



Rialtas na hÉireann
Government of Ireland

Ireland

Report on the Implementation of the Alternative Fuels Infrastructure Directive (2014/94/EU)

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Introduction

Article 10(1) of the Alternative Fuels Infrastructure Directive (AFID) requires Member States to submit a report on the implementation of the Directive by 18 November 2019. The report below has been prepared in line with the template provided by the European Commission.

Alternative Fuels Infrastructure Directive

Transport in Europe is almost entirely dependent on oil. To help reduce this dependency and the correlated harmful effects on the environment, the EU Commission developed a sustainable alternative fuels strategy, which identified the slow establishment of supporting infrastructure, along with a lack of associated common technical standards, as major obstacles to market uptake of alternatively fuelled vehicles across the EU. Directive 2014/94/EU was developed to address these issues and was published in November 2014.

Ireland transposed the AFID through the publication of the *National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland 2017-2030*, and through introducing national regulations to set technical specifications and consumer information relating to refuelling/recharging infrastructure. The *Framework* set targets for the development of refuelling or recharging infrastructure; included a Consultation Report and associated Strategic Environmental Assessment reports; and was published in May 2017. The technical regulation was signed into law by the Minister for Transport, Tourism and Sport in December 2018.

Here follows an up-to-date report on the implementation of the AFID in Ireland, outlining legal measures, policy measures, deployment and manufacturing support; research and technological development, targets and objectives and alternative fuels infrastructure developments.

1. Legal Measures

| CATEGORY | No | DENOMINATION | DESCRIPTION | AF FIELD | ALTERNATIVE FUEL | TYPE | TRANSPORT MODE | APPLICATION LEVEL | Start Year | Stop Year |
|--------------------------|----|---|--|----------|------------------|----------------------|----------------|-------------------|-------------------------|--------------------------------------|
| Legislative & Regulatory | 1 | Biofuel Obligation Scheme | Under this Scheme, mineral oil suppliers are required to ensure that 8.695% (by volume) of the motor fuels placed on the Irish market is produced from renewable sources. | AF | Biofuel | Norms & Requirements | Combination | National | 2010 | Plans to increase to 2020 and beyond |
| | 2 | Land Use Planning - National Planning Framework | Land use policy is a key determinant in transport investment decisions at strategic and local level, and implementation of the NPF is central in setting the context for future objectives | AFI | Combination | Permits | Road | National | 2018 | Ongoing |
| | 3 | Development Plan Guidelines | Guidelines being updated to support roll out of AFI through Planning Authority functional areas | AFI | Combination | Norms & Requirements | Road | National | 2007 | Update due 2020 |
| | 4 | Energy Performance of Buildings Directive | Directive is being transposed | AFI | Combination | Norms & Requirements | Road | National | Entered into force 2018 | Transposition due 2020 |

| | | | | | | | | | | |
|----------------|---|--|--|-------------|-------------|---|-------------|----------|---|---|
| | 5 | Climate Action Bill | A new Climate Action (Amendment) Bill will be published | Combination | Combination | Norms & Requirements | Combination | National | 2020 | Ongoing |
| | 6 | Alternative Fuels Infrastructure Legislation | Legislation relating to electric wiring standards and compressed natural gas installation | AFI | Combination | Norms & Requirements | Road | National | Electrical Wiring Standards - Public Consultation launched 2019 | Electrical Wiring Standards - Update due 2020 |
| | 7 | Ban on Sale of new Fossil Fuelled Cars | Legislation to ban the sale of new fossil fuel cars from 2030 and to stop granting NCTs from 2045 is under consideration | AFV | Select: | National targets | Road | National | 2030 (tentative) | 2045 (tentative) |
| Administrative | 1 | Taxation and Revenue Measures | One of the criteria assessed to calculate motor tax in Ireland is CO2 emissions, with lower emitting vehicles qualifying for lower motor tax rates.....also Carbon Tax and NOx tax (disincentivising fossil fuels) | AFV | Combination | AFV Classification on environmental performance | Road | National | 2008 | Ongoing |

| | | | | | | | | | | |
|--|---|-------------------------------|--|-------------|-------------|--|-------------|----------|------|-----------------|
| | 2 | Statutory Instrument | SI 647 of 2018 introduced transposing the terms of the AFID into Irish law | AFI | Combination | EU & international standards implementation | Combination | National | 2018 | N/A |
| | 3 | Planning Guidance | Guidance will be issued to planning authorities to ensure a consistent and future proofed approach to the rollout of EV charging infrastructure through planning decisions | AFI | Electricity | Certification of the environmental performance of businesses | Road | National | 2020 | N/A |
| | 4 | Clean Vehicles Directive | Minimum Procurement Targets for low-emission 'clean' vehicles | AFV | Combination | EU & international standards implementation | Road | National | 2021 | Targets to 2030 |
| | 5 | National Adaptation Framework | NAF placed adaptation on a statutory footing and required the development of 12 Sectoral Adaptation Plans and 31 Local Authority Adaptation Plans | Combination | Combination | Other | Combination | National | 2018 | Ongoing |

1.1 Biofuel Obligation Scheme

The *Biofuels Obligation Scheme*, introduced in 2010, places an obligation on fuel suppliers in the road transport sector to ensure that a certain proportion of all fuel supplied is from renewable sources. It is a certificate based *Scheme*, administered by the National Oil Reserves Agency, where certificates are issued in respect of volumes of biofuel which are placed on the market. In order to be issued certificates, compliance with strict sustainability criteria must be demonstrated. Two certificates are awarded for each litre of biofuel produced from specified sources (including wastes and residues) with one certificate awarded per litre biofuels produced from other sources (generally crops). For each calendar year, a fuel supplier must hold sufficient biofuel obligation certificates to demonstrate compliance. The number of certificates required is determined by the biofuel obligation rate.

The biofuel obligation rate is the number of biofuel certificates that must be held by each supplier in a given year as a percentage of the total transport fuel placed on the market in litres. The level of obligation has increased over time from an initial rate of 4% by volume; since the start of 2019, the obligation rate is set at 10% by volume. This means that for every 90 litres of fossil-based road transport fuel placed on the market, 10 certificates must be held. This rate is set in legislation as 11.111% which is calculated as the number of certificates (i.e. 10) divided by the litres of fossil-based road transport fuel (i.e. 90). From 1st January 2020, the obligation will increase to 11% by volume which is set in legislation as 12.359% corresponding to 11 certificates per 89 litres of fossil fuel.

There has been a very high level of compliance with the *Biofuels Obligation Scheme*. This is ensured through the requirement to pay a compliance fee (referred to as a 'buy-out charge' in legislation) when an obligated party does not meet its obligation. The compliance fee is set at a level of €0.45 for each certificate that a supplier is short of their obligation. The [Biofuels Obligation Scheme Annual Report 2018](#), published in May 2019 reported that circa 216 million litres of sustainable biofuels were placed on the Irish market. This was made up of approximately 162 million litres biodiesel (blended with diesel) and 54 million litres of bioethanol (blended with gasoline). A key feature of the *Scheme* is that the cost of increasing

the level of biofuels is socialised across the road transport sector through the obligation (and therefore the cost) being placed on all road transport users of petrol and diesel.

Public views were recently sought in relation to the development of the *Biofuels Obligation Scheme* for the period 2021 to 2030 and the implementation of the biofuel elements of the recast *Renewable Energy Directive*. Input was sought on a number of questions including the scope of the obligation, the level of renewable energy in the transport sector in 2030, the trajectory to that point, methods of meeting an increased obligation, the introduction of an additional obligation for advanced biofuels, technical challenges, cost impacts and the potential to move to an energy basis for calculating the obligation. The [public consultation](#) closed on Friday 15 November 2019. It is anticipated that the outcome of the consultation will provide certainty to industry in relation to the *Scheme* out to 2030.

In addition, the *Low Emission Vehicle Taskforce* (see Section 2.2.F) highlighted that the development of the *Biofuels Obligation Scheme* presents a key opportunity to provide a pathway for the decarbonisation of fuels used by compressed/liquid natural gas and hydrogen fuelled vehicles. It was recommended that the development of the *Obligation Scheme* be prioritised to support indigenous biomethane (for use in compressed natural gas (CNG) and liquefied natural gas (LNG) vehicles) and renewable hydrogen in the transport sector as a core element for the period 2021-2030 thus ensuring indigenous fuels could potentially contribute to the overall national renewable target set as part of the *National Energy and Climate Plan* (see Section 2.2.E).

1.2 Land Use Planning - National Planning Framework

Transport policies aimed at reducing travel demand and travel distances can only be delivered if there are effective spatial policies in place. The location of schools, jobs, shops, local services and other land uses relative to the location of residential developments are critical determinants of the need to travel, the distances to be travelled and the modes of transport chosen. Additionally, the provision of sustainable transport alternatives can only be effective if

matched with complementary development patterns which support and facilitate their use. Future investment in new public facilities must take account of the need for access without reliance on the car. Public transport use and modal shift should be encouraged through efficient planning. The implementation of the [National Planning Framework: Ireland 2040 - Our Plan](#), will be central in setting the context for future national planning objectives and will ensure that all future land use and transport planning is fully aligned to successfully influence how people travel. Land use policy is a key determinant in transport investment decisions at both the strategic and local level.

The *National Planning Framework* has set National Strategic Outcomes for *Sustainable Mobility* (NSP 4) and the *Transition to a Low Carbon Climate and Climate Resilient Society* (NSO 8). The Government has identified the transition to EVs and other LEVs as a critical factor in delivering these outcomes;

- The provision of adequate charging infrastructure is a key enabler for the growth of EVs. The Government's vision is that, where feasible, EVs are charged primarily where they are parked overnight and that supplementary charging opportunities are made available at suitable locations and destinations where vehicle parking is provided and along key travel routes;
- The cost of retrofitting charging infrastructure to existing homes, businesses, car parks and other locations can be a barrier to its installation and therefore to the transition to EVs. Consequently, it is vital that Local Authorities should ensure that provision is made for EV charging within their *Development Plans*, particularly at the point of development and construction; and
- The provision of adequate fuelling infrastructure nationally for other LEVs (such as CNG, LNG and hydrogen) should be facilitated, where appropriate, to support the uptake of these vehicles and their rollout nationally.

1.3 Development Plan Guidelines

In Ireland all Planning Authorities are required to have a *Development Plan* for their functional area (under Section 9 of the *Planning and Development Act 2000* (2000 Act)). *Development Plan Guidelines*, which are issued by the Irish Government, are currently under review. The *Development Plans* are already required to support the promotion of measures to reduce greenhouse gases and address necessity of climate change adaptation; some planning authorities already have reference to measures that support the roll out EV infrastructure.

To integrate LEV (both EV and alternative fuels) further into *Development Plans* the *Low Emission Vehicle Taskforce* recommended that the *Development Plan Guidelines* be updated to include:

- references to evolving Government LEV policies to support the roll out of LEV infrastructure through Planning Authority functional areas;
- make certain adequate numbers of EV charging points are installed and provision is made (e.g. through the installation of ducting) for future installation of EV charging points at all appropriate locations where parking is provided for passenger vehicles (including homes, businesses, on street and car parks);
- safeguard that adequate numbers of public EV charging points are '*accessible for all*'; and ensure locations that cater for traditional fuelling of vehicles (i.e. filling stations) provide charging for EVs and, where applicable and in line with Government policy, fuelling for other LEVs.

Planning authorities can play an important role in future proofing the need for EV charging infrastructure through the planning process. A planning authority can attach conditions to grants of permission for developments by requiring the installation of EV charging infrastructure. The *LEV Taskforce* therefore recommended that guidance should be issued to all planning authorities to ensure a consistent and future proofed approach to the rollout of EV charging infrastructure through planning decisions.

The current planning system enables the development of charging infrastructure for EVs by specifically exempting the requirement to obtain planning permission for the construction or erection of EV charging points. The *Taskforce* recommended that draft regulations be presented to the Houses of the Oireachtas for approval to future proof existing provisions in the *Planning and Development Regulations 2001*, exempting specified EV charging infrastructure from the requirement to obtain planning permission.

There is no planning exemption for the development of gas infrastructure for the purpose of fuelling vehicles. The location of fuelling infrastructure is tightly controlled and multiple Government bodies are required to grant permission for fuelling stations with regard to planning, health and safety and licensing.

1.4 Energy Performance of Buildings Directive

The revised *Energy Performance of Buildings Directive* (EPBD) has new provisions which aim to accelerate deployment of EV recharging infrastructure. The *EPBD* requirement (as per table below excluding bold text for 2025 provision) for recharging infrastructure will be included in an amendment to Part L of the *Building Regulations for New Buildings and Buildings undergoing Major Renovation*. Article 8 of the Directive requires the implementation of appropriate infrastructure, to enable the installation at a later stage of recharging points for EVs, for new residential buildings and residential buildings undergoing major renovation, by 2020. It also requires that Member States shall lay down requirements for the installation of a minimum number of recharging points for all non-residential buildings with more than 20 parking spaces, by 2025.

| Scope | MS Obligation | |
|---|--|--|
| New Buildings and Buildings undergoing Major renovation | Non-residential buildings with more than 10 no. parking spaces. | <ul style="list-style-type: none"> - Ensure the installation of at least 1 no. recharging point; and - Ensure the installation of ducting infrastructure for at least 1 in 5 no. parking spaces. |
| | Residential buildings with more than 10 no. parking spaces. | Ensure the installation of ducting infrastructure for every parking space . |
| Existing Buildings | Non-residential: All buildings with more than 20 no. parking spaces | Lay down requirement for the installation of a minimum number of recharging points – applicable from 2025 |

The amendment to the *Building Regulations* will set out the minimum obligations for EV enabled charging points. The minimum number of charging points required for existing buildings will be determined as part of the *Regulatory Impact Assessment* for the transposition of *EPBD*.

