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Progress Report 2020
Norway

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Draft report prepared by

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Norwegian Public Roads Administration (NPRA)

1 Introduction

1.1 General overview of the national activities and projects

The ITS Directive has been included in the EEA (European Economic Area) agreement and is applied as a framework legislation for ITS in Norway.

The Norwegian Parliament adopted an ITS Act in 2015 based on a proposal from the Ministry of Transport. This act is used for transposition of ITS legislation (the Delegated Acts) into Norwegian law. The act does not exclude regulations based on national policy and priorities and will provide the legal authority to ensure national coordination of ITS applications and services within the road sector and covering the interfaces to other modes of transport.

A new national act for testing and piloting automated driving was adopted by parliament in late 2017.

By adopting these acts, Norway has the basic legal foundation for deploying ITS services in place. This is also the case for testing and piloting C-ITS and automated driving. There is still a need to have guidelines and regulations related to the connected vehicle data and define ownership and rules for privacy and security as well as securing openness and availability for both public and private data. There is also a need to define responsibility, ownership and business models for hybrid communication supporting C-ITS. Norway has a clear intention to participate in European work on harmonisation and legislation for these areas.

We endorse the initiatives taken by the European Commission to review the delegated regulations under the ITS Directive, for instance by proposing an extension of geographic coverage and data types in the regulation for RTTI. We also welcome the initiative to secure access by road authorities and operators to vehicle data for re-use in road operations and traffic management.

Norway recognises that ITS and new technology will play an increasingly prominent role in the transport system. ITS and the introduction of new technological solutions, including connected, cooperative and automated mobility - CCAM, will contribute significantly to reaching the goals for traffic flow, traffic safety, environmental impact and accessibility.

The on-going rapid evolution of technologies creates a demand for a proactive and flexible policy towards necessary update of national legislation and regulation, as well as the need to follow up on activities defining and harmonising international regulations, standards and best practice.

The main responsibility for implementing the ITS Directive and the underlying Delegated Acts lies with the Norwegian Public Roads Administration (NPRA) in close consultation with the Ministry of Transport. The NPRA participates in all expert groups with regards to the Delegated Acts and in the sub-expert group on cyber security. With regards to the Delegated Act EU/2017/1926, Multimodal Travel Information Services, and the National Access Point (NAP), the Norwegian Railway Directorate, the Norwegian Digitalisation Agency and the state-owned company Entur AS also have significant roles. More information about this will follow. The relevant activities and projects for this report are managed by the NPRA, or the NPRA has a significant role.

At the international level, Norwegian authorities have participated actively in numerous European projects targeting a harmonised implementation of the actions covered by the ITS Directive:

- The CEF supported ***NEXT-ITS corridor projects*** have contained numerous deployment projects and coordination activities in Northern Europe in relation to ITS for road transport. More information available at https://next-its.its-platform.eu/
- The CEF supported ***European ITS Platform (EU EIP)*** serves as a knowledge management centre by developing, providing, promoting and maintaining harmonisation tools and processes with substantial value to National Road Authorities and road operators, to private actors as partners in the ITS value chain and network, to the European Commission in implementing and advancing ITS policy and regulation as well as to relevant stakeholders and multi-stakeholder collaborations in the ITS community. Key achievements of EU EIP comprise:
    - *the European Reference Handbook for harmonized ITS Core Service Deployment in Europe*
    - *an improved mechanism for Cross Corridor Cooperation*
    - *KPIs for ITS deployment and benefits*
    - *the ITS toolkit and the evaluation library*
    - *the community building on National Access Points*
    - *Innovation timelines and deployment roadmaps*
    - *information services quality frameworks and assessment methods*
    - *physical and digital infrastructure attributes for automated driving*
    - *good practices how to automate road operator's own ITS and integrating C-ITS into road operator's day-to-day business*

