be assured if it delivers sustainable and advanced products (European Commission 2012).

Hence, it can be concluded that there remains a need to decrease transport's CO₂ and pollutant emissions, and to increase its energy efficiency and competitiveness.

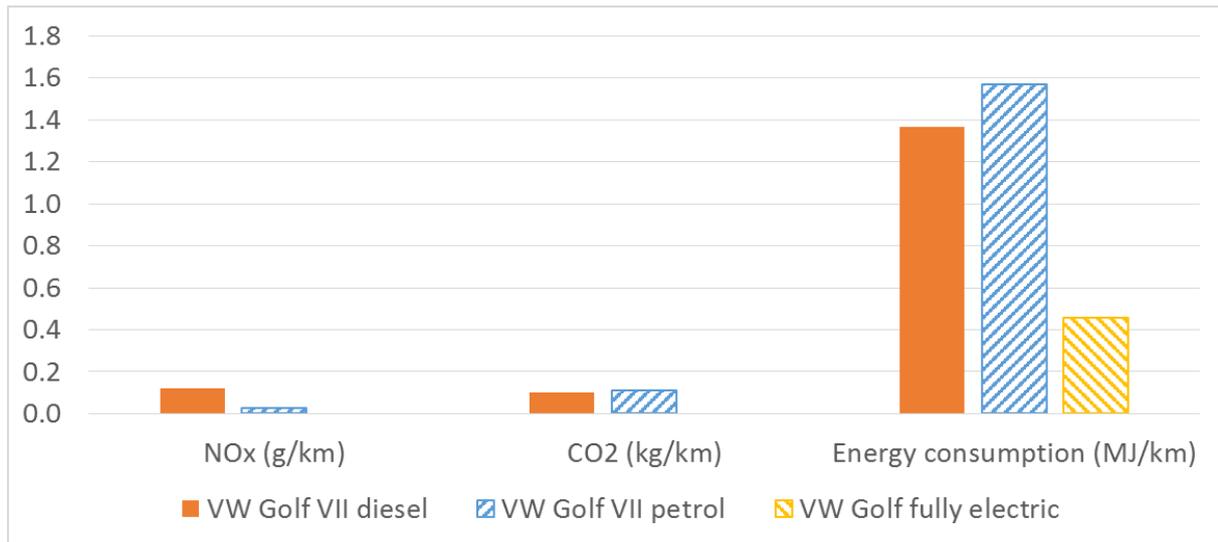
⁵⁵ The proportion of the EU urban population exposed to NO_x levels above the respective WHO AQG is the same as that for the respective EU emission limit value.

⁵⁶ 'Traffic-related' monitoring sites are one of four types of fixed air quality sampling points in Europe, the others being urban/suburban background, rural background and industrial (EEA, 2014).

20. ANNEX 12: GRAPHS FOR RELEVANCE

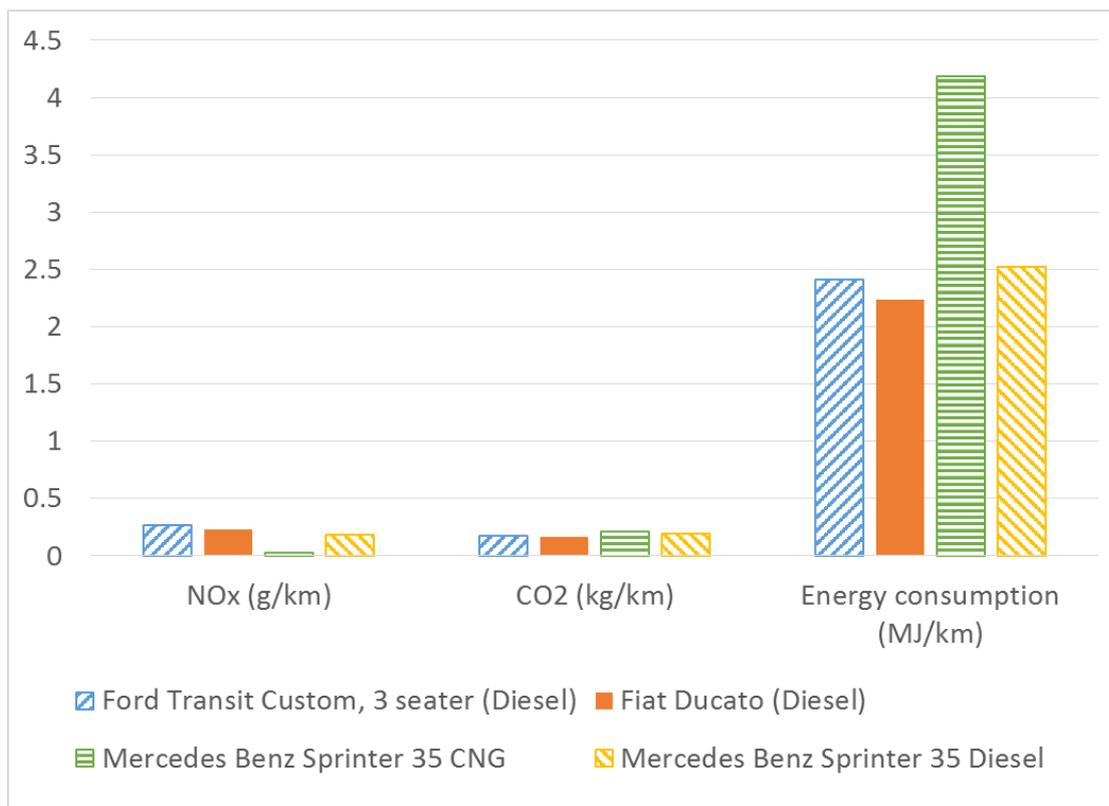
The graphs in this Annex are to complement the discussion about what might be considered to be a clean vehicle under relevance (see Section 6.2.2 of the main report). The figures below focus on NO_x emissions for air pollution, as this transport is the largest source of these emissions, as mentioned in Section 6.2.2.

Figure 20-1: Emissions of NO_x, CO₂ and the energy consumption of different variations of the same model of car