The 2025 requirements will not be included under the building regulations transposition in 2020 as it is not related to works to the building and will need to be implemented under a separate Statutory Instrument. The amendment to Part L of the *Building Regulations* where the EV charging requirement for *New Buildings and Buildings undergoing Major Renovation* is set out will also refer to the accessibility of charging units to take account of persons with disabilities. As part of the transposition of *EPBD*, there will be a stakeholder engagement/public consultation during Q4 2019. This engagement will inform the level at which *EPBD* will be transposed and set out the requirements for EV infrastructure within the curtilage *New Buildings and Buildings undergoing Major Renovation*.

1.5 Climate Action Bill

In June 2019, the Government published the [Climate Action Plan](#) (see Section 2.2.A), which commits to bring forward a new *Climate Action (Amendment) Bill* for publication in Q1 2020.

The objective of the new *Bill* is to provide for a strengthened statutory framework for continual long-term planning for the realisation of Ireland's 2050 vision, enforcing climate targets and reporting progress on the way.

The *Climate Action Plan* identifies clearly a number of provisions to be incorporated in the new *Amendment Bill*. These include:

- Establishing the 2050 target in law;
- Making the adoption of carbon budgets a legal requirement;
- Requirements for the setting of decarbonisation target ranges for each sector;
- Establishing the Climate Action Council as a successor organisation to the Climate Change Advisory Council;
- Requirement that the Climate Action Plan should be updated annually;
- Requirement that a Long-Term Climate Strategy should be published; and
- Ensuring that the proposed governance arrangements retain sufficient flexibility to allow necessary reorientation of policy in the light of changing technologies, circumstances, challenges and opportunities over the period to 2030 and beyond.

The 2050 objective will be retained from the current *2015 Act*, and this will provide the basis for outlining national plans or frameworks that will be statutorily underpinned. Under the *Bill*, the Government will develop the targets that are set out in the *Climate Action Plan* to adopt a system of carbon budgets, which will govern three five-year periods. A carbon budget will be the total amount of emissions which can be emitted during a five-year period and may be calculated on an economy-wide basis i.e. the Emissions Trading System (ETS) and the non-ETS sectors.

Once the Dáil has agreed the overall carbon budgets, the Minister for Communications, Climate Action and Environment will propose a decarbonisation target range for each sector within the ceiling of the adopted carbon budgets, as well as an annual trajectory target range for each

sector, for adoption by Government. Where there is any deviation from the carbon budgets set, or a sectoral target range, following a report by the Environmental Protection Agency (EPA), the Minister with primary responsibility for the sector shall report said deviation and the reasons for same to the Oireachtas Climate Action Committee, set out the measures planned to rectify the shortfall, and respond to any recommendation made by the Committee within three months. Where a sector has caused a significant cost to the Exchequer arising from the purchase of emissions allowances from other countries, the costs of purchasing allowances will be taken from that Department's budget.

The Ministerial responsibility for the target ranges and carbon budgets set should force greater actions within the sectors involved and it is therefore likely that a corresponding increase in policies and incentives to accelerate the uptake of climate friendly practices will be seen, such as the uptake of alternatively fuelled vehicles. As per Action 4 of the *Climate Action Plan*, the *Climate Action (Amendment) Bill 2019* must be published by Q1 2020.

1.6 Alternative Fuels Infrastructure Legislation

A. Electrical Wiring Standards

Restricted Electrical Works under the *Electricity Regulation Act 1999* are defined as electrical works that can only be carried out and must be certified by a Registered Electrical Contractor (REC). Restricted Electrical Works encompass most electrical works in a domestic premise. From 01 October 2013, anyone wishing to carry out Restricted Electrical Works must be registered with *Safe Electric*. Parties that carry out Restricted Electrical Works, but are not registered under the *Safe Electric Scheme*, will be subject to prosecution.

The *Scheme* is operated by the Register of Electrical Contractors of Ireland (RECI) on behalf of the Commission for Regulation of Utilities (CRU). It is a requirement of registration with *Safe Electric* that members agree to comply with the *Wiring Rules*. RECs on the *Scheme* are inspected and ultimately non-compliance with the rules may lead to disciplinary action

including fines and revoking of membership. Further information is available at <https://safeelectric.ie/help-advice/controlled-restricted-electrical-works/>.

Those installing EV rechargers must comply with the *Wiring Rules*; the *Rules* cover all types of installation up to 1,000 volts including domestic, commercial and industrial installations. The *Rules* are in the process of being updated and will explicitly contain a section (provisionally titled *Part 722 Supplies for Electric Vehicles*) outlining best practices and the standards to which EV rechargers must be safely installed.

B. Compressed Natural Gas (CNG) Installation Legislation

Under the *Gas (Interim) (Regulation) Act 2002*, the Commission for the Regulation of Utilities (CRU) may grant to a person the licence required to carry out the supply or shipping of natural gas or the operation of a transmission system, a distribution system, an LNG facility or a natural gas storage facility. As part of the licence application, under Section 9 of the *Electricity Regulations Act 1999*, as amended, the *Gas Safety Framework (GSF)* requires that a safety case is submitted to the CRU for acceptance. In their safety case, undertakings must demonstrate that they are managing the safety risks associated with their operations, to a level that is As Low As Reasonably Practicable (ALARP). Safety case and ALARP guidance are available on the [CRU website](#).

It is of note that the CRU's decision paper, *Compress Natural Gas for Vehicular Transport: Licensing Arrangements CER/16/154* clarifies that a supply licence is not required for 'own use' of CNG where the CNG is not supplied to customers and consequently a safety case is not required to be submitted to the CRU for acceptance in this case.

1.7 Ban on Sale of new Fossil Fuelled Cars

Action 80 of the *Climate Action Plan* calls for the introduction of legislation to ban the sale of new fossil fuel cars from 2030 and to stop the granting of National Car Tests (NCTs) for fossil fuel cars from 2045. It is illegal to drive a vehicle 4 years and older without a valid NCT,

therefore under this action it would no longer be permitted to drive fossil fuelled cars in Ireland post-2045. Ireland's Attorney General must assess the legal impacts of the introduction of such a measure before work can be undertaken on legislating for this Action; however it indicates the policy direction being taken in Ireland to encourage a move away from fossil fuelled vehicles towards alternatively fuelled vehicles and other sustainable modes of transport.

1.8 Taxation and Revenue Measures

A. Motor Tax

Motor tax is a legal requirement for the vast majority of drivers in Ireland. It is a charge imposed by the Government on most motor vehicles and is collected by local authorities. One of the criteria on which a vehicle is assessed for motor tax is which CO₂ emission band it falls under. A [list](#) of the CO₂ emissions bands shows that for zero emission vehicles, such as Battery Electric Vehicles (BEVs), the lowest rate of motor tax (€120 per annum) applies. This annual rate increases as vehicle CO₂ emissions increase, to the highest rate of €235 per annum for the highest emitting vehicles.

B. Vehicle Registration Tax

Vehicle Registration Tax (VRT) is paid whenever a car is registered for the first time in Ireland. Electric vehicles (EVs) receive VRT relief of up to €5,000. VRT relief is in place for BEVs until the end of 2021 and for plug-in electric vehicles (PHEVs) and conventional hybrids until end of 2020.

C. Carbon Tax

As well as tax incentives, Ireland is also introducing punitive tax measures related to fossil fuels. The *Climate Action Plan* states that carbon tax in Ireland will rise to at least €80 per tonne by

2030. As a first step towards this target, the Irish Government recently announced an increase of €6 per tonne on the price of carbon, increasing the current level of carbon tax from €20 to €26 per tonne. It is expected that this increase will generate €90 million in 2020, the entirety of which will be ring-fenced to fund new climate action measures.

D. NO_x Tax

In addition, from January 1st 2020 a new tax based on a vehicle's nitrogen oxide emissions will be applied to new car purchases and used imports. This is aimed at replacing a 1% diesel surcharge and will apply to both petrol and diesel vehicles. The level of this tax is outlined [here](#).

E. Accelerated Capital Allowance

The *Accelerated Capital Allowance* (ACA) is a tax incentive scheme, introduced in 2008, that promotes investment in energy efficient products and equipment. It is based on the long-standing 'Wear and Tear Allowance' for investment in capital plant and machinery, whereby capital depreciation can be compensated through a reduction in an organisation's tax liability.

The *ACA Scheme* allows a sole trader, farmer or company that pays corporation tax in Ireland to deduct the full cost of the equipment from their profits in the year of purchase. As a result, the reduction in tax paid by the organisation in that year is currently 12.5% of the value of capital expenditure. By contrast, the Wear and Tear Allowance provides the same tax reduction, but this is spread evenly over an eight-year period.

Currently, EVs, natural gas vehicles and their related recharging/refuelling equipment qualify for the *ACA Scheme*. The equipment purchased must be new and bought for use in a trade. It cannot be leased, let or hired to any person, body or organisation. The *Scheme* was originally due to run until 2020, however there is scope to extend it.

F. Minimum Excise Duty Rates

In Budget 2015 the excise rate for natural gas and biogas as a propellant was set at the current EU minimum rate (€2.60 per GJ) and a guarantee given that this rate would be held for a period of eight years. This rate puts CNG in a competitive price position with diesel.

The *Phase 2 Progress Report of the LEV Taskforce* (Section 2.2.F), which was approved by Government in October 2019, contained a recommendation to consider extending the low excise rate on natural gas as a vehicle fuel to allow for delays to infrastructure provision and to allow for vehicle purchase decision cycles; and similarly to apply the appropriate minimum excise rate for hydrogen for the same timeframe.

G. Benefit In Kind

A new Benefit in Kind relief for EVs was introduced in Ireland in 2018. A benefit-in-kind (BIK) is any non-cash benefit of monetary value that is provided by an employer to their employees. In the case of the provision of a vehicle, employees must usually pay certain taxes towards the private use of the vehicle, such as travel to and from work.

Where an electric car has been provided, no charge to BIK arises on the first €50,000 of the original market value of the car. For cars over €50,000 in value, a partial exemption is available which is granted by reducing the value by €50,000 when calculating the cash equivalent of the car.

1.9 Statutory Instruments

Publication of the *National Policy Framework* fulfilled the majority of the obligations associated with transposing the AFID. The provisions not addressed through the policy document, such as technical specifications, electricity supply provisions and consumer provisions, were transposed by the making of secondary legislation. The first piece of secondary legislation, [Statutory](#)

[Instrument 477 of 2018](#), amended SI 230 of 2008. This amendment requires the incorporation of values generated through the new WLTP vehicle type approval process on all consumer information material. Amendments under this SI transposed Articles 7(1) and (2) of the AFID. The SI was signed into law by the Minister for Transport, Tourism and Sport in November 2018.

Secondly, [Statutory Instrument 647 of 2018](#), requires infrastructure providers to conform to the various, primarily interoperability, standards set out in the AFID. Enforcement of the provisions relating to EV Charging Infrastructure is assigned to the Sustainable Energy Authority of Ireland (SEAI) and provisions regarding Natural Gas and Hydrogen refuelling will be enforced by the Commission for Regulation of Utilities (CRU). This Statutory Instrument was signed into law by the Minister for Transport, Tourism and Sport in December 2018.

1.10 Clean Vehicles Directive

The *Clean Vehicles Directive* (CVD) sets minimum procurement targets for low-emission ‘clean’ vehicles in all public road transport vehicle contracts including purchases, leases, hire-purchases and rentals. It entered into force on 1st August 2019 and applies to new vehicle contracts over EU procurement thresholds. The *Directive* extends to service procurement contracts in public service obligation (PSO) transport, school transport, mail and parcel transport and refuse collection services. The *Directive* must be transposed into Irish law by the 1st August 2021. Ireland has separate minimum procurement targets for light-duty vehicles (LDVs) and heavy-duty vehicles (HDVs), and these targets are also set for two distinct reference periods to reflect the anticipated rate of technological developments in clean vehicles.

| LDV Targets to 31 December 2025 | LDV Targets 2026-2030 | HDV Targets to 31 December 2025 | | HDV Targets 2026-2030 | |
|---------------------------------------|--------------------------|------------------------------------|-------|--------------------------|-------|
| | | Trucks | Buses | Trucks | Buses |
| 38.5% | 38.5% | 10% | 45%* | 15% | 65%* |

*Zero-emission sub-targets apply

The reduction in carbon emissions arising from the implementation of this *Directive* is expected to be limited as ‘state’ vehicles form a small proportion of the national vehicle fleet, although figures for lease/hire/rental contracts are unavailable. The CVD will help Ireland show public leadership in the transition to alternative fuels. The *National Development Plan* commits Ireland to purchasing no more diesel-only buses for our urban PSO bus fleets while the *National Policy Framework for Alternative Fuels Infrastructure* sets out our ambition that from 2030 all new cars and vans sold will be zero-emission or zero-emission capable. The CVD will push us towards achieving these targets. In addition, alternative fuels infrastructure will improve to support the increased number of alternatively fuelled vehicles on Irish roads.