  The entire EU EIP results address the ITS Priority Areas I-IV and contribute also to the development of KPIs related to ITS Corridors. More information is available at www.its-platform.eu.
- In the area of C-ITS the NPRA has participated in the CEF supported ***NordicWay*** and ***C-ROADS*** activities as described in relation to priority area 4 (linking the Vehicle with the transport infrastructure). More information is available at www.nordicway.net and www.c-roads.eu.
- The Ministry of Transport and Communications and the NPRA have participated in the ***CCAM Single Platform*** and in the preparations of the ***CCAM Partnership***.
- The Norwegian Public Roads Administration is the responsible authority for implementation and operation of the National Access Point (NAP) for Norway. The National Body (NB) responsible for assessment of compliance related to regulations for SRTI and RTTI, is the Road Supervisory Authority. Both these national authorities have contributed to the formation of, and initiatives by, the NAP and NB Harmonization Group and have the intention to participate and support a proposal responding to the upcoming CEF call for a "Coordination mechanism to federate the National Access points established under the ITS Directive".

The above mentioned projects cover all areas related to the ITS Directive, and the learnings from these joint European activities have been brought into practice already in conjunction with the activities related to priority area 1 (Optimal use of road, traffic and travel data) and 3 (ITS road safety and security applications) described under section 2 of this report.

1.2 General progress since 2017

The NPRA works actively to develop new ITS solutions in line with the National Transport Plan, EU regulations and guidelines. The NPRA's commitment to ITS will contribute significantly to a vision of the future mobility that is safe, efficient, green, seamless, service oriented and user friendly. To achieve this, the NPRA launched an Operational Plan for ITS in 2018 for the period until 2023 describing priority areas, roles, guiding principles to follow and the concrete goals to achieve.

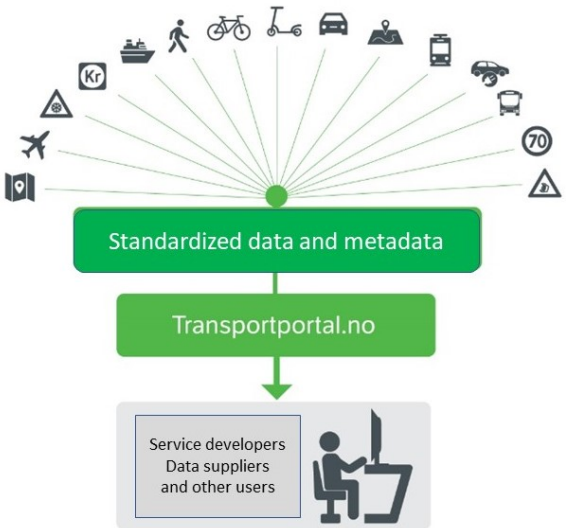
New National Access Point

A new National Access Point - https://Transportportal.no - was launched on 1st December 2019.

Earlier reports from the NPRA states that the National Access Point (NAP) for open public data free of charge, is a web portal run by the Norwegian Agency for Public Management and eGovernment (DIFI). In parallel, traffic information and other road related data were available at the NPRA website, vegvesen.no, and at websites operated by external service providers. However, metadata was only available in Norwegian language and not entirely in compliance with the metadata catalogue issued by the EU EIP project. Therefore, the NPRA, in cooperation with the Norwegian Railway Directorate, the Norwegian Digitalisation Agency and Entur (national hub for public transport information), launched a new NAP - Transportportal.no - on December 1st, 2019. Transportportal.no will from this date serve as the national access point for Norway, covering the Delegated Acts (EU) 886/2013, (EU) 962/2015 and level of service 1 in (EU) 1926/2017.

Transportportal.no is a metadata catalogue based on the D-CAT standard and CKAN software with a discovery service as required, and in both English and Norwegian language. The portal includes descriptions (metadata) and links to SRTI and RTTI data on road infrastructure, road status, incidents, travel times as well as MMTI data on public transport stops, routes and schedules, traffic information, parking information, warnings and mobility services like city bikes and new micro mobility. These data may be re-used to make new services and combine different sets of data to make new and innovative information and mobility for all types of transport users.

Transportportal.no contains metadata in compliance with the metadata catalogue issued by the EU EIP project. The portal contains only metadata describing the sets of data and where to find them. The data sources are with the individual data owners. The metadata include links (URL) where to access the data. By using the link, you will find further details about the data and supporting information related to downloading, subscription and use. For some (mostly commercial) datasets there may be rules for use, re-use and payment.