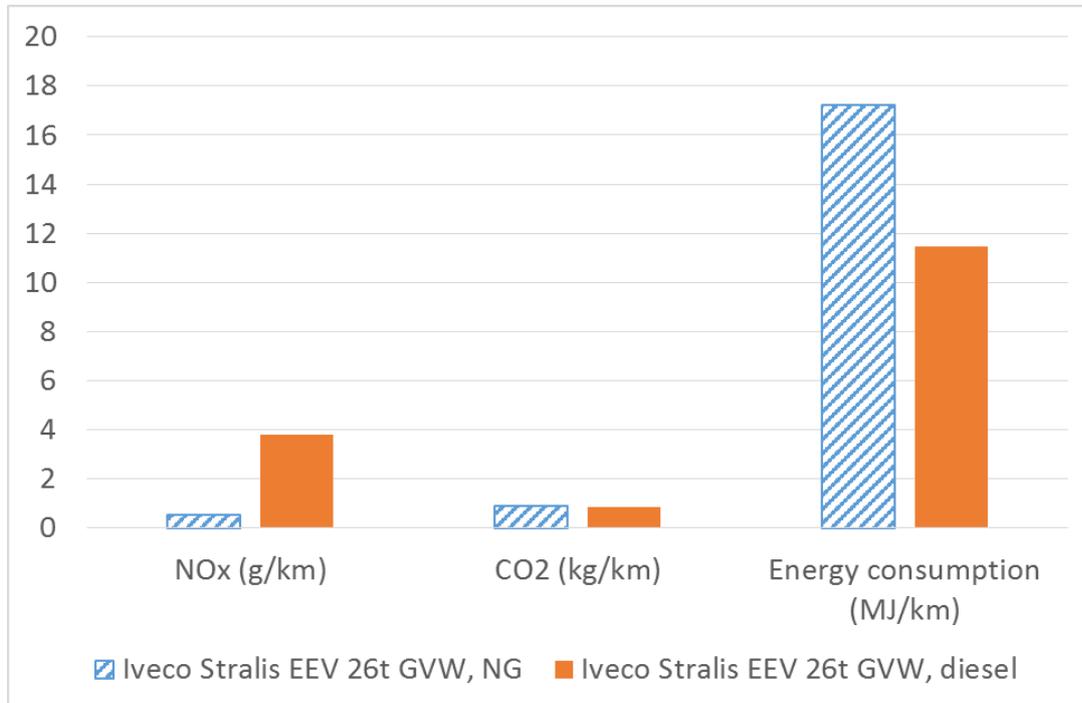
Source: Own research (see Annex 18) from manufacturers' website and reviews

Figure 20-2: Emissions of NO_x, CO₂ and the energy consumption of different light commercial vehicles



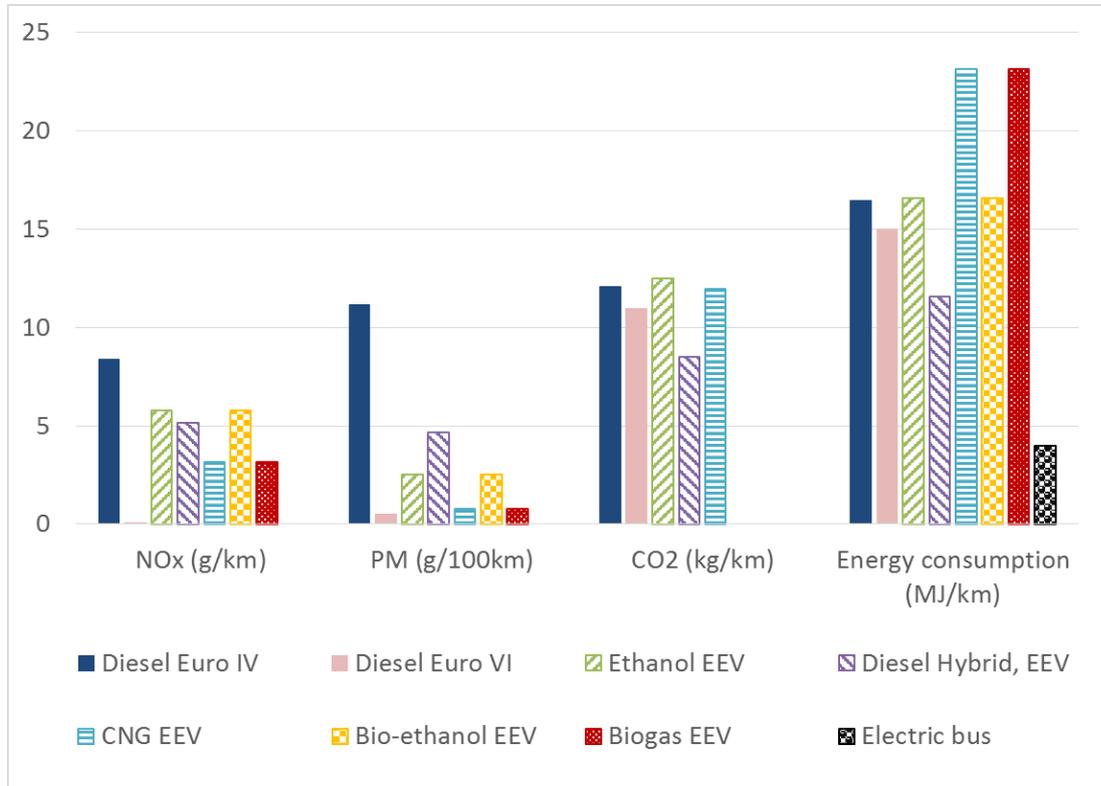
Source: Own research (see Annex 18) from manufacturers' website and reviews

Figure 20-3: Emissions of NO_x, CO₂ and the energy consumption of different versions of the same heavy goods vehicle



Source: Cenex (2014); see Annex 18

Figure 20-4: Emissions of NO_x, CO₂ and the energy consumption of different types of bus



Source: VTT (2013)

21. ANNEX 13 – ASSESSMENT OF WHETHER REPORTING REQUIREMENTS ON MEMBER STATES WOULD BE EFFECTIVE AND PROPORTIONATE

The assessment presented in this Annex contributes to one evaluation question, i.e.:

- Question 7: Could the effects have been achieved in a more efficient way (e.g. through other or additional (legislative) measures)? (see Section 6.7.1 of the main report).

Approach taken

This assessment focuses on identifying the extent to which:

- The current reporting obligations (on the Commission) are adequate; and
- Whether the introduction of reporting requirements on Member States would be an effective and proportionate means of determining the impacts of the CVD.

In order to assess the ***adequacy of the current reporting obligations***, it was necessary to:

- Identify the extent to which the current reporting obligations facilitated the Commission in understanding the application and effects of the Directive;
- Compare reporting requirements in similar pieces of EU legislation in order to identify the extent to which the requirements of the CVD in this respect differed from those considered important elsewhere; and
- Identify the views of Member States and stakeholders.

The latter two elements were also used to inform the assessment of whether the ***introduction of reporting requirements on Member States would be effective and proportionate*** in determining the impacts of the CVD. This part of the assessment was undertaken in a manner consistent with the Commission's own Impact Assessment Guidelines (European Commission 2015). In other words, the following stages were implemented:

- A long-list of potential options for Member State reporting was identified on the basis of similar reporting requirements in similar pieces of EU legislation and suggestions from the project Steering Group, Member States and stakeholders.
- The options included on the long list were then assessed qualitatively according to a number of criteria, including their potential effectiveness, their proportionality and their political acceptability. The feedback from Member States in the course of the Member State representative meeting was taken into account for the last criterion.
- A short list of options was then identified for which administrative costs were estimated, in order to try to provide quantitative evidence of the proportionality of the different proposed reporting requirements.

In order to support this assessment, views on the adequacy of the existing monitoring and reporting arrangements and on the utility, or otherwise, of Member State monitoring and reporting requirements were asked of:

- Member States; and
- EU level stakeholders (as part of the EU stakeholder interviews, see Annex 2, and in the stakeholder workshop, see Annex 3).