1.11 National Adaptation Framework

In tandem with mitigation measures, the *Climate Action Plan* includes climate adaptation measures to ensure that the State is ready to protect people from climate-related risks such as precipitation, floods and storms. These measures build upon the *Climate Action and Low Carbon Development Act, 2015* and ensuing *National Adaptation Framework (2018)*, which placed adaptation planning on a statutory footing and required the development of 12 Sectoral Adaptation Plans and 31 Local Authority Adaptation Plans. This included the preparation of plans to safeguard critical infrastructure networks (transport, communications and energy networks) from the negative effects of climate change.

The *Sectoral Adaptation Plan for Transport Infrastructure* was published in October 2019. It sets out a number of actions to ensure that future infrastructural projects undertaken by transport agencies (including alternative fuels infrastructure installed by transport service providers) will recognise the need to ensure resilience to the projected changes to Ireland’s climate. Under Action 17 of the *Plan*, it is expected that climate resilience will be incorporated in the update to the *Common Appraisal Framework*, which appraises and evaluates transport investments in accordance with the Public Spending Code. Furthermore, the Department of Communication, Climate Action and the Environment has committed to consider climate resilience as a criterion

for evaluation of projects awarded funding in future calls under the *Climate Action Fund*; such projects may include development of recharging or refuelling infrastructures for alternatively fuelled vehicles.

A *Sectoral Adaptation Plan for Gas and Electricity Networks* was also published in October 2019. This *Plan* sets out sectoral actions for the gas and electricity sector which are directly applicable to alternative fuels infrastructure. Notably, energy networks companies will be obliged to ensure that climate change is taken into account in planning and design standards and engineering management practices.

2 Policy Measures

| CATEGORY | No. | DENOMINATION | DESCRIPTION | AF FIELD | TYPE | INDICATOR | ALTERNATIVE FUEL | TRANSPORT MODE | APPLICATION LEVEL |
|--|------|-----------------------------|--|-------------|--------------------------|-----------|------------------|----------------|-------------------|
| M1 - Measures to ensure national targets and objectives | M1.1 | Fiscal Incentives | EV Purchase Grants; Reduced Tolls; Capital Support for Infrastructure; eSPSV Grant | Combination | Financial incentives | Subsidies | Combination | Road | National |
| | M1.2 | Public Transport | 100% LE buses by 2030 under BusConnects programme | Combination | Non-financial incentives | | Combination | Road | Regional |
| | M1.3 | Procurement | Clean Vehicles Directive; Public Spending Code Reform | AFV | Non-financial incentives | | Combination | Combination | National |
| | M1.4 | National Plans and Policies | Climate Action Plan; Demand Management Study; EV Deployment Roadmap; National Mitigation Plan, National Energy and Climate Plan, LEV Taskforce, National Development Plan, National Aviation Policy, Hydrogen Policy | Combination | Other | | Combination | Combination | National |

| | | | | | | | | | |
|---|------|-------------------|--|-------------|--|--|-------------|------|----------|
| M2 - Measures that can promote AFI in public transport services | M2.1 | Public Transport | Electrification of commuter urban rails; electrification of new PT projects (Metro); | Combination | | | Combination | Rail | Regional |
| | M2.2 | Policy | NDP (sustainable mobility - no diesel buses) | AFV | | | Combination | Road | Regional |
| M3 - Measures that can promote the deployment of private electro-mobility infrastructure | M3.1 | Fiscal Incentives | Domestic Charger Grants; Accelerated Capital Allowance | Combination | | | Combination | Road | National |

2.1 Fiscal Incentives

A. Electric Vehicle Purchase Grant

In Ireland, a number of incentives have been introduced in order to stimulate the growth of EVs. An *EV Purchase Grant* was launched in April 2011, offering a €5,000 grant towards the purchase of a new privately-owned EV. The *Grant* applies to BEVs and PHEVs; the level of the grant depends on the list price of the vehicle.

Commercially bought EVs were originally eligible for a *Purchase Grant* of up to €3,800. It was recently announced that *Grant* would be discontinued for electric cars, due to the fact that the generous benefit-in-kind tax relief that is available for such vehicles (see Section 1.8.G) is considered adequate incentive to drive growth in this sector. The €3,800 grant will continue for companies purchasing electric vans and there will be no change in the level of the private car grant into 2020.

The *Electric Vehicle Purchase Grant* was the first in a suite of incentives for EV drivers which have been announced in recent years (see Appendix 1). Following the introduction of these measures Ireland has seen a sharp increase in the number of EVs on Irish roads, albeit from a low base, reaching over 14,600 by end October 2019 which is approximately double the number at the same point in 2018.

B. Capital Support for AF Infrastructure

B.1: Public Recharging Network

There is currently a public recharging network of approximately 800 charge points across the country, of which more than 70 are fast chargers. These chargers serve over 14,600 EVs as of the end of October 2019. This network of EV chargers was developed by the ESB Network. Funding for the development of the network was suspended for a number of years due to deliberations by the Commission for Regulation of Utilities (CRU) on its future ownership and maintenance. In September 2018, the CRU approved the proposal by ESB Networks for ESB

eCars to operate and maintain the public charging network for the coming years (see Appendix 2).

Under the [Climate Action Fund](#) funding of up to €10 million has been made available to ESB eCars to support the development of a nationwide, state-of-the-art EV charging network. This amount will be matched by ESB to bring the total investment in the project to €20 million. The project aims to develop a nationwide 'state-of-the-art' EV charging network capable of facilitating large-scale EV uptake over the next decade. It is proposed to install over one hundred high powered (150kW) chargers at key locations on the national road network. In addition, subject to planning permission and approval, it is intended to replace one hundred 50kW fast chargers and also to refurbish up to 200 standard (22kW) chargers. This is a multi-annual project expected to commence in 2020 and be fully completed by 2022. This comprehensive expansion and upgrade programme will go some way towards alleviating range anxiety for citizens who are required to undertake longer return journeys.



B.2: Local Authority Recharging Network

An additional programme which will be funded by revenue generated from the recent increase in carbon tax will see €1.5 million allocated for the rollout of up to 2,000 on-street public charge points by Local Authorities. Funding will be made available over the next 5 years (c.400 chargers a year). The scheme caters mainly for EV owners who rely on on-street parking as their primary means of parking near their homes.

Local authorities around the country are already making climate friendly changes in their transport sectors. Two case studies are outlined below.

Case Study A: Fingal County Council

Fingal County Council’s transport fleet is made up of 230 vehicles, which consumed 6.4 GWh of energy in 2017 and accounted for 12% of the Council’s total emissions, due to its reliance on petrol and diesel. Converting the fleet to EVs is essential to reducing these carbon emissions,

and FCC is implementing a replacement programme that aims to electrify its fleet, where possible, by 2030.

To begin this process Fingal County Council added five new EVs to its fleet, in an effort to promote sustainability and tackle climate change. The fully electric Citroen Berlingo vans marked the beginning of Fingal's transition to the electrification of its fleet.



Photo courtesy of Fingal County Council

15 more fully electric vans and 2 3.5T lorries have been purchased by Fingal County Council in 2019 and the first batch are currently being liveried. Delivery is expected in the coming weeks. Twelve charging points for fleet electric charging were also installed across Fingal, where EVs are expected to take just 30 minutes to completely re-charge at these points.

Fingal County Council has also become the first local authority in Ireland to install Integrated EV Charging in its public street light columns for members of the public to use. The new street light charging point was installed on Chapel Lane in Swords, adjacent to County Hall, as a part of a wider project. Its performance and usage is being monitored by the Operations Department staff with a view to rolling out across the region.



Photo courtesy of Fingal County Council

Parking by-laws were amended to take account of EV Recharging Bays in the public realm and are currently in draft format. They are currently being progressed through the area committee's process before going out to public consultation. It is expected that they will be adopted by the full Council in Q1 2020. These are spaces intended for the parking of an EV during recharging and are indicated by means of traffic sign number RRM 035 of the Signs Regulations. Standard parking charges apply depending on location of bays. Separate fees for charging the EV will apply.

FCC has implemented preferential parking and charging locations for alternatively fuelled vehicles both for Fingal staff and visitors and for Fingal's electric fleet vehicles at FCC office and depot locations. FCC has provided designated EV parking only bays with charging infrastructure in all staff car parks. The parking bays are marked for EV parking only.

Case Study B: Mayo County Council

Mayo County Council purchased two electric Citroen Berlingos in September 2018. One is available as a fleet van so all staff have the opportunity to trial an EV for work journeys and the other is in use by Castlebar Municipal District. These vans were also used to ensure the greening of Mayo Day and their use was promoted in the run up to the event and on the day which was attended by around 30,000 people.



Photo courtesy of Mayo County Council

In terms of public awareness, EVs were also on display at the Driving Safer for Longer conference organised by Mayo County Council in May 2019. A crucial element of Mayo CC's fleet policy will be to increase the number of EV vehicles it operates, going forward. Climate Fest, an event co-hosted by Mayo County Council was held on the last week of September 2019 and included a workshop on sustainable travel. Local EV owners spoke about their experiences of owning and using and EV in Mayo. Local car sales companies also had electric cars on display. In relation to infrastructure, there are a number of EV charge points throughout Mayo in conjunction with ESB. There are six Mayo County Council staff EV charge points, which were installed by the end of September 2019. There are also free EV car parking spaces throughout the county at various EV charge points.



Photo courtesy of Mayo County Council

B.3: Small Public Service Vehicle Recharging Network

The public nature of the small public service vehicle (SPSV) fleet, which includes taxis, hackneys and limousines, means the sector has a strong leadership role to play in decarbonising transport. As such, €1.5 million of funding has been earmarked in 2020 to support the installation on SPSV dedicated fast recharging infrastructure at transport hubs around the country, including Dublin Airport and major train stations nationwide. Easier and more convenient charging points should act as a further incentive to encourage taxi drivers to adopt EVs at the earliest opportunity.

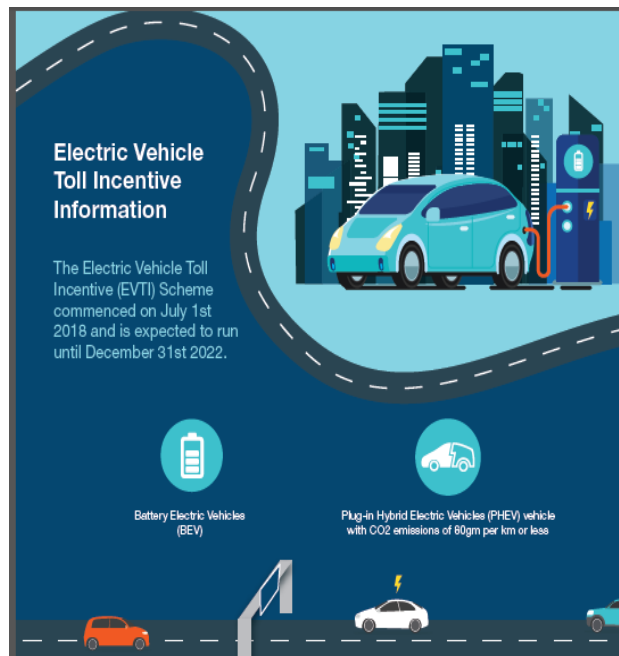
B.4: Domestic Home Charger Grant

The installation of domestic chargers is aided by the Electric Vehicle Home Charger [Grant](#), a government funded support scheme introduced in 2018 which provides a grant up to the value of €600 towards the purchase and installation of a home charger unit. The applicant must be the owner of an eligible new or second-hand EV.

The EV must meet the M1 or N1 classification as defined under the EU Directive 2007/46/EC and the European Communities Whole Vehicle Type Approval Process (ECWVTA). BEVs must have 0g/km tailpipe emissions and a range greater than 100km, while PHEVs must emit less than 75g/km of CO₂ and have an electric only driving range greater than 20km.

C. Electric Vehicle Toll Incentive Scheme

The *Electric Vehicle Toll Incentive Scheme* (EVTI) is an initiative introduced in July 2018 following recommendations by the *LEV Taskforce* (see Section 2.2.F). Transport Infrastructure Ireland (TII) estimated that 340 million tolled journeys were taken in Ireland in 2017 and that approximately 400,000 drivers would be considered ‘heavy toll users’; it was determined, therefore, that a reduced tolling regime could potentially act as a meaningful incentive to encourage private car commuters who regularly use tolled roads to buy low emitting EVs.



Under the *Scheme*, BEVs and PHEVs qualify for 50% and 25% toll reductions respectively up to a maximum of €500 per annum. The *Scheme* is proving popular with regular toll users. As of end August 2019, approximately 54% of EVs in Ireland had registered. This is considered a high percentage given the fact that the toll roads in Ireland are mainly located in the South and East

of the country while uptake of EVs has occurred on a national level. Registered vehicles have made over 450,000 discounted tolled journeys since the *Scheme's* launch.