Usage of data described in the portal shall preferably be free of charge, but the Delegated Regulations allow the owner of the data to impose financial compensation for use. Licence agreements, whenever used, shall in any event impose as few restrictions on re-use as possible. The regulations state that financial compensation shall be reasonable and proportionate to the legitimate costs incurred of providing and disseminating the relevant travel and traffic data. We hope to see European Guidelines for more detailed and harmonised principles for this issue.Transportportal.no will be further developed and improved according to national and international requirements and needs in the

coming years. Major upcoming milestones will be related to deployment of level of service 2 and 3 for multimodal travel information services.

DATEX II

The national DATEX II-node has been in operation since 2014 and is currently offering real time data from different NPRA source systems in DATEX II version 2.3 format. Per 2020 there are 500 registered users of data from the DATEX II-node including international service providers and media. This is an increase compared with 2017 when the number of users was close to 300.

During 2019 and 2020, preparations for the deployment of DATEX II version 3.0 have been carried out. By the end of April 2020, the first version of a DATEX II version 3.0 value chain went into production, comprising the NPRA source systems for road weather data, travel times and traffic data and a web client used by the five NPRA Traffic Management Centres (TMC). By the end of 2020, the source systems for VMS information messages and web cameras will follow. Full deployment of DATEX II version 3.0 will be coordinated with the deployment of the new TMC-system for incident- and traffic management during 2021 (see chapter 2.1.1.). By the end of 2021 a complete DATEX II ver 3.0 service will be launched and for a period of 1 – 1,5 years the NPRA will offer DATEX II data in ver 3,0 and ver 2.3 formats in parallel to users.

The general ITS progress since 2017 also includes amongst the following:

- A political reform including major reorganisation of the counties and the Norwegian Public Roads Administration came into force on 1st January 2020 and have caused significant changes to the Norwegian transport sector:
    - A merging of counties, from 19 to a total of 11 counties from 1st January 2020.
    - The previous joint administration of public roads where NPRA had a responsibility for operations and management of county roads was terminated, and the counties are now establishing their own road administrations.
    - The NPRAs organisation will change from a regional to a divisional organisation structure
    - From regional to national organisation of the NPRAs Traffic Management Centres.
- Due to the reorganisation of the administration of public roads, a project was started by the NPRA in 2020 to review and renew national regulations to secure submission of road and road traffic information from all levels of road authorities and operators to support national databases and services. The Ministry has found it necessary to further regulate the national submission of road and road traffic information from all levels of road authorities and operators, including the regional road municipalities and Nye Veier AS (the national highway company). The NPRA has therefore been commissioned to elaborate on the need for a regulation in this area that will support national databases and services and ensure cooperation between the authorities and operators in the sector, etc. The ongoing elaboration will result in a proposal of a regulation that will be submitted to a public hearing before a final resolution is made.
- In 2018, the NPRA launched an ITS programme which aims at obtaining knowledge and experience through ITS-pilots. The programme is in particular focussing on coordination of C-

ITS pilots, regulative issues and the development of a Big Data platform. Selected ITS-pilots are carried out in collaboration with the Nordic Way project while others are stand-alone national pilots. The program will end in 2023.

- Responsibility for the national guidelines on electronic ticketing (including mobile apps and 3D bar codes) and national guidelines for public transport data submission were transferred from the NPRA to the Norwegian Railway Directorate in 2017.
- A national act to regulate testing and piloting of automated driving was adopted in late 2017 and applications for several trials and pilots for automated driving was handled and a few were started throughout the country.
- The Norwegian Road Supervisory Authority has carried out assessments of compliance annually for the Delegated Regulation EU/2013/886 and every other year for the Delegated Regulation EU/2015/962
- An ITS Cooperation Arena was established by the NPRA to further facilitate ITS cooperation between road authorities, industry and academia in Norway. Cooperation with external actors is important and a priority for the NPRA. To facilitate a collaboration, the NPRA has established a national ITS cooperation Arena. The main purpose is to contribute to better use of ITS solutions, both nationally and locally. The arena is a meeting place where participants can discuss relevant topics with other stakeholders in the ITS area. The arena has just launched a new website to present information about ITS (projects, pilots, data, legislation, etc.). In the near future the most important task for the arena is to facilitate several webinars and other digital meetings with different ITS related topics.