Adequacy of the current reporting obligations

Currently, the CVD places no reporting requirements on Member States; it only requires the Commission to produce a monitoring report every two years on the CVD's application and effects. The Commission's report needs to cover the:

- Application of the Directive;
- Complementary actions taken by Member States;
- Effects of the Directive, especially Article 5(3) options and how these have affected the market for vehicles (including an evaluation of Article 6 methodology);
- Nominal/relative numbers of vehicles purchased corresponding to best market alternative; and
- Need for further action, and proposals, as appropriate.

To date, the Commission has produced one monitoring report on the application of the Directive (European Commission 2013), and has commissioned one report in support of its monitoring actions (Ricardo-AEA and TEPR, 2012). The former noted that the absence of reporting obligations on Member States made analysing the implementation of the Directive difficult and suggested that it might be appropriate to impose reporting obligations on Member States in the future, which echoed the findings of the latter report. Hence, the first attempt at identifying the impacts of the Directive, let alone its measurable impacts, proved to be difficult. As part of this evaluation, we have also attempted to obtain information about the impacts of the Directive in order to quantify its impacts (as discussed in Section 4.1 of the main report). This has again proved to be challenging in spite of the number of responses to the online survey that have been received.

In order to identify whether there are alternative approaches to assessing the impact of EU legislation, a number of other Directives have been reviewed in order to identify from where the Commission obtains information to assess the implementation of these. (This review was also relevant to the next part of this assessment, i.e. the development of options for potential reporting requirements on Member States.) The focus was on identifying and reviewing legislation that was similar in its requirements to the CVD, particularly that which required action from public authorities at the regional or local levels. In the legislation covered in this review, it was clear that the CVD is in a minority in that it does not require action from Member States (see Table 21-1). Consequently, it can be concluded that some form of monitoring and reporting action on Member States is generally considered to be important for the purpose of monitoring EU legislation that is applicable at the regional and local levels.

Table 21-1: Summary of monitoring and reporting requirements on Member States in EU legislation that requires action at the local level

Procurer	Energy saved (toe)
New general procurement legislation, Directives 2014/24 and 2014/25	Member States are required to monitor the application of the public procurement rules and the results of these monitoring activities are to be made available to the Commission; Member States have to submit monitoring reports to the Commission every three years from 2017 that has to include any issues relating to implementation and enforcement
Alternative Fuels Infrastructure Directive, Directive 2014/94	Starting in 2019, Member States are required to submit a report to the Commission every three years on the implementation of their national policy framework, the adoption of which is required by the Directive; these have to cover

	<i>inter alia</i> the relevant legal measures, policy measures that have been implemented to support the national policy framework, budgets (e.g. to support infrastructure deployment and R&D), targets and objectives, and information on the supply and demand of the fuels concerned
Energy performance of buildings, Directive 2010/31	Member States are required to report all input data/assumptions for the calculation of cost-optimal levels of minimum energy performance requirements to the Commission at regular intervals (of no longer than 5 years); Member States have to develop national plans to increase number of nearly zero energy buildings and inform the Commission of these; Member States have to draw up a list of existing and proposed measures to promote the objectives of the Directive, and communicate this to the Commission
Environmental noise, Directive 2002/49	Member States are required to inform the Commission of any relevant limit values in force or planned, the major roads, railways, airports and agglomerations in their territories, other criteria for drawing up action plans and of the information from strategic noise maps and actions plans developed as a result of the Directive
Air quality framework, Directive 2008/80	Member States are required to make annual reports available to the public for all of the pollutants covered by the Directive, which should include <i>inter alia</i> exceedances, objectives, alert thresholds etc.; Member States are to ensure that information on ambient air quality is made available to the Commission within specified timescales

Source: Own review on the respective pieces of legislation

Of the 14 Member States that responded to the question about the adequacy of the current provisions on the Commission for the effective assessment of the impacts and operation of the Directive, five believed that there were adequate, five did not, while the other four had no clear opinion. Of those that thought the requirements were adequate, two (Germany and Italy) were going to put in place their own monitoring systems, while two others argued that requiring on Member States would increase the administrative significantly as a result of the need to collect information from a large number of local authorities. Two of the Member States that considered the current situation to be inadequate were not in favour of additional reporting requirements on Member States for similar reasons, i.e. the increased burden that this would entail.

On the other hand, most stakeholders believed that the current reporting requirements were inadequate and that reporting requirements on Member States would motivate Member States to act to deliver on the Directive. It was also noted that reporting requirements were important to be able to properly inform any revision of the Directive. However, one stakeholder also raised the same issue as several Member States that it

would be difficult to monitor the impact in practice as a result of the number of authorities involved and their reluctance to report (see Annex 2). This issue was also raised at the meeting with Member State representatives.

Taken together, the discussion in this section suggests that: i) it is proving to be difficult to assess the impacts of the Directive, particularly to quantify these, on the basis of the approach taken in this evaluation; ii) generally similar EU Directives do require Member States to monitor and report on the implementation of (at least elements of) Directives to the Commission; and iii) some stakeholders, although not Member States, believe that it is important that there are monitoring and reporting requirements on Member States in EU legislation, not least as this can also act as a motivation for taking action. Consequently, it can be concluded that the current reporting requirements on the Commission are not sufficient and are not consistent with similar legislation. The extent to which it is possible to identify monitoring and reporting requirements for Member States that will be effective and proportionate is assessed in the following section.

Development and assessment of potential reporting requirements on Member States

The first stage of this part of the assessment was to identify a long-list of possible options for including monitoring and reporting requirements on Member States in the Directive, and to identify what role the Commission might have in each case. This was undertaken by reviewing reporting requirements in similar pieces of EU legislation, i.e. those that require action by local and regional public authorities (as noted above), and in legislation suggested by the various Commission DGs involved in the project's Steering Group, as well as by asking Member States and EU level stakeholders (see Section 6.7.1) for their suggestions. There is a range of potential requirements that might be put in place to improve the monitoring of the Directive. The following discussion starts with the options that require less in the way of changes to the current situation, progressing to significantly more comprehensive options. First, it is important to note that the Commission's Impact Assessment Guidelines for assessing different policy options recommends the inclusion of a 'no change' option in any assessment; hence, this is included on the long-list as the first option.

There are a number of complementary Commission initiatives (see Annex 10) that have been put in place to support the implementation of the Directive. Some of these already monitor procurement opportunities and directly engage with procurers. Consequently, a potential option is to utilise similar future initiatives, assuming that the Commission will continue to support such initiatives, to monitor the implementation of the Directive.

An alternative option might be for the Commission to monitor the implementation of the Directive with the explicit support of the newly formed Sustainable Transport Forum Expert Group (which we understand will effectively replace the Committee that is set up under the CVD, which would otherwise have been an option). Such an approach is similar to the requirements of Directive 2010/31 (energy performance of buildings), which requires the Commission to evaluate that Directive with the assistance of a Committee set up by the Directive. However, it should be noted that there are other reporting requirements on Member States as a result of this Directive (see Table 21-1). In the course of the engagement undertaken for this project, a Member State suggested that the Clean Vehicles Directive could be monitored by the Commission with the support of Member State experts (see Annex 2).