D. Free Public Charging for EVs

The majority of public chargers in use in Ireland are part of the ESB eCars network. Until recently, there were no fees for using this charging network. Fee-free charging, while an important initial incentive to the early adoption of EVs and signalling public policy support for EV technology was deemed unsustainable going forward as the number of EVs increased. As such, the ESB recently announced that fees will apply to its 50-kW fast chargers from November 18th and intend to implement same for on-street charging from mid-2020. If the consumer opts to pay as they go, the charge for fast charging will be 33 cent per kW. A separate membership option will cost the consumer €5 per month and will have a reduced charging fee of 29 cent per kW.

To give an example of usage, in 2018 the average overall number of transactions per day on all the 'high power chargers' (i.e. fast chargers) on the ESB EV Charging Network was 840, with an average duration of stay of 47 minutes. It is worth noting that during this time, there were no fees for charging on the EV Charging Network, as well as no overstay fee, therefore this data may be skewed. It may change significantly now that pricing is introduced and an overstay fee is in place.

E. eSPSV Grant Scheme

Another initiative which was launched by DTTAS on foot of recommendations made by the *LEV Taskforce* was the *Electric Small Public Service Vehicle (eSPSV) Grant Scheme*. This *Scheme* is funded through the Green Public Transport Fund, established in 2017 to support the uptake of low carbon, energy efficient technologies within the public transport sector (bus, rail and taxi).

The *eSPSV Grant Scheme* aims to support the transition of the national SPSV fleet away from fossil fuelled vehicles towards electricity. The *Scheme* currently offers grants of up to €7,000 towards the purchase of a new fully electric BEV or €3,500 towards a new PHEV for taxis, hackneys and limousines. It is planned that the level of grants for BEVs will increase to up to €10,000 from 1 January 2020. The *Grant* can be used in conjunction with other Government supports for EVs such as the *EVTI Scheme* (see Section 2.1.C) and VRT Relief (see Section 1.8.B).



The first fully electric wheelchair accessible taxi/hackney in Ireland was purchased by a hackney driver in 2018 under the *Scheme*. In order to encourage an increase in electric wheelchair accessible vehicles (WAV) in the taxi fleet, further support will be given to through an extra €2,500 grant for the conversion of an eSPSV to a WAV. This grant will be introduced in 2020 and will be complementary to both the increased eSPSV grant and the existing WAV grant.

Since its launch, over 70 eSPSV Grants have been issued totalling €430,500, including €190,500 to date in 2019. The majority of the grants issued have been for BEVs, meaning that the traditionally diesel fuelled vehicles are being replaced by 100% electric variants.

F. Incentives for Heavy Duty Vehicles (HDVs)

Under the *LEV Taskforce* (see Section 2.2.F) Phase 2, Working Group 4 considered incentives and infrastructure requirements needed to encourage the uptake of non-electric low emission vehicles in Ireland, particularly in the heavy duty vehicle (HDV) sector where electric technology is not quite as advanced as it is for smaller vehicles. HDVs include both heavy goods vehicles (HGVs) and buses/coaches.

Following recommendations outlined in the Phase 2 Progress Report (due to be published shortly), a new Purchase Grant will be introduced for alternatively fuelled HDVs (electric, CNG, LNG and hydrogen fuelled vehicles) to support an increased uptake of low emission vehicles. Under this scheme, grants of up to 30% of the cost differential between a traditional fossil fuelled HDV and an equivalent alternatively fuelled vehicle will be available. It is intended that the purchase grant scheme will be introduced early in 2020.

Additionally, complementary supports such as introduction of a new reduced tolling incentive regime for CNG/LNG/hydrogen fuelled HDVs will be introduced in 2020. This will be modelled on the EVTI Scheme which has been in place for EVs since 2018 (see Section 2.1.C).

2.2 National Plans and Policies

A. Climate Action Plan

Climate disruption is already having diverse and wide ranging impacts on Ireland's environment, society, economic and natural resources. The [*Climate Action Plan*](#), published in June 2019, sets out an ambitious course of action over the coming years to address this issue with an aim to make Ireland a leader in responding to climate disruption. The *Plan* clearly identifies the nature and scale of the challenge it faces. It outlines the current state of play across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and charts a course towards ambitious decarbonisation targets.

The *Plan* will be monitored quarterly and updated annually, with a *Climate Action Plan 2020* published in early next year. This will ensure that the *Plan* is a living document, with new actions being added each year. A Climate Action Delivery Board has been established which will hold each department and public body accountable for the delivery of actions set out in the *Plan*.

Under the *Plan*, every public body will be given a climate action mandate by their line Minister to prioritise climate action and new letters of expectation will issue to semi-state bodies on climate action. In addition, the Minister for Communications, Climate Action and Environment signed a Charter in October 2019 with all 31 Local Authorities in Ireland, committing local government to driving forward meaningful climate action in their communities through the actions set out in the *Climate Action Plan*. These steps will encourage public bodies to further step up to the plate in terms of their own actions.

B. Demand Management Study

The *Climate Action Plan* charts a course towards decarbonisation targets for key sectors including transport with a number of actions and targets which should encourage fewer diesel and petrol cars on Irish roads, particularly in cities. Fewer fossil fuelled cars would have a number of effects in Irish cities, including improved air quality, less congestion and of course, lower levels of CO₂ emissions. In order to encourage the transition away from fossil fuels onto more sustainable forms of transport, Action 81 of the *Plan* calls for:

[The development of] a regulatory framework on low emission zones and parking pricing policies, and provide local authorities with the power to restrict access to certain parts of a city or a town to zero-emission vehicles. Examine the role of demand management measures in Irish cities, including low emission zones and parking pricing policies.

Implementing this commitment, a Demand Management Study will be commissioned by year end 2019, the purpose of which is to understand what measures are available to help address

the impacts of growing transport levels in our major cities (Dublin, Cork, Limerick, Galway and Waterford). The study will look at a range of factors and ultimately should recommend options on how we might better manage travel demand in urban areas.

C. *Electric Vehicle Deployment Roadmap*

Passenger cars account for over half of all land transport emissions in Ireland; therefore a transition to low and zero emission cars is one of the necessary changes if Ireland is to substantially reduce its transport emissions. Accordingly, EVs are a prominent mitigation in the recently published Climate Action Plan, which sets targets of 180,000 EVs on Irish roads by 2025, and 936,000 EVs by 2030. With over 14,600 EVs in Ireland at the end of October 2019, these targets are very challenging and they are indicative of the scale of the transformation that is needed across all sectors if Ireland is to reduce national emissions and reach its legally binding emission ceiling in future years.

It is widely expected that, over the coming years, the combination of:

- Improvements in technology;
- Reductions in vehicle purchase prices;
- Increasing driving ranges and model availabilities, coupled with
- Government incentives and new investment in the recharging network

will maintain the current positive policy environment under which we have seen EV sales rise steeply over the past year, albeit from a low base. Action 79 of the *Climate Action Plan* commits Ireland to developing a *roadmap* on the optimum mix of regulatory, taxation and subsidy policies to drive significant ramp-up in passenger EVs and electric van sales from very early in the next decade. The relevant Departments will be convened by the end of 2019 to pursue this aim.

D. *National Mitigation Plan*

The [National Mitigation Plan](#), which preceded the *Climate Action Plan*, was an initial step aimed at setting Ireland on a pathway to achieve the level of decarbonisation required. It is a whole-of-Government Plan, reflecting in particular the central roles of the key Ministers responsible for the sectors covered by the Plan – Electricity Generation, the Built Environment, Transport and Agriculture, as well as drawing on the perspectives and responsibilities of a range of other Government Departments.

The *Plan* was designed to lay the foundations for transitioning Ireland to a low carbon, climate resilient and environmentally sustainable economy by 2050. It includes over 100 individual actions for various Ministers and public bodies to implement. The Government, publishing this *Plan*, recognised that it does not provide a complete roadmap to achieve the 2050 objective, but began the process of development of medium to long-term mitigation choices for next and future decades.

The Transport section of the *National Mitigation Plan* considered the characteristics and emissions profile of the transport sector in Ireland, looked at how that profile had changed over recent years, and projected how it might help into the future. The Chapter identified and discussed various measures already helping to reduce the level of greenhouse gas emissions associated with the transport sector in Ireland. It also identified a range of potential additional measures with the aim of further intensifying efforts to mitigate emissions from the sector. The key considerations and broad indicative nature of the costs and benefits associated with such measures are also described.

Transport measures under the *Plan* included increasing public transport capacity, incentivising the transition to low-emission vehicles, sustaining the current Biofuels Obligation Scheme, funding Smarter Travel measures, undertaking research and development and implementing the *National Policy Framework on Alternative Fuels Infrastructure for Transport: 2017-2030*.

E. National Energy and Climate Plan

In accordance with the Governance of the *Energy Union and Climate Action Regulation*, Ireland's first *National Energy & Climate Plan (NECP) 2021-2030* is to be submitted to the European Commission by 31 December 2019. A draft of this Plan which was submitted by the end of 2018 took into account energy and climate policies developed to date, the levels of demographic and economic growth identified in the [Project Ireland 2040](#) process and includes all of the climate and energy measures set out in the [National Development Plan 2018-2027](#). The final draft will take into account additional policies and measures within the *Climate Action Plan*. In terms of transport, the NECP outlines trajectories for renewable energy consumption by source from 2017 to 2040. The biofuels in question include biodiesel, bioethanol and electricity.

F. Low Emission Vehicle Taskforce

The *Low Emission Vehicle (LEV) Taskforce* was established in December 2016 to consider the range of measures and options available to Government to accelerate the uptake of low carbon technologies in the road transport sector. The *LEV Taskforce* included representatives from across the public sector and consulted widely with industry, stakeholders and representative groups. The work programme of the *Taskforce* was structured into two distinct phases. The first phase focused exclusively on EVs, including both BEVs and PHEVs. The second phase covered other low emission fuels including CNG, LNG and hydrogen. Each phase was composed of a Steering Group and two Working Groups (WGs) – these WGs considered the following topics:

Phase 1 – Electric Vehicles

Working Group 1: Market Growth Stimuli, Visibility and Public Leadership

Working Group 2: Infrastructure, Energy Regulation and Pricing

Phase 2 – Other Alternative Fuels

Working Group 3: Planning, Building and Leadership

Working Group 4: Incentives and Infrastructure

Both phases of the *Taskforce* have completed their work, and a Progress Report was completed at the end of each phase. The [Phase 1 Progress Report](#) is published and the Phase 2 Progress Report has been approved by Government and is due to be published shortly.

Each Progress Report contained a number of recommendations for consideration by Government aimed at increasing the number of low-emission vehicles and increasing the level of alternative fuel infrastructure in Ireland. The Phase 1 Progress Report recommendations informed the suite of incentives available to EV drivers while it is expected that recommendations made in the Phase 2 Progress Report will lead to the extension of certain incentives to other alternative fuels as well as the creation of additional measures to encourage uptake of low emission vehicles (see Appendix 1).

G. National Aviation Policy

The National Aviation Policy (NAP) recognises the importance of a response to climate change including seeking ways to reduce aviation emissions in order to ensure the sustainable development of international air transport. Ireland's policy to reduce the climate impact of aviation emissions is aligned with the strategies being pursued at EU level and globally by the UN's specialised agency the International Civil Aviation Organisation (ICAO). As such, the NAP promotes actions on a range of measures based on the ICAO's "basket of measures" which includes market-based measures, operational improvements e.g. the optimisation of air traffic management and airport ground operations, supporting development and use of green aircraft technologies and sustainable aviation fuels (SAFs).

In line with Resolutions of the ICAO on climate change, Ireland continues to coordinate an [Action Plan for Aviation Emissions Reduction](#). The Action Plan 2019-2023 is the result of close consultation by DTTAS across the range of aviation stakeholders including State agencies such as the Environmental Protection Agency (EPA) and the Irish Aviation Authority (IAA). The Plan

details the set of measures already underway and in planning by those stakeholders across various streams such as operational measures and investment in green aircraft technology.

On aircraft technology, the two major Irish airlines have invested heavily in newer fuel efficient aircraft over recent years – new engine technologies, lightweight seats, noise mitigation detectors and wing-lets all significantly improve the environmental performance of aircraft compared to earlier models. The data shows that Irish airlines also operate with relatively high passenger load factors meaning carbon emissions, on a per passenger basis, measure favourably when compared with other airlines in Europe.