Most of these developments are described in more detail in the following text and tables.

1.3 Contact information

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2 Projects, activities and initiatives

2.1 Priority area I. *Optimal use of road, traffic and travel data*

2.1.1 Description of the national activities and projects

Priority area I: Optimal use of road, traffic and travel data	
Activities related to priority action "A" – multimodal travel information services	A public transport database is the foundation for a countrywide, competitively neutral information system with travel planning for all types of scheduled public transport. Prerequisites are that all service providers should have equal access to the database. In principle, data from the database shall be offered free of charge.

	• New organisational structure for public transport coordination on the national level was implemented 1.1.2017, transferring more responsibility to the Norwegian Railway Directorate. • A new national multimodal travel planner was launched in November 2017. • Public transport data is open and available at the national access point. A new National Access Point, Transportportal.no, was launched 1st December 2019, for details, see 2.1 • The NPRA and the Norwegian Railway Directorate both participates in the expert meetings regarding revision of the Delegated Regulation EU/2017/1926 and the NAP and National Body Harmonisation Group • Norway participates in the development of NeTEx and Siri profiles. • The NPRA has started work concerning regulation and legislation of micro mobility. • In 2020, a Smart Mobility Hackathon was initiated by the NPRA together with StartupLab and Entur. The goal for the hackathon was to encourage new innovations and solutions within the mobility space based on the goals from the ambitious National Transport Plan
Services related to priority action "B" – real-time traffic information services	**Travel time information**: Real time travel time registration has been implemented in Norway's five largest cities in addition to the E18 from Oslo to Kristiansand, E6 from Ås to Kolomoen and E8 from Skibotn to the Finnish border. There is a need to expand travel time registrations in the major urban areas and on important national corridors. **Map-based travel information**: The service (vegvesen.no/trafikk) offers a map-based traffic information system to users. The service is adapted to PCs, tablets and smartphones. **Web camera service**: The web camera service offers road-users a picture of the traffic situation and driving conditions from more than 500 cameras. The system has been enhanced and offers video streaming service with image updates every second. **Static road data service**: Spatial data related to the road network (Elveg) is a cooperation between the National Mapping Authority and the NPRA. The National Road DataBase offers APIs for relevant static data about the road infrastructure available in the NAP. The service facilitates frequent updating of datasets in order to ensure that operational ITS systems have correct, high quality underlying data. **ITS out-station operation and management system (Målestasjonsregisteret)**: The system covers all types of ITS out-stations along the road network operated by the NPRA. The system contains all characteristics and meta data necessary for the operation and management of the out-stations.
Services related to priority action "C" - Road safety related traffic information services	The SRTI-service has been in operation since 2015 according to the best effort quality level. The service covers the whole TEN-T and national road network with all the 8 data elements included. The national body appointed is the Norwegian Road Supervisory Authority. Assessment of compliance has been carried out every year since 2016. **Road weather data and prognoses**: The road weather information system – Vegvær - is implemented and under continuous development. Road weather data is available from the DATEX II-node and as part of the preparations for the deployment of DATEX II version 3.0, data has been converted from version 2.3 to 3.0. The system is also a decision-making support system for winter maintenance