Many Directives have some type of reporting requirement on both Member States and the Commission, including those Directives that aim to reduce the environmental impacts of *inter alia* road transport. Examples of such Directives are the environmental noise Directive (2002/49) and the air quality framework Directive (2008/80), both of which are similar to

the CVD in that they effectively set a European policy framework, but have to be largely implemented at the regional and local level. As noted in Table 21-1, both of these Directives have a number of reporting requirements on Member States. Additionally, both also require the Commission to review and report on, at least aspects of, the implementation of the respective pieces of legislation.

There are also reporting requirements on both Member States (see Table 21-1) and the Commission in the recently adopted alternative fuels infrastructure Directive (2014/94), which is complementary to the CVD, as it focuses on infrastructure for alternative fuels. The Commission has to provide an assessment of the national policy frameworks and, every three years, has to submit a report on the application of the Directive, including actions taken by Member States, the effects of the Directive on the development of the market with respect to infrastructure and fuels. Many of these elements are comparable to issues on which the Commission has to report under the CVD (see Section 6.7.1). It is also worth noting that Annex I to the alternative fuels infrastructure Directive, which sets out the requirements for Member State reporting, explicitly notes that the “use of public procurement in support of alternative fuels” is one of the measures on which Member States should report, although this does not make an explicit reference to the CVD.

Similarly, the new public procurement Directives (2014/24 and 2014/25) both explicitly put monitoring and reporting requirements on Member States (see Table 21-1). A similar approach was proposed by a stakeholder as part of the engagement undertaken within this project (see Annex 2).

A couple of stakeholders also suggested that there was a need for a more comprehensive approach to reporting on clean transport; this would require Member States to report on a wide range of relevant initiatives, not just the CVD.

On the basis of the above discussion, the following long-list of options was identified and presented to the Member States in the Expert Group meeting (that took place as part of this project):

1. Maintain the current approach, in which the Commission has to produce a monitoring report every two years on the application and effects of the CVD.
2. Commission uses a related initiative, e.g. the Clean Vehicle Portal or a suitable alternative, to monitor the implementation and impact of the CVD, and produces monitoring reports on the basis of this information.
3. Commission monitors the application and effects of the CVD with the support of the Expert Group, which should agree a common reporting methodology and guidelines, and produces monitoring reports on the basis of the information provided by the Expert Group.
4. Member States are required to monitor the application and effects of the CVD (as a result of provisions added to the Directive) and to make results available to the Commission every three years on the basis of which the Commission produces its monitoring reports.
5. Member States are required to monitor the application and effects of the CVD and to make the results available to the Commission in their reports as part of the report to be submitted under the new public procurement Directives on the basis of which the Commission produces a separate monitoring report for the CVD.
6. Member States are required to report generally on clean transport measures, including the CVD, on the basis of which the Commission prepares a monitoring report on the CVD.

These options have been assessed for their potential effectiveness and proportionality (as required by the terms of reference), as well as for their potential to make monitoring and reporting under the CVD consistent, comparable and complete and political acceptability (see Table 21-2)⁵⁷. For the sake of clarity, it is noted that the Commission's own IA guidelines state that the principle of proportionality means that action at the European level "should not go beyond what is necessary to achieve satisfactorily the objectives that have been set" (European Commission 2015). In the context of this assessment, we assume that the "objectives" are that the Commission has a good understanding of the implementation and impacts of the Directive.

Option 1, retaining the existing approach, has the advantage that it requires no change to the existing monitoring and reporting arrangements, but, as described above, it has so far proved difficult to obtain sufficient information to be able to fully identify the implementation and effects of the CVD. The effectiveness of the approach depends on the contributions of a large number of actors over a short timescale. While attempts have been made to ensure that the information received is consistent and comparable, it cannot be considered to be complete. This also brings into question the proportionality of the current approach, which does not enable the Commission to obtain a full understanding of the impacts of the Directive. However, this option should be retained as it is the one currently in place. Option 2 has the slight advantage over Option 1 in that monitoring can be undertaken over a longer period of time, but many of the issues with Option 1 are likely to remain, although it might be possible to improve the consistency of the information obtained over the longer periods involved. Additionally, a commitment on a complementary initiative to contribute to the monitoring of the Directive would mean that resources allocated to other support tasks would be less than would otherwise have been the case. There would also be issues of budgets and responsibilities in this respect, as future support initiatives would probably be funded under Horizon 2020, whereas monitoring of legislation is the responsibility of the DGs concerned. Hence, it is not considered that this approach brings much in the way of added value, given the changes needed, and potential issues associated, with setting this option up.

Option 3 has the advantage that the relevant monitoring and reporting requirements, including their frequency and format, can be agreed, and therefore amended as appropriate, by the Commission and the Member States in the Expert Group, which we assume would be the newly formed Sustainable Transport Forum Expert Group. Hence, together the members of the relevant Group could ensure that the requirements were effective, proportionate, consistent and comparable, as the Group together considered they needed to be, which should ensure the political acceptability of such an approach. However, the issue here is whether such an approach would deliver reporting requirements to the level needed for the Commission to understand the impacts of the Directive, which might need more information that would be provided under such a consensual approach. Option 4 provides consistency with the general public procurement legislation, which has only recently been adopted, so might be considered to be the result of current thinking with respect to monitoring and reporting on public procurement in the EU. It is likely to be more effective and lead to more complete results, as it would be a legal requirement, but it is likely to face challenges of political acceptability.

Option 5 is slightly different from Option 4 in that monitoring and reporting for the CVD would be integrated into the monitoring and reporting requirements of the general public procurement legislation (rather than the reporting requirements being integrated into the CVD). While this option has the attraction that one fewer report would need to be submitted by each Member States, there is a risk that the reporting on the CVD is diluted to a level

⁵⁷ These are the most relevant criteria used in the assessment of reporting obligations, e.g. see Regulation 525/2013 on greenhouse gas monitoring European Union (2013). Regulation 525/2013/EU on Greenhouse Gas Emissions Monitoring and Reporting, Official Journal of the European Union .

that does not enable its effective, consistent and comparable monitoring and reporting. However, it should be noted that there is a justification for this approach as the public procurement legislation refers to the CVD in an Annex, as the only sector-specific piece of public procurement legislation in place at the EU level. This approach might be implemented, although on a voluntary basis, if the Commission included the CVD in its reporting format that it will propose for Member States. This approach might be potentially less effective and lead to less complete results than option 4, but might be considered more proportionate and so politically acceptable.

There are various risks with Option 6. It would require a new monitoring and reporting system to be set up, and entail a potentially significant increase in the reporting requirements on Member States if such an approach is to be meaningful for all of the issues covered. Hence, it is likely to face challenges from the perspective of political acceptability and proportionally, while not necessarily delivering sufficient information on the CVD, as reporting on this Directive risks being overshadowed in the wider reporting mechanism.