The State Airports Dublin, Cork and Shannon are actively reducing their year-on-year carbon footprint under the Airport Council International (ACI) Airport Carbon Accreditation scheme. These airports have introduced and are pursuing various infrastructure upgrades designed to improve energy efficiency, lower emissions, lessen noise impacts and improve local air quality. A small sample of these sustainability initiatives include:

- Dublin Airport is actively replacing diesel-powered ground power units, used to power aircraft at rest, with Fixed Electrical Ground Power (FEGP). FEGP is currently available at most of the aircraft contact stands on 3 out of the 4 piers at the airport and the Dublin Airport Authority (DAA) has committed to introduce FEGP on all future (new) stands;
- Shannon Airport has replaced runway lighting with LED lighting and continues to pursue a programme of replacement of ground vehicles with electric vehicles (EVs) where feasible;
- Dublin is committed, and Cork Airports also intends, to become carbon neutral under the Airport Carbon Accreditation Scheme by 2020, through initiatives such as the use and generation of green electricity and various other renewable energy projects. Cork Airport (and Dublin and Shannon) are accredited by ACI at “Level 2 Reduction” status i.e. are successfully reducing overall emissions/carbon footprint year after year; and
- Dublin and Cork Airports, as part of ACI EUROPE, have committed to achieving net zero emissions by 2050 at the latest. This is part of a collective pledge by 194 airports across

24 countries. The resolution means that by 2050 Europe's airports will produce no carbon emissions, without using offsets such as buying carbon credits.

H. Hydrogen Policy

As an island based land transport system with a relatively small vehicles market, especially for new vehicles, there are currently no hydrogen vehicles in use in Ireland and no real suppressed demand for hydrogen vehicles at current market prices. A potential first wave early deployment of sufficient sustainable hydrogen production, three clustered refuellers with c. 100 vehicles in 2022/23 is under consideration by a range of engaged stakeholders potentially with government support. However, even with such an early deployment, a second wave deployment between 2025 and 2030 would also be on an internationally small scale, based on current estimates of production and TCO costs.

2.3 Public Transport

A. Urban Buses

In the urban bus fleet, a clear trajectory towards low-emission has firmly been established. In the short term, the *National Development Plan* committed Ireland to no longer purchase diesel-only buses for the urban public bus fleet from July 2019. In the short-term, a decision was made by the *National Transport Authority* (NTA), which is responsible for procurement of vehicles in the public service obligation (PSO) fleets, to purchase hybrid-electric buses in the short term. Nine hybrid buses have entered into service in Dublin city centre.

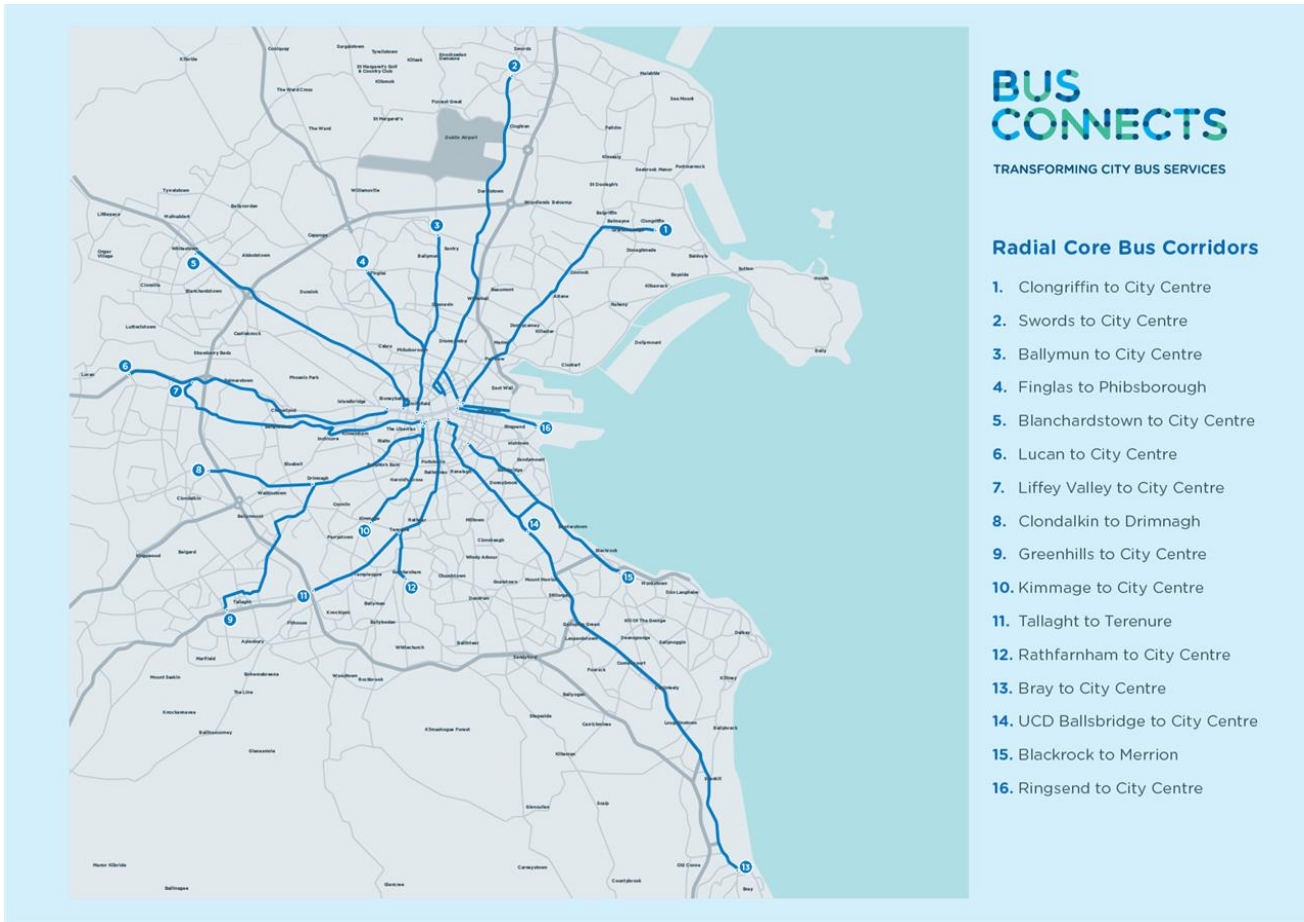
In order to inform future purchasing decisions, a [low emission bus trial](#) was launched in December 2018. The trial assessed full electric, diesel-electric hybrids and compressed natural gas buses. The medium and longer term approach to the procurement of low-carbon buses will be informed by a range of matters, including the outcome of the low-emission bus trials, as well

as the [Sustainable Mobility Policy review](#) and complementary information from trials and demonstrations of lower-emitting buses undertaken in other jurisdictions across Europe.

Under the [National Development Plan](#) 2018-2027, an investment of €8.6 billion has been committed to Public Transport over the 10-year duration of the plan. One of the major projects which will be funded through the National Development Plan is *BusConnects*, a programme to fundamentally transform Dublin's bus system, so that journeys for passengers by bus will be fast, reliable, punctual, convenient and affordable.

It is planned to roll out the *BusConnects* project across all major cities in Ireland, starting in the Greater Dublin Area. This programme is expected to have a transformative effect on the operation of bus services and will improve bus journey times by 40% to 50%; provide a bus service that is easier to use and understand; enable more people to travel by bus than ever before; and provide a network of cycling infrastructure that will enable more people to cycle.

BusConnects also commits to the uptake of low emission vehicle technology in its fleet. A key policy decision is the fuel type and technology to be deployed in support of this commitment. It is anticipated that by 2023, half of the bus fleet (approximately 500 buses) will be converted to low-emission vehicles, with plans for full conversion by 2030. Indicative funding of €2.4bn has been allocated to the *BusConnects* programme, which is currently at public consultation stage.



B. Electrification of commuter urban rails

The DART (Dublin Area Rapid Transit) system is an electrified commuter rail network serving the east coast of Dublin, including its city centre. It stretches from Greystones, Co. Wicklow, in the south to Howth and Malahide in north Co. Dublin. The DART currently serves 31 stations and provided over 35 million passenger journeys in 2018. An estimated €2 billion is earmarked for investment in the *DART Expansion Programme* which will create a full metropolitan area DART network for Dublin and will transition current diesel commuter lines to electricity from the city centre to Drogheda, Co. Louth, to Celbridge/Hazelhatch and Maynooth, Co. Kildare. This will also involve a new interchange station with bus, LUAS (light rail) and planned MetroLink (see Section 2.3.C) networks. Delivery is also expected in 2022 of Ireland’s first diesel-electric trains, which will enable the enlargement of the rail fleet by approximately 300 new rail carriages.

C. Electrification of new public transport projects

Almost €460 million will be invested in light rail projects out to 2021 in Dublin; investments include the Green Line Capacity Enhancement Project which, in addition to the recently completed Luas Cross City project, will add capacity to the light rail network in Dublin through additional and longer trams. Funding has also been allocated to progress a new metro system, *MetroLink*, which will stretch from Swords, north Co. Dublin, to Dublin's south city centre. This system will provide Dublin with a high-capacity, high-frequency cross-city rail corridor, serving critical destinations including Dublin Airport and Dublin City University. *MetroLink* will provide faster reliable journey times to and from these key destinations while offering interchange with other rail, DART Expansion, light rail and bus services.

2.4 Procurement

A. Public Spending Code Reform

In order to capture the environmental impacts of carbon and emissions and other pollutants, the Public Spending Code requires the use of a 'Shadow Price' to capture these impacts within a cost benefit analysis. The Shadow Price of Carbon for 2019 is €20 and will rise to €100 by 2030 and €265 by 2050, reflecting the increasing urgency with which decarbonisation will be needed in future years. This Shadow Price will ensure that the relative economic cost of interventions which encourage fossil fuel based mobility will increase significantly compared with alternative fuels, thereby providing a lever to encourage increased investment in alternative fuels.

B. EV Public Procurement Framework

The *LEV Taskforce* considered the important leadership role that public bodies and Government Departments can play in encouraging LEV uptake was examined. The *Taskforce* recommended

the introduction of a new public procurement framework for EVs by 2020 and this recommendation was echoed in the *Climate Action Plan* (Action 149: *Enable the deployment of electric vehicles in public sector fleets*). The Office of Government Procurement is now developing a direct drawdown mechanism to allow public sector bodies to purchase an EV with a reduced administrative burden. It is expected that this measure will promote greater uptake of EVs within the State vehicle fleet, including ministerial vehicles.

3. Deployment and Manufacturing Support

| CATEGORY | No. | DENOMINATION | DESCRIPTION | AF FIELD | ALTERNATIVE FUEL | TRANSPORT MODE | APPLICATION LEVEL |
|-----------------------|-----|---|---|----------|------------------------|----------------|-------------------|
| AFI deployment | 1 | ESB eCars EV Charging Network | ESB own and maintain the current network of 1,100 EV chargers across the island of Ireland (including 300 in Northern Ireland), 90 of which are fast chargers. | AFI | Electricity | Road | National |
| | 2 | Electric Vehicle Home Charger Grant | Grant up to the value of €600 towards the purchase and installation of a home charger unit | AFI | Electricity | Road | National |
| | 3 | ESB Electric Vehicle High Power Charging Infrastructure Development Project | Government supported project under the Climate Action Fund which will see the roll-out of a nationwide 'state of the art' EV charging network capable of facilitating large-scale EV uptake | AFI | Electricity | Road | National |
| | 4 | Location EV Charger Network | Privately installed EV charging points such as hotels, shopping centres, visitor attractions, places of employment and private car parks | AFI | Electricity | Road | National |
| | 5 | Causeway Project | Installation of 14 public CNG refuelling stations and a large scale renewable gas injection point on the gas network by 2021 (1 refuelling station operational to date) | AFI | CNG (incl. Biomethane) | Road | National |
| | 6 | Green Connect | Follow on project from the Causeway Programme which will deliver 21 additional CNG stations and 4 renewable gas injection facilities | AFI | CNG (incl. Biomethane) | Road | National |
| | 7 | EV Fast Chargers for taxis at Transport Hubs | Roll-out of fast charging points to taxi ranks at transport hubs around the country | AFI | Electricity | Road | National |
| | 8 | Local Authority Electric Vehicle Infrastructure | Investment to double the number of local authority street charge points in 2020 | AFI | Electricity | Road | National |

3.1 EV Infrastructure Deployment

Please see the following sections for further information:

- 2.1.B.1: Public Recharging Network and ESB Electric Vehicle High Power Charging Infrastructure Development Project;
- 2.1.B.2: Local Authority Electric Vehicle Infrastructure;
- 2.1.B.3: EV Fast Chargers for taxis at Transport Hubs; and
- 2.1.B.4: Electric Vehicle Home Charger Grant

3.2 Location EV Charger Network

Location or destination charging includes chargers provided at hotels, shopping centres, visitor attractions, places of employment, private car parks etc. Such chargers are considered a feature that can, and will be, provided as a service for the benefit of the customers and/or employees. There are numerous examples of such chargers being installed and it is expected to grow alongside the number of EVs.

3.3 CNG Infrastructure Deployment

The first CNG refuelling station opened in Ireland in December 2018 at Dublin Port as part of the Causeway Project, developed by Gas Networks Ireland (GNI). The *Causeway Project* represents a significant step forward in delivering a sustainable alternative fuel for Irish transport. The Project will see the formation of a national CNG refuelling network, a renewable gas



injection facility and the deployment of a fleet of CNG vehicles.

GNI has received co-funding from the European Commission, under the CEF (Connecting Europe Facility) Transport Fund, to install a further 13 public CNG refuelling and a large scale renewable gas injection point on the gas network by 2021.