	operators. Inclusion of friction data from vehicles in traffic are tested in the CEF-project Nordic Way. **Traffic incident management**: Traffic incident management is based on close cooperation between the TMCs and police and rescue services. In 2018, a state-of-the art telephone and communication system was deployed in the TMCs. A new TMC-system for incident- and traffic management is still under development and will be deployed in the TMCs during 2021. This system will manage traffic incidents, road works, road closures and be the source for information about rerouting / diversions and data will be available from the DATEX II-node. The system will increase interoperability and efficiency of the TMCs. It will enhance incident and emergency detection and lead to higher quality for data required under the regulations 886/2013 and 962/2015.
Assessment of compliance	The Norwegian Road Supervisory Authority is the appointed national body who carries out the assessment of compliance to requirements set out in the Delegated Regulations EU/2013/886 and EU/2015/962. Assessment of compliance has been carried out every year for EU/2013/886 and every other year for EU/2015/962. See chapters 2.1.3. and 2.1.4.
NEXT-ITS	As a follow up of the previous NEXT-ITS and NEXT-ITS 2 projects, the NEXT-ITS 3 project (2018-2020) covers the Northern part of the Scandinavian-Mediterranean corridor, including the core road network and the key comprehensive network links. The project connects North and East Germany and the Nordic countries (Denmark, Finland, Norway and Sweden) to the Central and West European road networks through the Northern sections of the Scandinavian – Mediterranean CEF Corridor. The Northern sections connect with the North-Sea – Baltic CEF Corridor in Berlin, Bremen and Helsinki and to the Orient – East Med CEF Corridor in Bremen, Rostock and Berlin. NEXT-ITS is co-funded by CEF. The aim of the project is to enhance corridor and network performance by full-scale deployment of ITS services that ensure interoperability and continuity of services, support harmonisation, and increase the cost-efficiency in the operation of traffic management. The ITS services concerned in NEXT-ITS 3 are the following: - information services, including heavy goods vehicles, parking services, giving the road users a possibility to make good decisions - traffic management services to steer and regulate the traffic flow - Incident Management to restore normal traffic flow as quickly as possible - utilisation of connected vehicles in traffic management - data collection through various sources of information as well as data mining and fusion. Norway participates in the NEXT-ITS project without EU funding but regard the collaboration with the neighbouring countries as highly valuable.

2.1.2 Delegated Regulation (EU) 2017/1926 on the provision of EU-wide multimodal travel information services (priority action a)

A new National Access Point, Transportportal.no, was launched 1st December 2019. See chapter 1.2 for details. Transportportal.no contains most of the requirements set out in level 1 of the regulation.

Experts from both the NPRA and the Norwegian Railway Directorate is attending the meetings on the upcoming revision of the regulation. The NPRA works continuously to improve data quality and types of data. For example, there is ongoing work concerning regulation of micro mobility. This will have impact on the availability and quality of these data.

Please see Annex 1 for a list of the datatypes required in the Delegated Regulation available in Transportportal.no today.

2.1.3 Reporting obligation under Delegated Regulation (EU) 2015/962 on the provision of EU-wide real-time traffic information services (priority action b)

See chapter 1.2 for details on the National Access Point, Transportportal.no

Road network coverage

Existing real time information services, both static and dynamic, do not exclude any part of the national road network. The coverage of certain data elements will be extended during the coming years. TEN-T roads and motorways have the highest priority for instrumentation. Static road data and incident warnings and information cover the comprehensive national road network, including TEN-T and all other motorways. This coverage will also apply for the implementation of Delegated Act (EU) 2015/962.

Dynamic data in the Norwegian National Access Point (NAP)

The Norwegian Public Roads Administration (NPRA) has had a national traffic information service in operation since the early 1990's. The service is based on NPRA' s five Traffic Management Centres (TMCs) as the coordinating actor for the service. Dynamic data on driving conditions, traffic, travel times, road works and incidents are either automatically collected from roadside units (traffic- and road weather stations, tolling road side units, cameras etc.) or reported to the TMCs by the police, contractors, media or road users. Information regarding incidents, road works, restrictions and closures are registered in the national TIC system (Traffic Information Centre)

Dynamic road and traffic data are available from the national DATEX II-node (see also chapter 1.2). Currently, the following dynamic data categories are available free of charge:

- real time road weather data
- travel times
- web camera images
- incidents
- road works
- driving conditions
- road closures and diversions

Static data in the Norwegian NAP

The NPRA is responsible for the National Road DataBase (NRDB). This database covers the comprehensive road network of Norway; national, county and municipal roads as well as private roads. NRDB stores both basic data and calculated data like traffic accidents and average annual daily

traffic. It contains basic data on airports and all stop points and terminals for bus, subway, railway and ferries. Other static data are road geometry, driving restrictions, traffic plans, permitted axle load, surface material, road curvature, speed limits, road width, tunnels and bridges, road furniture, rails, traffic signs, manholes, ditches, brick walls etc. Environmental data are also registered into the database.