Table 21-2: Assessment of long list of options against the selected criteria

Option	Results of assessment with respect to the potential:			
	Effectiveness	Proportionality	Consistency, comparability and completeness	Political acceptability
1. Maintain the current approach	x	x	xx	✓✓✓
2. Commission uses a related initiative	x	x	x	✓✓✓
3. Commission monitors the application and effects of the CVD with the support of an Expert Group	✓✓	✓	✓	✓✓✓
4. Member States are required to monitor the application and effects of the CVD	✓✓✓	✓	✓✓✓	xx
5. Member States are required to monitor the application and effects of the CVD as part of the reporting under the public procurement legislation	✓✓	✓✓	✓✓	✓✓
6. Member States are required to report generally on clean transport measures	-	xxx	-	xxx

Source: Assessment undertaken for this report

Key: Assessment ranges from "✓✓✓" (option contributes well to this criterion) through "-" (option no effect on this criterion) to "xxx" (option is very negative with respect to this criterion)

As noted above, relevant questions were asked of both Member States and stakeholders as part of the engagement within this project, while the above short-list was presented to Member States in the Expert Group meeting. The main comments in this respect were:

- Several stakeholders suggested that the inclusion of reporting requirements on Member States in the Directive would focus Member States on the Directive and act as a stronger motivation for action. Other stakeholders argued that it was important to have some type of mandatory reporting otherwise it was impossible to know what the impact of the Directive had been and whether changes were necessary. It was also suggested that the alternative fuels infrastructure Directive might be used to support reporting under the CVD (see Annex 2).
- Some Member States noted that they already publish the data that they have and/or are planning to evaluate the Directive. It was noted that it is likely that the challenges of undertaking an evaluation at the national level would be similar to those faced by a European level evaluation, such as this one. Hence, it was suggested that there would be little in the way of added value from putting additional reporting requirements on Member States (see Annex 3).
- A Member State suggested that the monitoring might be best focused on analysing market data, rather than on trying to identify the impacts of the Directive on a large number of small, dispersed actors. It was also suggested that, rather than new monitoring requirements, it might be better to cover clean vehicles as a separate part of similar reporting requirements.

While some Member States do identify and publish information on the implementation of the Directive, and some may evaluate it, it is not likely that all Member States will do so. Hence, an alternative reporting requirement might be to require Member States to monitor the implementation of the Directive, at fixed periods, but without being too prescriptive, and to report to the Commission the findings of this process.

As a result of the assessment above, and a discussion with the Commission, it was agreed that the following options are retained on the short-list for further consideration:

- A. Maintain the current approach, in which the Commission has to produce a monitoring report every two years on the application and effects of the CVD. No additional monitoring or reporting requirements are put on Member States (Option 1 above). While this was not rated well in the above assessment, it needs to be retained as it is the current approach against which all other short-listed options can be measured.
- B. Commission monitors the application and effects of the CVD with the support of Member States, e.g. in the newly formed Sustainable Transport Forum Expert Group. Member States would be asked to monitor the application and effects of the CVD in a manner that they consider to be appropriate (i.e. as agreed in the Group) and to make the results available to the Commission at least every five years. On the basis of these reports, the Commission will produce its monitoring reports. This is based on Option 3 above, but loosened to be less prescriptive as to what, and how frequently, Member States report.
- C. Reporting under the CVD is brought into line with, and made consistent with, that required under the general public procurement legislation. As part of the reporting under this legislation, the Commission would provide a reporting template for Member States that would cover the application and effects of the CVD. This template would be voluntary, but the Directive does require Member States to report to the Commission every three years (starting from 2017) on the basis of which the Commission produces its monitoring reports. This option is effectively Option 4 above.

- D. Reporting under the CVD is brought into line with, and made consistent with, that required under the alternative fuels infrastructure Directive. As part of the reporting under this legislation, Member States are required to report to the Commission every three years (starting from 2019) on the implementation of their respective national policy frameworks on the basis of which the Commission produces its monitoring reports. The CVD could be included in this reporting by supplementing the guidelines that are to be adopted by the Commission concerning Member State reporting for this Directive by an Annex that sets out guidance for reporting for the purpose of the CVD. This option is based on Option 4, above, but focuses on the alternative fuels infrastructure Directive instead.

It is worth noting that the only real difference between Options C and D is that the CVD reporting is integrated into a different Directive. Hence, the assessment of these options is – at this point in time – the same as that for Option 4 in Table 21-2. In practice, it may turn out that one of these options is more politically feasible than the other; hence, both are included here. The difference between Option B and Option C/D is that the former is less prescriptive as to the format of reporting and requires less frequent reporting.

Comparison of the administrative costs of the short-listed options

In order to apply the SCM, the actions required by different actors need to be listed and the potential time commitments and associated costs for each action/actor need to be estimated on the basis of input from a number of Member States. As we were unable to obtain any support from a Member State to estimate these costs, in this section we compare these qualitatively.

The actions required by different actors for options A, B and C are set out in Table 21-3). Only three options are considered, as a result of the similarities between options C and D, as noted above. On the basis of these actions, the differences in relative costs per actor compared to Option A of Options B and C are set out in Table 21-4. This analysis suggests that Options B and C would both incur more administrative costs for Member States than the current approach, largely as a result of the need for Member States to take on the responsibility for engaging with local authorities and collating and reporting these results to the Commission. The costs under Option C would be higher than under Option B, as more frequent and prescriptive reporting would be required. The costs on local authorities are also higher under Option C than Option B, as more frequent engagement would be required. For both Options B and C, it is assumed that any engagement required between the Commission and Member States would be undertaken and meetings that would have taken place for other purposes, so there are no additional meetings for either. Hence, the Commission benefits administratively from both options, as neither need the costs associated with the consultancy contract in Option A to be incurred; this saving also outweighs the need to develop a reporting template under Option C.

Table 21-3: Actions required under each of the short-listed options

Option	Commission	Member States (MS)	Local authorities (LAs)	Others
A. Maintain current approach	<ul style="list-style-type: none"> - Commission and manage consultancy contract - Prepare monitoring report on the basis of consultancy report 	<ul style="list-style-type: none"> - Engage with consultants 	<ul style="list-style-type: none"> - Engage with consultants 	<ul style="list-style-type: none"> - Costs for consultancy contract

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

B. Commission monitors impacts with support of MS in an Expert Group	- Prepare monitoring report on basis of MS reports	- Engagement with local authorities and other national stakeholders - Prepares evaluation report for the Commission at least every 5 years	- Engage with national authorities (likely that more LAs involved than in Option 1) at least every five years	- Potential monitoring systems set up
C. Reporting under CVD in line/integrated with public procurement Directives	- Develops reporting template for MS - Prepare monitoring report on basis of MS reports	- Engagement with local authorities and other national stakeholders at least every three years - Prepares evaluation report for the Commission at least every three years	- Engage with national authorities (likely that more LAs involved than in Option 1) at least every three years	- Potential monitoring systems set up