In addition, The *Green Connect* project has been approved for EU funding of €11.6m from CEF. It is a follow on project from *Causeway* to complete a national network of CNG stations along the core road network in the Republic of Ireland. The project is due to deliver 21 additional CNG stations and 4 renewable gas injection facilities as part of its scope. The project will also support 400 CNG vehicles supported by a vehicle grant scheme and 4 mobile CNG refuelling units.

GNI is also working on a project called GRAZE (Mitchelstown Central Grid Injection Point). This project will create the first large scale central injection point on the gas network, facilitating significant private investment in anaerobic digestion facilities, an important first step in decarbonising the gas network and the difficult to decarbonise sectors of heat and transport. The project has been shortlisted for grant assistance under the *Climate Action Fund* and is currently going through the project validation stage. The Mitchelstown CGI project is currently going through the Planning Application process.

The provision of biogas injection facilities under the *Causeway* and *Green Connect* projects will enable indigenous renewable gas to become part of Ireland's future transport fuel mix. GNI has a stated ambition that by 2030 20% of the gas in the network will be renewable. Natural and renewable gases emit very low levels of particulate matter and nitrogen oxide when combusted.

4. Research

| No. | DENOMINATION | DESCRIPTION | AF FIELD | ALTERNATIVE FUEL | TRANSPORT MODE |
|-----|---|--|-------------|------------------|----------------|
| 1 | Feasibility Study of Development of AFI in Irish Ports | Comprehensive feasibility study on the development of AFI in Ireland | AFI | Combination | Water |
| 2 | Low Emission Bus Trial | DTTAS carried out a low emission bus trial in December 2018 assessing full electric, diesel-electric hybrids and compressed natural gas buses | AFV | Combination | Road |
| 3 | Mitigation of air pollution impacts of Irish Heavy Duty Vehicles | Co-funded by DTTAS, this SEAI aims to explore and establish environmental, economic and health impacts of vehicular emissions generated from the HDV fleet along with developing tools to monitor and calculate future energy consumption and related vehicular emissions. | AFV | Combination | Road |
| 4 | Mitigation measures to reduce CO2 emissions from the existing Irish HDV fleet | Desktop study which will review international best practice and benchmark the Irish HGV fleet against other comparator countries, followed by the quantitative assessment of select policies and measures with generic and bespoke simulation and optimization-based transport modelling tools emissions and air quality impacts | AFV | Combination | Road |
| 5 | Eco-Driving Techniques to limit Greenhouse Gas Emissions from HDVs | The aim of this project is to quantify the effectiveness of EDT in the Irish HDV fleet and investigate related policy implications. | Combination | Combination | Road |
| 6 | Urban Transport-Related Air Pollution | Working Group on UTRAP has been convened and funding has also been committed to two research projects evaluating pollutant emissions from road and port traffic | AF | Combination | Combination |

4.1 Feasibility Study on the Development of Alternative Fuel Infrastructure in Irish Ports

Ireland committed in the [National Policy Framework](#) to review market needs in order to set targets for shore-side electricity (SSE) and LNG in TEN-T ports by 2025. DTTAS therefore commissioned the Irish Maritime Development Office (IMDO) to carry out a comprehensive feasibility study on the development of alternative fuel infrastructure in Irish ports. The report also examined the factors that result in locational or sectoral concentrations in the deployment of AFI and discussed the applicability of these factors in the Irish context.

Findings suggest that successful AFI deployment has been achieved where geographic, economic, technological and regulatory factors align. These conditions are present in large trading ports such as Rotterdam, Antwerp, Los Angeles, and Vancouver, as well as geographic clusters in Scandinavia that include the ports of Oslo and Gothenburg. These ports benefit from favourable economic environments, within which the per unit cost of electricity and/or natural gas falls below European averages (Eurostat, 2019). For example, per/KWh cost of electricity to industry in Norway and in British Columbia is approximately half that of Ireland, which was among the five most expensive countries in Europe in 2017 (Government of Canada, 2019; Eurostat, 2019). A lower per unit cost of electricity allows shore side power provided by the port to become more competitive relative to traditional auxiliary fuel sources used by ships while at berth.

Many economic advantages, however, are derived from natural resources available to these and other ports with successful AFI installations. The Netherlands and Norway have significant reserves of natural gas. Norway supplies one third of all natural gas imported from outside the EU, while The Netherlands is the second largest supplier inside the bloc (Eurostat , 2019). Such abundant natural resources allow both countries greater flexibility in terms of price and installation when considering LNG infrastructure at ports. Regarding electricity production, two thirds of all electricity production in Canada and Norway is from renewable sources (Statistics Norway , 2019; Government of Canada , 2019). Hydroelectricity is a significant source of power in both countries, with Canada the second largest producer of hydroelectric power in the world

(Government of Canada, 2019). Similar to large natural gas resources, significant renewable electricity production capacity allows countries to drive down per unit costs, increasing the likelihood of successful AFI development.

Favourable economic and geographic environments are necessary but not sufficient to stimulate the successful development of AFI. A regulatory environment that demands and/or incentivises AFI is commonplace in ports that have successful developments. The IMO and EU have been the most active bodies in the imposition of stringent regulation geared towards the abatement of harmful emissions. The most significant stimulus came from the IMO – in the form of the International Convention for the Prevention of Pollution from Ships (MARPOL) – labelled Annex VI (IMO, 2014; DNV GL, 2019). Coming into force in 2005, it targeted reductions in nitrogen (NO_x) and sulphur (SO_x) oxides and created Emission Control Areas (ECA's), wherein ships must adhere to stricter emission standards. All of the ports listed above as well as any significant cluster of ports with AFI installations, lie within these ECA's. Ireland currently lies outside of these areas.

Outside of favourable economic and geographic conditions and a stringent regulatory environment, scale of operations was found to be a common influence in the successful deployment of AFI. Rotterdam and Antwerp were the two largest ports in Europe in 2017 (Eurostat, 2019), while L.A. is the largest container port in North America (U.S. Dept of Transportation, 2018). The scale of operations in these ports gives rise to significant number of vessel calls each year, increasing the likelihood of demand for alternative refuelling facilities such as LNG. In addition, ports of such scale are often located in close proximity to large urban centres. This proximity often results in easy access to an electricity grid capable of handling shore side power facilities for ships.

Such scale is closely correlated with successful deployments of AFI, allowing ports to generate predictable, forecastable demand, which is a prerequisite for any form of large capital investment. Scale also allows ports the opportunity to undertake trial installations to establish underlying demand. Both provide ports with the opportunity not only to become champions of

alternative fuels, but market leaders in their provision. This potential to create market change improves the likelihood of capital investment in AFI.

Taking the aforementioned drivers into account, the report considered the demand for, and feasibility of, AFI at Irish ports. The report found that many of the characteristics evident at current AFI locations are not present at Irish ports. Ireland does not gain from geographic conditions favourable to local natural gas production or to renewable energy production on the scale outlined in previous examples. Therefore, Ireland's price competitiveness is relatively low in the renewable energy market. In addition, Ireland currently falls outside the Emission Control Areas, wherein the most stringent regulatory standards are applied. Lastly, the scale of operations in Irish ports and the number of ships calling to them does not generate sufficient demand to justify the capital investment that AFI requires. As a result, forecasted demand for alternative refuelling facilities or SSE in Irish ports is low.

In reaching these findings, the Irish Marine Development Office (IMDO) undertook an assessment of market demand for AFI at Irish ports, as well as an analysis of the financial viability of potential investments in such infrastructure. In addition to this quantitative research, the IMDO engaged extensively with industry stakeholders to gain clarity on the barriers which they see to investing in AFI. The findings from these consultations follow the pattern of assessment outlined above. Many industry leaders highlight their concerns that the forecasted demand does not justify large scale capital investment in AFI, and that the Irish regulatory environment is not a barrier to current methods of operation.

Irish ports expressed the view that because the debate in relation to the future usage of alternative fuels remains unsettled globally, prudence demands that large scale capital investment should be avoided until stable demand conditions are established. Furthermore, there is a widely held belief within the shipping industry that LNG represents a short-to-medium term solution to what is a long term problem. The innate conservatism and risk aversion of the industry make investment in LNG unlikely because of the potential obsolescence of LNG technologies through the development of alternative fuels such as hydrogen and ammonia.

Based on the findings from the market demand analysis, Ireland is proposing not to set targets for SSE and LNG infrastructure for seagoing ships at ports on the TEN-T network at this time. As stated in the AFI Directive an absence of demand is a reasonable justification for not setting national infrastructural targets. Ireland does however commit to the continued monitoring of market trends to assess the level of convergence in solutions to achieve the ambitions of the maritime transport sector set out in the Directive. The IMDO, supported by the Sustainable Energy Authority of Ireland and other state agencies, will engage with key stakeholders and industry contacts across the transport and energy sectors to ensure that up to date market intelligence that informs investment decisions is made available to policy makers, ports and the wider business community. The IMDO will facilitate discussions between the maritime industry, and other industries currently using LNG, to surface opportunities to exploit synergies and to generate a cross-industry demand to increase the viability of investments in alternative fuels in transport. Finally, the IMDO have agreed to look at annually collating and reporting statistics on the use of alternative fuels to ensure that if the market demands changes Ireland will be in a position to respond rapidly.

4.2 Low Emission Bus Trial

Only approximately 3% of all transport-derived CO₂ emissions come from the Irish bus and coach sector; however other harmful pollutants arising from combusting fossil fuels, such as nitrous oxides (NO_x) and particulate matter (PM) are also emitted. Ireland generally has better overall air quality than most countries in Europe, but nevertheless, in built up towns and cities, the negative implications for air quality can be exacerbated. Therefore, while transitioning the public bus fleet towards low-emission fuels and technologies will have a limited impact on mitigating CO₂ emissions, it can play an important leadership role in normalising the use of non-conventional technologies and encouraging people to consider alternatives to diesel and petrol when buying private vehicles.

Under the [National Development Plan](#), Ireland has committed to stop buying diesel-only buses for the urban bus fleet. This commitment came into effect in July 2019. In order to inform future purchasing decisions, a low emission bus trial was launched in December 2018. This trial involved buses of different fuels performing a simulated bus service along existing bus routes in Dublin and Cork, including stopping at bus stops and using ballast in place of passengers to replicate the real-world weight requirements of such buses. As part of the trial, three hybrid-electric double deck buses, two CNG buses and two full battery electric buses (single deck) from a range of suppliers were tested, using a standard Euro VI diesel bus as a baseline. The operational phase of the low-emission bus trial has concluded and [key findings](#) have been published.

4.3 Research into the Mitigation Emissions from the Irish Heavy Duty Vehicle (HDV) Sector

HDVs, including lorries and trucks (>3.5t), produce significant vehicular emissions, the level of which is expected to increase due to economic growth and the related increase in freight movement in Ireland. Throughout Ireland's recovery from the economic recession at the start of this decade, there has been a steady increase in the number of HDVs in the national fleet and greater levels of road freight activity have been registered. Modelled future demand for freight suggests a near doubling (c. 91%) in current freight activity (kilometre tonnes) by 2050, surpassing the previous peak of activity before the 2011 economic crash.

While HDVs are a relatively small proportion of the total fleet, they account for a disproportionate share of emissions. In 2017, freight emissions accounted for c. 18% of all CO₂ emissions within the land transport sector, and without intervention freight emissions will continue to increase in line with rising freight activity levels. A number of research projects relating to HDVs have been recently funded in order to gain more insight into this key area with potential for significant emissions savings:

1) A project entitled 'Mitigation of air pollution impacts of Irish HDVs (MAP-HDV) is being funded to explore and establish environmental, economic and health impacts of the vehicular emissions generated from the Irish HDV fleet along with developing an appropriate tool-kit to monitor and calculate future energy consumption and related vehicular emissions from the fleet using the most advanced simulation tools. Furthermore, research will be also focused on exploring and evaluating a set of fleet and demand management tools learned from international and European best practices to mitigate vehicular emissions including CO₂ by developing a scenario-based modelling approach. Following evaluation of the potential environmental and economic impacts and long-term sustainability of multiple measures, recommendations of the most suitable measures for implementation will be made. The policy implications of these plans will be discussed and guidelines to achieve the aforementioned goals will be recommended. This project is expected to culminate in the second half of 2020.

2) A desktop study is being funded to review international best practice and benchmark the Irish HDV fleet against other comparator countries, following by the quantitative assessment of select policies and measures with generic (LEAP, TIMES) and bespoke simulation and optimization-based transport modelling tools emissions and air quality impacts. Consultation with industry and stakeholders in terms of their practices, preferences and behaviours will inform the quantitative assessments and provide a qualitative layer for selection of measures. Review of international best practice, the model-based assessment and consultation will inform the process of identifying options for decarbonisation of and reduction of pollutant emissions from the HDV sector in Ireland, with the least cost. This project is expected to culminate in the second half of 2020.

3) A study is being funded which aims to evaluate the impacts of adapting eco-driving training (EDT) in the Irish HDV fleet. Eco-driving and related practices have shown to improve fuel efficiency and reduce vehicular exhaust emissions in the HDV fleet internationally. There exists little to no research investigating the impacts of eco-driving and adaptation of eco-driving training in the Irish HDV fleet. The project aims to quantify the effectiveness of EDT in the Irish HDV fleet and investigate related policy implications.

The Eco-HDV project will focus on identifying the perception and awareness of EDT in the freight sector, the best eco-driving practices that exist at present in Ireland, analysing the immediate and long-term impacts of adaptation of eco-driving programmes and developing simulation models to estimate the future policy implications. It will perform a comparative before-and-after analysis of the effect of EDT in driver behaviour change using a driving simulator based experiment. Furthermore, the project will generate guidelines for adaptation and evaluation of eco-driving programmes to reduce vehicular emissions from the Irish HDV fleet. This project is expected to culminate in the second half of 2020.

4.4 Urban Transport-Related Air Pollution (UTRAP)

Road transport is a major source of air pollution emissions, particularly nitrogen oxides (NO_x) and particulate matter (PM), from both exhaust releases and tyre and brake-wear. While the national [Clean Air Strategy](#) is being prepared a recent report by the Environmental Protection Agency (EPA) concerning [NO₂ levels in Dublin](#) was published indicating that areas around certain heavily trafficked roads may have higher levels of air pollution than previously shown and in fact may be over the allowed EU emission limit. These findings make it clear that a movement towards fewer and cleaner vehicles is necessary. Consequently, DCCAE and DTTAS have convened Working Group on Urban Transport-Related Air Pollution (UTRAP). This Working Group will, inter alia, consider a range of options for potential measures to address NO₂ and other air pollution from transport including the role of alternatively fuelled vehicles. It is intended that the Group will submit their recommendations to Government in 2020.

DTTAS has also committed to funding two projects commencing in 2020 (pending EPA approval) evaluating pollutant emissions from road and port traffic. The findings from these bodies of research, alongside the UTRAP recommendations and the *Clean Air Strategy* will help inform policy development in this area.

4.5 Other Research Projects

A. Fundamental Information for Technology Commercialisation of Lignocellulosic Waste to Liquid Transportation Fuels by Acid Hydrolysis

The EU Renewable Energy Directive legally mandates all member states to acquire >10% of transportation fuels from renewable sources by 2020. This gap can be filled by the production of oxygenated hydrocarbons from waste lignocellulose (biomass, paper) by acid-hydrolysis to produce a variety of drop-in fuel components. This technology has been proven in the laboratory, but is unproven commercially due to the absence of a number of basic fundamental pieces of information.

The work proposed under this project will gather essential chemical engineering data on aspects critical to the commercial viability of this process; 1) Determination of the solubility limits of various lignocellulosic wastes in acidified alcohol solvents; 2) Determination of the technical and cost-effectiveness of separation procedures to remove water co-produced with the fuel components; 3) Experimental data characterising the efficiency of the process on a short series of real lignocellulosic feedstocks.

All of this information will be combined to produce a chemical engineering process model that will allow for both the technical and economic outcomes of the commercialisation of the process to be known to useful accuracy. This critical information will inform as to what the identity of any further bottlenecks are, or otherwise to the next most prudent step toward the commercialisation of the process and the decarbonising of the Irish transportation sector, particularly the HDV sector.

B. BIO-RPISM: biofuel production, digestate purification and CO₂ sequestration with highly productive auto-floating microalgae technology

This project is aimed at the development of novel technologies for selecting and cultivating highly productive auto-floating microalgae for large scale algal biofuel production, in

conjunction with digestate purification and CO₂ bio-fixation. The feasibility of the project has been justified with a preliminary study.

A highly productive auto-floating microalga - *Tribonema* sp. has been enriched in the preliminary study, which showed high lipids productivity in digestate. This project will thoroughly explore its potential through fundamental research (growth and lipids accumulation characteristics in digestate), process development (photo-bioreactor, raceway pond system) and optimization, meso-scale demonstration, and techno-economic & environmental sustainability analysis.

The project will constitute a substantial step towards the industrial implementation of algal biofuels by addressing several major challenges (harvesting, contamination, nutrient and CO₂ supply) in large scale algal biofuels production. It will also contribute to the development of biogas industry by providing a low-cost digestate treatment solution.

C. TRACTOR – Transitioning to Renewable energy for Agriculture by making Clean hydrogen Technology for field Operations Ready for practice

This project, which is dependent on INTERReg funding, aims to accelerate the transition to renewable energy in agricultural transport in North-West Europe (NWE). Teagasc is involved in this project application on Ireland's behalf. The project brings together innovators from NWE to demonstrate that the technology is ready and feasible. Currently, tillage farming is entirely dependent on fossil fuels for all operations on the land.

At Biopolder, a full operational chain starting from wind energy will be developed. An electrolyser converts the electricity into hydrogen, because batteries cannot store enough energy for farming. An electric tractor, with a fuel cell as range extender, would replace the traditional diesel tractor. Such a system has not, as yet, been deployed anywhere in the world.

The partnership will actively invite innovators from their networks to participate in study visits to Biopolder. During the project period 30 meetings have been planned, reaching over 300

stakeholders and bringing together innovators from all over NWE which will result in the exchange of ideas and best practices to stimulate the process of change. Research institutes will monitor the performance of the full demonstrator.

Additionally, two hydrogen-electric tractors will be available to participate in events throughout NWE, aiming to practically demonstrate the electric tractor in action and convince the audience that energy transition is feasible. The partnership aims to reach over 50,000 stakeholders. Experimental farms in a number of countries including Ireland will test the hydrogen-electric tractors in practical operations.

If, by the end of the project, 100 farmers have made concrete plans to replace at least one of their diesel tractors with an alternatively fuelled alternative, over 1.5 million litres of diesel will be saved - an equivalent of almost 4,000 t/CO₂ per year. The partnership will formulate policy recommendations to stimulate the energy transition and communicate these with the proper regional, national and European authorities. Supported by an industry roadmap, deployment in NWE aims to achieve a reduction of as much as 50,000 t/CO₂ in 2034.

5 AFV Estimates

| TRANSPORT MODE | ALTERNATIVE FUELS VEHICLES (AFV) | CURRENT AND PAST NUMBER OF AFV | | | NUMBER OF AFV EXPECTED TO BE REGISTERED | | |
|----------------|---|--------------------------------|-------|-------|---|---------|---------|
| | | 2016 | 2017 | 2018 | 2020 | 2025 | 2030 |
| | ELECTRICITY | | | | | | |
| Road | Electric Vehicles, EV (total road) | 0 | 3,580 | 7,464 | 59,219 | 181,263 | 936,363 |
| | Powered Two Wheelers (PTW) | | | | | | |
| | Electric Vehicles, EV (excl. PTW) | 0 | 3,580 | 7,464 | 59,219 | 181,263 | 936,363 |
| | Electric Passenger Cars (BEV+PHEV) | 0 | 3,580 | 7,287 | 53,866 | 150,735 | 840,165 |
| | • BEV | | 2,718 | 4,528 | | | |
| | • PHEV | | 862 | 2,759 | | | |
| | Electric Light Commercial Vehicles | 0 | 0 | 177 | 5,353 | 29,939 | 94,978 |
| | • BEV | | | | | | |
| | • PHEV | | | | | | |
| | Electric Heavy Commercial Vehicles | 0 | 0 | 0 | 0 | 0 | 0 |
| | • BEV | | | | | | |
| | • PHEV | | | | | | |
| | Electric Buses and Coaches | 0 | 0 | 0 | 0 | 592 | 1,220 |
| | • BEV | | | | | | |
| • PHEV | | | | | | | |
| Water | Inland Waterway Vessels | | | | | | |
| | Seagoing Ships | 0 | 0 | 0 | 0 | 0 | 0 |
| Air | Aircraft | 0 | 0 | 0 | 0 | 0 | 0 |
| Rail | Locomotives | 144 | 144 | 144 | 144* | 196* | 600* |
| | CNG (including Biomethane) | | | | | | |
| Road | CNG Vehicles (total road) | 0 | 0 | 2 | 20 | 100 | 150 |
| | Powered Two Wheelers | | | | | | |
| | CNG Vehicles (excl. PTW) | 0 | 0 | 2 | 20 | 100 | 150 |
| | CNG Passenger Cars | | | | | | |
| | CNG Light Commercial Vehicles | | | | | | |
| | CNG Heavy Commercial Vehicles | | | 2 | 20 | 100 | 150 |
| | CNG Buses and Coaches | | | | | | |
| Water | Inland Waterway Vessels | | | | | | |
| | Seagoing Ships | 0 | 0 | 0 | 0 | 0 | 0 |
| Air | Aircraft | 0 | 0 | 0 | 0 | 0 | 0 |
| Rail | Locomotives | | | | | | |

| | | LNG (including Biomethane) | | | | | |
|-------|--|-----------------------------------|----------|----------|----------|----------|----------|
| Road | LNG Vehicles (total road) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Powered Two Wheelers | | | | | | |
| | LNG Passenger Cars | | | | | | |
| | LNG Light Commercial Vehicles | | | | | | |
| | LNG Heavy Commercial Vehicles | | | | | | |
| | LNG Buses and Coaches | | | | | | |
| Water | LNG Inland Waterway Vessels | | | | | | |
| | LNG Seagoing Ships | 0 | 0 | 0 | 0 | 0 | 0 |
| Air | Aircraft | 0 | 0 | 0 | 0 | 0 | 0 |
| Rail | Locomotives | | | | | | |
| | | HYDROGEN | | | | | |
| Road | Fuel Cell Vehicles, FCEV (total road) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Powered Two Wheelers | | | | | | |
| | Hydrogen Passenger Cars | | | | | | |
| | Hydrogen Light Commercial Vehicles | | | | | | |
| | Hydrogen Heavy Commercial Vehicles | | | | | | |
| | Hydrogen Buses and Coaches | | | | | | |
| Water | Inland Waterway Vessels | | | | | | |
| | Seagoing Ships | 0 | 0 | 0 | 0 | 0 | 0 |
| Air | Aircraft | 0 | 0 | 0 | 0 | 0 | 0 |
| Rail | Locomotives | | | | | | |
| | | LPG | | | | | |
| Road | LPG Vehicles (total road) | 0 | 0 | 0 | 0 | 0 | 0 |
| | Powered Two Wheelers | | | | | | |
| | LPG Passenger Cars | | | | | | |
| | LPG Light Commercial Vehicles | | | | | | |
| | LPG Heavy Commercial Vehicles | | | | | | |
| | LPG Buses and Coaches | | | | | | |
| Water | Inland Waterway Vessels | | | | | | |
| | Seagoing Ships | 0 | 0 | 0 | 0 | 0 | 0 |
| Air | Aircraft | 0 | 0 | 0 | 0 | 0 | 0 |
| Rail | Locomotives | | | | | | |

| | OTHER AF | | | | | | |
|-------|---------------------------------------|----------|----------|----------|----------|----------|----------|
| | Other AF Vehicles (total road) | 0 | 0 | 0 | 0 | 0 | 0 |
| Road | Powered Two Wheelers | | | | | | |
| | Passenger Cars | | | | | | |
| | Light Commercial Vehicles | | | | | | |
| | Heavy Commercial Vehicles | | | | | | |
| | Buses and Coaches | 0 | 0 | 9* | 0 | 0 | 0 |
| Water | Inland Waterway Vessels | | | | | | |
| | Seagoing Ships | 0 | 0 | 0 | 0 | 0 | 0 |
| Air | Aircraft | 0* | 0* | 0* | 0* | 0* | 0* |
| Rail | Locomotives | | | | | | |

5.1 Points of Clarification

- Projections are included for electric and CNG road vehicles as they are the only technologies that are projected in the modelling used. BEV/PHEV breakdown for the projections are not available at the moment.
- The figures used for the number of rail locomotives expected to be registered are outlined in the 'Electricity' section of the template, however these figures include hybrid trains which are expected to come into service in the coming years.
- Most commercial aircraft in use in Ireland are capable of using a blend of conventional and sustainable aviation fuel (SAF). However, there are no SAF stocks in use in any Irish airport, as no flights originating out of Ireland or landing in Ireland from elsewhere have requested use of such fuel. The table shows 'nil' for alternatively fuelled aircraft, due to the fact that all aircraft still use conventional fuel despite their capacity for the use of SAF.
- 9 alternatively fuelled buses were ordered in 2018. These buses were delivered in 2019, and six have already entered service in Dublin City Centre. The buses are diesel-electric hybrids. No targets for alternatively fuelled buses or coaches have been included for the period 2020-2030 as the medium to long term technology pathway for the urban public bus fleet is currently being prepared by the NTA and such figures are not yet available in the requested breakdown. Future purchasing of buses will, of course, have to take into account the public fleet procurement requirements under the EU Clean Vehicles Directive.