Source: Assessment undertaken for this report

Table 21-4: Qualitative assessment of relative costs by actor (compared to maintaining the current approach)

Option	Commission	Member States (MS)	Local authorities (LAs)	Others
B. Commission monitors impacts with support of MS in an Expert Group	✓✓ As no additional meetings to convene (as there is no consultancy report to manage)	xx As a more active role required of Member States	x As there will be a need for more involvement in order to respond to Member States' questions about the Directive	x As there will be a need to set up a monitoring system, at least to contact local authorities and bring together any information received
C. Reporting under CVD in line/integrated with public procurement Directives	✓ As no additional meetings to convene (as there is no consultancy report to manage), but there would be a template to prepare	xxx As a more active role required of Member States, and on a more frequent basis compared to Option B	xx As there will be a need for more involvement in order to respond to Member States' questions about the Directive, and on a more frequent basis than for Option B	x As there will be a need to set up a monitoring system, at least to contact local authorities and bring together any information received

Source: Assessment undertaken for this report

Key: Assessment ranges from "✓✓✓" (option reduces the costs significantly for this actor compared to maintaining the current approach) through "-" (option has no effect for this actor compared to maintaining the current approach) to "×××" (option increases the costs significantly for this actor compared to maintaining the current approach)

Combining the results of the two levels of assessment (i.e. Table 21-2 and Table 21-4) suggests that the preferred option depends on the balance of the benefits of the more prescriptive approach set out in Option C (or Option D, whichever proves to be more politically acceptable) that is likely to deliver more complete results and Option B, which is less prescriptive and so potentially less complete. However, it is important to recall that reporting under both of these options would still effectively be voluntary. Given that on the basis of the assessment undertaken within this evaluation, it was not possible to conclusively decide between Option B and Option C, the best approach might be for the Commission to adopt a prescriptive approach as proposed in Option C. However, as the use of the prescriptive template would be voluntary, it would be left up to Member States to decide whether there is sufficient benefit in using this template on the basis of the implications for administrative costs in their respective national systems.

ANNEX 14: OVERVIEW OF RELEVANT POLICIES AND INSTRUMENTS (SUPPORTING COHERENCE Q10)

Overarching strategies

There are a number of overarching strategies which set out the general framework under which Directive 2009/33 contributes to, and these include high level environmental targets covering a range of sectors.

The Europe 2020 Strategy (European Commission 2010) sets out a series of targets including those aimed at reducing CO₂ and improving energy efficiency. These targets include a 20% reduction in EU GHG emissions from 1990 levels by 2020; 40% by 2030 (domestic); and 80% by 2050. It is within this framework that emissions from transport must also be addressed to meet these targets. Hence, all targets aimed at reducing CO₂ and energy efficiency implicitly include vehicles. In addition, part of the justification for the policy was to ensure energy security of supply, a target of 20% of energy from renewables and a 20% increase in energy efficiency. The targets also encompass smart and inclusive growth, with relevant actions to promote innovation, competitiveness and growth in Europe (e.g. 3% of the EU's GDP to be invested in R&D). There are also targets for employment (75% of 20-64 year olds to be employed).

2030 Framework for Climate and Energy Policies (European Council 2014): EU leaders agreed on a binding target to reduce EU domestic greenhouse gas emissions by at least 40% below the 1990 level by 2030. Reducing GHG emissions and the risks related to fossil fuel dependency in the transport sector are highlighted as being important. The Framework calls for further examination of instruments and measures for a comprehensive and technology neutral approach for the promotion of emissions reduction and energy efficiency in transport, for electric transportation and for renewable energy sources in transport also after 2020. Such measures should contribute towards achieving the 40% reduction in GHG emissions target.

Transport White Paper (European Commission 2011): contains a high-level goal to reduce GHG emissions from the transport sector by 60% by 2050 (against 1990 levels). There are also 10 further goals for a competitive and resource efficient transport system. Whilst the objectives of the CVD complement most of these goals, the way in which the objectives of the CVD are to be achieved (inputs to the intervention) are in contradiction to some of these goals, in particular, to "halve the use of 'conventionally-fuelled' cars in urban transport by 2030 [...]" (goal 1). Whilst the aim of the CVD is to increase the proportion of clean vehicles by stimulating their public procurement, the case study of the monetisation methodology (see Annex 9) reveals that the use of the methodology tends to favour diesel vehicles, rather than other alternatively fuelled-vehicles (AFVs).

The CARS 21 Final Report (European Commission 2012, European Commission 2014) (part of the CARS 2020 process) sets out a strategic vision for the automotive sector for 2020 and specific recommendations on a number of policy areas that are of importance to the automotive sector. Key aspects of relevance include 'new vehicles purchased by EU customers, which are clean in terms of regulated pollutants, more fuel-efficient, quiet, safe and connected'; 'a portfolio of propulsion technologies, dominated by advanced combustion engine technology, although increasingly electrified'; and 'the deployment of vehicles with alternative powertrain concepts (such as electric and fuel cell vehicles)'. The objectives of CVD are coherent with these key aspects of the strategic vision. In terms of reducing CO₂ from vehicles, the key messages highlight the need to reduce CO₂ from HDVs, with a first step ensuring there is an appropriate method for evaluating their CO₂ emissions (whole vehicle rather than engine). In terms of reducing pollutant emissions, key messages mention the need for a new test cycle and test procedure for measuring fuel consumption and emissions that is more representative of real-world driving. It is suggested that this should be complemented by measures controlling in-use vehicle emissions with the aim of delivering a timely reduction of real-world pollutant emissions and therefore contributing

to improved air quality. Again, these aims to reduce CO₂ emissions from vehicles, but recognising the need to address lack of appropriate HDV data, are coherent with the CVD.

The **Strategy for reducing Heavy-Duty Vehicles' fuel consumption and CO₂ emissions** (European Commission 2014) sets out a clear, coherent policy framework for stakeholders, indicating likely regulatory developments, thereby facilitating decision-making and investment planning. The main objective of the Strategy is to curb HDV CO₂ emissions in a cost-efficient and proportionate way for stakeholders and society. Key short-term actions include a series of initiatives foreseen in the Transport White Paper reinforcing existing EU policies that directly or indirectly contribute to curbing HDV fuel consumption and CO₂ emissions; and an action to address the identified knowledge gap by measuring HDV fuel consumption and CO₂ emissions, as well as certifying and reporting newly registered vehicles' CO₂ emissions – with plans for the Commission to make legislative proposals to this end in 2015. Whilst CVD aims to promote clean and energy-efficient vehicles, it is hindered, in part, by the lack of data for HDVs. Therefore forthcoming legislation in this area, including addressing this data gap, will be of assistance when applying the CVD in the future.

The **Sustainable Development Strategy** (Council of the EU 2006): sets out a number of high level objectives that are coherent with the Clean Vehicles Directive, including aiming to ensure high level of protection and improvement of the quality of the environment; to prevent/reduce environmental pollution whilst promoting sustainable consumption; and to increase global market share in the field of environmental technologies and eco-innovations (thus promoting competitiveness), while respecting the limits of the planet's natural resources.