6 AFI Targets

| TRANSPORT MODE | ALTERNATIVE FUELS INFRASTRUCTURE (AFI) | CURRENT AND PAST NUMBER OF RECHARGING/REFUELLING POINTS | | | TARGET NUMBER OF RECHARGING/REFUELLING POINTS | | |
|----------------|---|---|--------------|--------------|---|----------------|----------------|
| | | 2016 | 2017 | 2018 | 2020 | 2025 | 2030 |
| | ELECTRICITY | | | | | | |
| Road | Total recharging points (public* + private) | 3,141 | 3,712 | 4,764 | 18,970 | 201,200 | 701,400 |
| | Recharging points (publicly accessible) | 920 | 928 | 946 | 950 | 1,100 | 1,200 |
| | Normal power recharging points, P ≤ 22kW (public) | 660 | 668 | 666 | 850 | 950 | 1,000 |
| | High power recharging points, P > 22kW (public) | 130 | 130 | 140 | 100 | 150 | 200 |
| | • AC fast charging, 22kW < P ≤ 43 kW (public) | 55 | 55 | 62 | | | |
| | • DC fast charging, P < 100 kW (public) | 75 | 75 | 78 | | | |
| | • DC ultrafast charging, P ≥ 100 kW (public) | 0 | 0 | 0 | | | |
| | Recharging points (private) | 2,221 | 2,784 | 3,818 | 18,020 | 200,100 | 700,200 |
| | Normal power recharging points, P ≤ 22kW (private) | 2,221 | 2,784 | 3,818 | 18,000 | 200,000 | 700,000 |
| | High power recharging points, P > 22kW (private) | 0 | 0 | 0 | 20 | 100 | 200 |
| | • AC fast charging, 22kW < P ≤ 43 kW (private) | 0 | 0 | | | | |
| | • DC fast charging, P < 100 kW (private) | 0 | 0 | | | | |
| | • DC ultrafast charging, P ≥ 100 kW (private) | 0 | 0 | | | | |
| Water | Shore-side electricity supply for seagoing ships in maritime ports | | | | | | |
| | Shore-side electricity supply for inland waterway vessels in inland ports | | | | | | |
| Air | Electricity supply for stationary airplanes | 0* | 0* | 46* | TBD* | TBD* | TBD* |
| | NATURAL GAS (including Biomethane) | | | | | | |
| Road | CNG refuelling points (total) | 2 | 3 | 4 | 4 | 66 | 168 |
| | CNG refuelling points (public) | | | 1 | 1 | 23 | 42 |
| | CNG refuelling points (private fleet operators) | 2 | 3 | 3 | 3 | 43 | 126 |
| | LNG refuelling points (total) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LNG refuelling points (public) | | | | | | |
| | LNG refuelling points (private fleet operators) | | | | | | |

| | | | | | | | |
|-------|--|----------|----------|----------|----------|----------|----------|
| Water | Maritime Ports - LNG refuelling points | | | | | | |
| | Inland Ports - LNG refuelling points | | | | | | |
| | HYDROGEN | | | | | | |
| Road | H2 refuelling points (total) | 0 | 0 | 0 | 0 | 0 | 0 |
| | H2 refuelling points – 350 bar (total) | 0 | 0 | 0 | 0 | 0 | 0 |
| | H2 refuelling points – 350 bar (public) | | | | | | |
| | H2 refuelling points – 350 bar (private fleet operators) | | | | | | |
| | H2 refuelling points – 700 bar (total) | 0 | 0 | 0 | 0 | 0 | 0 |
| | H2 refuelling points – 700 bar (public) | | | | | | |
| | H2 refuelling points – 700 bar (private fleet operators) | | | | | | |
| | LPG | | | | | | |
| Road | LPG refuelling points (total) | 0 | 0 | 0 | 0 | 0 | 0 |
| | LPG refuelling points (public) | | | | | | |
| | LPG refuelling points (private fleet operators) | | | | | | |
| | OTHER AF | | | | | | |
| All | AF refuelling points (total) | 0 | 0 | 0 | 0 | 0 | 0 |
| | AF refuelling points (public) | | | | | | |
| | AF refuelling points (private fleet operators) | | | | | | |

6.1 Points of Clarification

- The number of public and private EV chargers is based on best estimates of availability and operation each year.
- Dublin Airport has completed the installation of Fixed Electricity Ground Power (FEGP) on Piers 1, 3 and 4 on the majority of contact stands, i.e. on 3 out of the 4 available piers, replacing the mobile diesel-powered units previously deployed. This amounts to 46 FEGP units in total. Dublin Airport also plans to introduce FEGP on all future new contact stands. They may retain some traditional units as backup and some will be required for remote stands. A breakdown of the number of FEGP units by year is not available, therefore 46 has been entered into the table under 2018. A breakdown of future targets is also not available.

7 AFI Developments

* S – Supply; D – Demand; R - Ratio

| | | PAST | | | | | | | | | FUTURE ESTIMATED | | | | | | | | | |
|-------------------|------------------------|------|------|---|------|------|---|------|------|----|------------------|-------|----|------|--------|-----|------|--------|-----|--|
| | | 2016 | | | 2017 | | | 2018 | | | 2020 | | | 2025 | | | 2030 | | | |
| MODE OF TRANSPORT | ALTERNATIVE FUEL | S | D | R | S | D | R | S | D | R | S | D | R | S | D | R | S | D | R | |
| Road | Electricity | 660 | 2270 | 3 | 668 | 3799 | 6 | 666 | 7647 | 11 | 950 | 25000 | 26 | 1100 | 181500 | 165 | 1200 | 936000 | 780 | |
| | CNG (incl. Biomethane) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 20 | 20 | 66 | 2269 | 34 | 152 | 3032 | 20 | |
| | Select: | | | | | | | | | | | | | | | | | | | |
| Water | Select: | | | | | | | | | | | | | | | | | | | |
| | Select: | | | | | | | | | | | | | | | | | | | |
| | Select: | | | | | | | | | | | | | | | | | | | |
| Air | Select: | | | | | | | | | | | | | | | | | | | |
| | Select: | | | | | | | | | | | | | | | | | | | |
| | Select: | | | | | | | | | | | | | | | | | | | |
| Rail | Select: | | | | | | | | | | | | | | | | | | | |
| | Select: | | | | | | | | | | | | | | | | | | | |
| | Select: | | | | | | | | | | | | | | | | | | | |

| Changes in fuels use | | | | | | | |
|----------------------|--------------------------------|--|-------------|-------------|---|-------------|-------------|
| | | PAST AND CURRENT STATUS OF FUELS USE IN THE TRANSPORT SECTOR | | | ASSESSMENT OF FUTURE DEVELOPMENT OF FUELS IN THE TRANSPORT SECTOR | | |
| MODE OF TRANSPORT | FUEL | Percentage of different fuels use for transport [%] | | | Estimated percentage of different fuels use for transport [%] | | |
| | | 2016 | 2017 | 2018 | 2020 | 2025 | 2030 |
| Road | Gasoline | 24% | 22% | 19% | 21% | 21% | 17% |
| | Diesel | 73% | 74% | 77% | 72% | 69% | 64% |
| | Electricity | 0% | 0% | 0% | 0% | 1% | 10% |
| | CNG | 0% | 0% | 0% | 0% | 0.01% | 0.01% |
| | LNG | 0% | 0% | 0% | 0% | 0% | 0% |
| | Hydrogen | 0% | 0% | 0% | 0% | 0% | 0% |
| | LPG | 0% | 0% | 0% | 0% | 0% | 0% |
| | Biofuels | 3% | 4% | 4% | 6% | 8% | 9% |
| | Synthetic and paraffinic fuels | 0% | 0% | 0% | 0% | 0% | 0% |
| | Other AF | 0% | 0% | 0% | 0% | 0% | 0% |
| | Total Road | 100% | 100% | 100% | 100% | 100% | 100% |
| Maritime | Marine gas oil | | | | | | |
| | Marine diesel oil | 100%* | 100%* | 100%* | 100%* | 100%* | 100%* |
| | LNG | | | | | | |
| Inland waterway | Marine gas oil | | | | | | |
| | Marine diesel oil | | | | | | |
| | LNG | | | | | | |

7.1 Points of Clarification

- No supply or use of alternative fuels has occurred to date through Irish airports. As yet, no projected possible future use estimations are available.
- The only figure available for transport fuels for marine and inland waterways is a single figure for marine diesel that covers both. It is not possible to differentiate between the two.

Appendix 1 – List of Supports for Alternative Fuel Vehicles

| Measure | Description |
|---|--|
| Electric Vehicle Purchase Grant Scheme | A grant of up to €5,000 towards the purchase of a new Battery Electric Vehicle (BEV) or Plug-in Hybrid Electric Vehicle (PHEV). |
| VRT Relief | VRT relief of up to €5,000 for BEVs (until end 2021), up to €2,500 for PHEVs and up to €1,500 for conventional hybrids subject to CO ₂ thresholds (until end 2020). |
| Electric Vehicle Domestic Charger Grant | A grant of up to €600 towards the installation cost of a domestic charge point for new and second-hand BEVs or PHEVs. |
| Low Motor Tax | BEVs qualify for the lowest tax band of motor tax at €120 per annum, while a PHEV is typically taxed at circa €170 per annum. |
| Toll Incentive Scheme | As of July 2018, BEV and PHEVs qualify for 50% and 25% toll reductions respectively up to a maximum €500 annual threshold for private vehicles and a maximum annual threshold of €1,000 for commercial vehicles (greater off-peak rates also apply to the M50 toll). From 1 January 2020, fuel cell electric vehicles alternatively fuelled HDVs will also qualify for lower toll charges. |
| Lower fuel and maintenance costs | Studies show that you can save circa 70% annually on electric vehicle fuel costs in comparison with a diesel alternative. |
| Comprehensive public and on-street EV charging network | ESB eCars rolled out a network of EV charging points throughout Ireland including approximately 90 fast chargers. A map outlining the availability of these charge points is updated in real time. This network is complimented by charge points provided at locations such as hotels, shopping centres, visitor attractions, places of employment and private car parks. |
| 0% Benefit-in-Kind (BIK) Rate | BEVs qualify for a 0% Benefit-in-Kind rate up to €50,000 without mileage conditions (until end 2022). |

| Measure | Description |
|---|---|
| Accelerated Capital Allowance (ACA) | EVs, CNG vehicles and their associated recharging/refuelling infrastructure qualify under the ACA scheme. This scheme enables businesses to identify and buy the most energy efficient equipment including electric charging infrastructure and write down the cost of such equipment in the year of purchase rather than over the traditional 8 years. The LEV Taskforce has recommended extending this Scheme to fuel cell electric vehicles. |
| eSPSV Grant Scheme | A grant of up to €10,000 towards the purchase of a battery electric vehicle, a plug-in hybrid electric vehicle or a fuel cell electric vehicle for vehicles in the taxi /hackney/limousine sector. A further €2,500 on top of the grant will be available for the conversion of an eSPSV to a wheelchair accessible vehicle, supplementary to the existing WAV grant available from DCCAE. |
| Alternative Fuel Heavy Duty Vehicle Purchase Grant | In early 2020, a vehicle purchase grant will be introduced for EV/CNG/LNG/hydrogen fuelled HDVs to support an increased uptake of LEVs. |

Appendix 2 – Commission for the Regulation of Utilities Decision Letter on EV Charging Infrastructure, 2018



The Grain House
The Exchange
Belgard Square North
Tallaght, Dublin 24
D24 EX9V0
T +353 1 4000 800
F +353 1 4000 850
E info@cru.ie
www.cru.ie

19 July 2018

CRU Ref: D/18/11428

Paddy Hayes,
ESB Networks,
Leopardstown Rd,
Sandyford,
Dublin 18,

Dear Paddy,

Re: Electric Vehicle Charging Infrastructure Project Close Down Report

I am writing to you in response to ESB Networks' *Electric Vehicle Charging Infrastructure Project Close Down Report*, received 02 May 2018, requesting the Commission for Regulation of Utilities (CRU) to consider the conditional termination agreement recommendation for the close down of the EV Pilot project.

The Commission consulted on the ESBN EV Pilot and published its decision in October 2017. That decision concluded that the EV assets should not be added to the RAB and that the current financial value of the EV assets is minimal. In that context, the Commission has considered ESB Networks' recommendation, including the proposal on value sharing and the commitments by ESB in respect of the existing network. The Commission approves, in principle, the proposed approach subject to the following conditions:

1. It is recognised that interoperability is a condition of the agreement and that any services provided by ESB eCars to Electric Ireland shall be based on the same terms, including access to recharging infrastructure, available to all electricity suppliers. (i.e. Electric Ireland should not gain a competitive advantage over other market actors through its dealings with ESB eCars),
2. This does not affect regulatory oversight of the Retail Market, including bundling of products, and
3. The ESB eCars brand, the branding of the infrastructure, and associated services, is unchanged for the period of the arrangement.

Furthermore, for the avoidance of doubt, the DUoS customer shall receive a proportionate share of the total value of the EV charging infrastructure at the time of



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sale, or at the end of the termination agreement. This is consistent with CRU/17/283 Decision on ESBN Electric Vehicle Pilot & Associated Assets.

In the event the assets are sold within 12 months of the termination date, the CRU may review the valuation of the assets if the sale value is higher than the valuation.

Please do not hesitate to contact me should you have any queries regarding the above.

Yours Sincerely,

A handwritten signature in black ink, appearing to read 'Garrett Blaney', written over a horizontal line.

Garrett Blaney,
Commissioner