The **Thematic Strategy on Air Pollution** (European Commission 2005) was launched by the Commission in 2005 in order to make progress towards a long-term EU objective: "*to achieve levels of air quality that do not result in unacceptable impacts on, and risks to, human health and the environment*". The strategy set out intentions to simplify air quality legislation (see Air Quality Directive 2008/50/EC below). With regards to transport in particular, the Strategy aimed to encourage a shift towards less polluting modes of transport, alternative fuels, reduced congestion and the internalisation of externalities into transport costs. The aims of the CVD are coherent with the intentions of the strategy, in terms of aiming to reduce air pollutant emissions, and encouraging a shift towards less polluting modes of transports/use of alternative fuels.

The **7th Environmental Action Programme (EAP)** (European Commission 2013) sets out three priority objectives which include to protect, conserve and enhance the Union's natural capital; to turn the Union into a resource-efficient, green and competitive low-carbon economy; and to safeguard the Union's citizens from environment-related pressures and risks to health and well-being.

Clean Air Programme for Europe (European Commission 2013) aims to propose legislation to reduce harmful emissions in the longer term which contribute to poor air quality and damage the natural environment. It also aims to promote measures that also mitigate atmospheric warming and climate change. The measures set out in the strategy build upon those originally set out in the Thematic Strategy on Air Pollution (European Commission 2005). As Member States have struggled to comply with air quality standards, the strategy also aims to tackle the reasons for the wide-spread non-compliance. Where Options 1 and 2a of the CVD are applied and tailored to local needs, the CVD will enable local authorities to address air quality concerns. However, as mentioned earlier, there may be issues with using the monetisation methodology (Option 2b) if air quality is a particular objective that an authority is aiming to address (if diesel vehicles are selected).

European Energy Security Strategy (European Commission 2014) includes short term measures to help Member States cope with supply risks (e.g. increasing stocks, developing emergency infrastructure, reducing short-term energy demand and switching to alternative fuels). Medium to long-term challenges are also covered, including increasing energy

efficiency and reaching the proposed 2030 energy and climate goals, as well as other measures to improve infrastructure and the internal market. The strategy states that the EU's dependency on oil needs to be reduced, in particular in the transport sector. Therefore in order to reduce EU energy dependence, substantial changes to the energy system in the medium to long term, including calls for shifting to alternative fuels and improving energy efficiency in transport, are required. The CVD is coherent with the objects of the strategy, including working towards reducing the EU's dependence on oil.

Whilst the CVD appears to be largely complementary to the objectives of the overarching strategies, it is the unintended outcomes of applying the provisions of the CVD (i.e. the monetisation methodology), that are contradictory in some instances, particularly where overarching strategies are aiming to be technology neutral, or specifically encouraging the uptake and use of alternatively fuelled vehicles.

CO₂ legislation

There are a number of important supply- and demand-side measures that affect CO₂ from road transport vehicles in the EU.

Supply-side CO₂ measures

In terms of CO₂ the main EU supply-side legislation is in the form of the Light Duty Vehicle (LDV) CO₂ Regulations for passenger cars and vans:

- **Passenger car CO₂ Regulation (443/2009)** (European Commission 2009): sets a fleet-wide average target of 130 gCO₂/km for new passenger cars to be met by 2015, and a target for 2021 of 95 gCO₂/km.
- **LCV CO₂ Regulation (510/2011)** (European Commission 2011): sets a fleet-wide average target for new light commercial vehicles of 175 gCO₂/km by 2017 and 147 gCO₂/km for 2020.

General objectives for the Regulations include providing a high level of environmental protection, improving energy security and fostering the competitiveness of the European automotive industry and encourage innovation in fuel efficiency technologies. The CVD works alongside these Regulations as one of two main EU-level demand-side measures. As supply-side measures, the Regulations aim to reduce the average CO₂ emissions from new passenger cars and vans, whereas the CVD aims to stimulate the public procurement of cleaner and more energy efficient vehicles.

Demand-side CO₂ measures

As mentioned, the CVD is one of two main demand-side measures, which aim to reduce CO₂ emissions through influencing the demand for certain vehicle types (it also aims to address air pollutant emissions). The second main demand-side measure is the Car CO₂ Labelling Directive.

Directive relating to the availability of consumer information on fuel economy and CO₂ emissions in respect of the marketing of new passenger cars ("Car CO₂ Labelling Directive" - 1999/94/EC) (European Commission 1999): requires fuel economy and CO₂ performance information to be publicly provided for all new cars on sale (European Commission, 1999). The objectives are therefore to raise consumer awareness on fuel economy and CO₂ emissions of new passenger cars offered for sale or lease in the Union in order to: enable more informed purchase decisions; influence consumer choice in favour of cars which use less fuel and thereby emit less CO₂; and to encourage manufacturers to take steps to reduce the fuel consumption of the cars they manufacture.

Both the CVD and the Car CO₂ Labelling Directive encourage the demand for, and uptake of clean and energy-efficient vehicles. The CVD uses public procurement as a mechanism to stimulate the uptake of low carbon vehicles, helping to develop an early market for such vehicles and to bring down costs, whereas the Car CO₂ Labelling Directive does this through

aiming to improve consumers' knowledge, enabling them to differentiate between vehicles and demand better fuel efficiency. The CVD therefore complements rather than replicates this legislation.

In addition to the Car CO₂ Labelling Directive, the majority of Member States use fiscal instruments at the national level to reduce CO₂ from road transport vehicles, such as vehicle taxation, which aim to have an effect on vehicle demand. Twenty EU Member States currently apply some form of CO₂ tax to the registration and/or ownership of passenger cars (ACEA 2015). Again, the CVD can be viewed as complementary to these national measures, and can work in parallel in order to stimulate the purchase of clean and energy efficient vehicles.

Infrastructure, fuel, and energy carrier policies

There are a number of policies relating to infrastructure, fuel and energy carriers which are of relevance when considering clean and energy efficient road transport vehicles. These include the following:

Directive on the deployment of alternative fuels infrastructure (2014/94/EU) (European Commission 2014): sets out a common framework of measures for the deployment of alternative fuels infrastructure with the objective of minimising dependence on oil and to reduce the environmental impact of transport. The Directive sets out minimum requirements for alternative fuel infrastructure (including recharging points for electric vehicles, refuelling points for natural gas and hydrogen), as well as setting out common technical standards for equipment needed and user information. This Directive supports the CVD through ensuring that the relevant alternative fuel infrastructure is in place to support an increase in the share of alternatively-fuelled road transport vehicles, further promoting their uptake and use.

The **Renewable Energy Directive (RED) (2009/28/EC)** (European Commission 2009) established a common framework for the production and promotion of energy from renewable sources (European Commission, 2009). The goal related to a share of energy from renewable sources in the transport sector was increased to at least 10% of final energy consumption by 2020 under the RED. The **Fuel Quality Directive (FQD) (2009/30/EC)** (European Commission 2009) established minimum specifications for petrol and diesel fuels for use in road and non-road mobile applications for health and environmental reasons. This includes targets for reducing the GHG intensity of transport fuels by 2020, as well as facilitating lower air pollutant emissions. Article 7a of the FQD requires fuel suppliers to reduce the greenhouse gas intensity of energy supplied for road transport (Low Carbon Fuel Standard).

The Renewable Energy Directive and Fuel Quality Directive complement other supply-side legislation in promoting the reduction of CO₂ emissions from transport (at various stages in the life cycle) and diversification of transport fuels (thus supporting energy security), and all can be considered coherent with the CVD.

End-of-Life vehicle policies

There are two main end-of-life policies. The **End-of-Life Vehicle (ELV) Directive (2000/53/EC)** (European Commission 2000) aims to primarily prevention or reduce waste from vehicles. This Directive requires that an average of at least 80% of the mass of an ELV is to be reused or recycled and another 5% or more of its mass is energetically recovered in each EU Member State. In 2015 the rates will increase to 85% and 10%, respectively.

Directive 2006/66/CE (European Commission 2006) on batteries requires a recycling rate of 50% for electric vehicle Lithium-Ion batteries. It also requires the recycling of 65% by average weight of lead-acid batteries and accumulators, including the recycling of the lead content to the highest degree that is technically feasible while avoiding excessive costs. The Directive does not specifically address nickel-metal hydride batteries that are sometimes used in hybrid cars.

The CVD is focussed on the 'in use' phase of a vehicle's life cycle, whereas the ELV Directive and Directive 2006/66 are focussed on the 'disposal' phase. However, potential conflicts may be identified with regards to the technology choices available (and promoted via the application of the CVD) to reduce CO₂ emissions and the impacts on recycling and recovery. Encouraging the uptake and use of more energy efficient vehicles may have negative implications for recycling and recovery at the end-of-life stage – in particular, making it more challenging. The treatment of batteries (used in hybrid and electric vehicles) may pose challenges for reaching high levels of recycling in the future. However, significant progress has been made in recent years, with a particular focus on recovering the valuable rare earth elements and a number of developments in Japan, France, Belgium, Germany, the USA and Norway (Optimat 2013). For example, an industrial-scale battery recycling operation (for Li-ion and NiMH batteries) has opened in Germany (Umicore website, accessed January 2015⁵⁸).

Air quality and noise legislation

Regulation 715/2007/EC on type approval ("Euro standards") (European Commission 2007) sets out the Euro 5 and 6 Emission standards for light passenger and commercial vehicles⁵⁹ whereas **Regulation 595/2009** (European Commission 2009) sets out Euro VI for heavy duty vehicles⁶⁰. Further supply-side measures, the Regulations require vehicle manufacturers to achieve the limit values (in mg/km) that have been set out for emissions of a range of pollutants, including carbon monoxide (CO), total hydrocarbons (THC), non-methane hydrocarbons (NMHC), oxides of nitrogen (NO_x), particulate matter (PM) (light duty and heavy duty vehicles), methane (CH₄) and Ammonia (NH₃) (heavy duty vehicles only). Over time, the achievement of increasingly stringent emission standards will support the availability, promotion and penetration of clean and energy efficient vehicles in the European fleet, thus supporting the objectives of the CVD.

The **Air Quality Directive on Ambient Air Quality (AQD)** (2008/50/EC) (European Commission 2008) regulates concentrations of a range of air pollutants, including sulphur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter (PM₁₀, PM_{2.5}), carbon monoxide (CO), ozone (O₃), benzene and lead. Local and regional Member State administrations are required to develop and implement air quality management (AQM) plans in areas where exceedances occur in the air quality limit and target values as set out by the Directive. Whilst the CVD requires that the operational energy and environmental impacts to be taken into account should include emissions of NO_x, NMHC and particulate matter (along with energy consumption and emissions of CO₂⁶¹), the application of the monetisation methodology can result in diesel vehicles being prioritised (see Annex 9) – which could have negative implications for authorities experiencing areas of poor air quality and striving to meet the air quality limit and target values as set out under the AQD (even new Euro 6 diesel vehicles emit higher levels of NO_x compared with new petrol vehicles).

The main aim of the **Environmental Noise Directive (END)** (2002/49/EC) (European Commission 2002) is to "define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise". The Directive aims to provide a basis for developing Community measures to reduce noise emitted by major sources, and specifically identified from road vehicles (in addition to other sources of noise). The CVD complements the END by enabling procurers to consider other environmental impacts, which may include noise.

⁵⁸ http://www.batteryrecycling.umicore.com/supply/HEV_EV/

⁵⁹ Euro 5 came into force in September 2009. Euro 6 standards apply from 1st September 2014 for approval and 1st January 2015 for the registration and sale of new types of cars.

⁶⁰ Euro VI came into force in January 2013 for heavy duty vehicle.

⁶¹ Article 5(2)

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ABBREVIATIONS

ACEA	European Automobile Manufacturers' Association
AEGPL	Association of the European LPG Industry
AFVs	Alternatively Fuelled Vehicles
AQG	Air Quality Guidelines
BEUC	European Consumer Organisation
CEMR (CCRE)	The European Network for Rural Development (city network)
CLEPA	European Association of Automotive Suppliers
CNG	Compressed Natural Gas
CO ₂	Carbon Dioxide
COMPRO	Common Procurement of collective and public service transport vehicles
CONCAWE	European Oil Company Organisation for Environment, Health and Safety
CVD	Clean Vehicles Directive
DfT	Department for Transport (UK)
EBA	Euro Biogas Association
EBB	European Biodiesel Board
EBTP	European Biofuels Technology Platform
ECF	European Climate Foundation
EEV	Enhanced environmentally friendly vehicle
EHA	European Hydrogen Association
EIB	European Investment Bank
EMTA	European Metropolitan Transport Authorities
ERTRAC	European Road Transport Research Advisory Council
EU	European Union
EU-28	28 Member States of the European Union
FCH-JU	Fuel Cells and Hydrogen Joint Undertaking
FIA	International Automobile Federation
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPP	Green Public Procurement
IA	Impact Assessment
ICLEI	Local Governments for Sustainability (city network)
IPCC	Intergovernmental Panel for Climate Change
IRU	International Road Transport Union
JAMA	Japan Automobile Manufacturers' Association
KAMA	Korea Automobile Manufacturers' Association
kg	Kilogram
km	Kilometre
LDV	Light Duty Vehicles
LPG	Liquefied petroleum gas
MJ	Megajoule
MS	Member State
NGVA	Natural & Bio Gas Vehicle Association
NO _x	Nitrogen oxides NO and NO ₂
NMHCs	Non-Methane Hydrocarbons
POLIS	Network of European Cities and Regions for innovative transport solutions
PROCURA	Green Fleet Procurement Models
PSOs	Public Service Obligations
REFIT	REGulatory FITness and performance programme

Ex-Post Evaluation of Directive 2009/33 on the promotion of clean and energy-efficient road transport vehicles

SCM	Standard Cost Model
TED	Tenders Electronic Daily
WHO	World Health Organisation