The database offers a standardised web application based on the standard REST-API, for retrieving road and road traffic data. Data types will be road network geometry, road characteristics, traffic regulations, speed limits and many other types relevant for digital maps and information systems such as travel planners and navigations services. The data are available for use by the public sector and by national and international service providers and digital map producers.

Traffic data in the Norwegian NAP

The traffic data collection system in Norway for national and county roads has been substantially modernised during the last years. Traffic registration points collect basic data elements using real time communication for updating the central database. Data for bicycling and manual traffic registrations are also included in the central database. This database offers an API for retrieving traffic data statistics free of charge. The real time traffic data for volume, speed and vehicle categories from the registration points will shortly be made available in the NPRA Datex-node and therefore also in the NAP.

National body

The Ministry of Transport has designated the Norwegian Road Supervisory Authority (RSA) as the national body for ensuring that requirements are met. The formal assignment is based on the national ITS Act adopted in the Parliament December 2015.

Assessment of compliance

The RSA performs an assessment of compliance every other year. The assessment has been based on the use of the standardised form for self-declaration developed by the follow-up expert group and coordinated by the Commission.

The result of the assessment of compliance in 2020 shows no deviations from the requirements.

2.1.4 Reporting obligation under Delegated Regulation (EU) No 886/2013 on data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users (priority action c)

Road network coverage

The Norwegian Public Roads Administration's five traffic management centres (TMCs) are the hubs in the NPRA's Incident and Traffic Management (see also chapter 2.1.3). The TMCs have access to video surveillance from selected road sections, mainly tunnels, and to real time traffic data. In many tunnels, video surveillance is supplemented with automatic incident detection that responds to vehicle stops and objects in the road.

The Norwegian traffic information service does not operate with different service levels depending on the road category. The ability to detect traffic safety-related incidents varies naturally with the degree of instrumentation, traffic volume and personnel on the roads. Therefore, the complete national road network can be considered to be covered by the information service.

Events and conditions covered by the service

The information service in operation is based on open data available in DATEX II version 2.3 format in the national access point. Automatic flagging of SRTI-messages in the DATEX II-node was deployed in 2018 and makes it possible for service providers to identify SRTI-messages in DATEX-publications and to display SRTI-messages in navigation systems and map solutions.

For further information about data categories available from the DATEX II-node, see chapter 2.1.3.

The service covers all SRTI data elements with a best-effort quality level for the entire national road network, including TEN-T.

Planned development of the service

The NPRA will work continuously to improve the service and data quality for all eight SRTI data elements. This will require investments in more instrumentation along the roads, in enhanced reporting procedures and in the near future, data collection from cooperative ITS (C-ITS). Progress and investment levels will depend on annual budgets. In addition, central databases and applications need to be upgraded. This will also create the best possible benefit from investments in instrumentation and new technology.

During 2019 and 2020, further development of the DATEX-node has been carried out in order to prepare for the deployment of DATEX II version 3.0 in 2021 (see chapter 1.2). In connection with this, a pilot for data collection from C-ITS (DENM-messages) and transmission to the DATEX-node was carried out during autumn 2019. The results from the pilot were promising and gave a first indication of how C-ITS data can improve the SRTI service.

National access point

The national access point is described in chapter 1.2

Dissemination of information

The TMCs represents the main data source for the dissemination of information. The main national information services are provided by the national broadcaster, NRK, and by the NPRA. Early in 2016, the NPRA extended its basic information services to include a new map-based service developed in responsive design, where the selected event categories are visually indicated. On parts of the main road network, traffic safety related information is displayed on VMS boards.

National body

The Ministry of Transport and Communications has designated the Norwegian Road Supervisory Authority (RSA) as the national body for ensuring that requirements are met. The formal assignment is based on the national ITS Act adopted in the Parliament December 2015.

Assessment of compliance

The RSA has performed an assessment of compliance every year since 2016. The assessment has been based on the use of the standardised form for self-declaration developed by the follow-up expert group and coordinated by the Commission. Usually the RSA also performs random inspections.

The result of the assessment of compliance in 2020 shows no deviations from the requirements.

2.2 Priority area II. *Continuity of traffic and freight management ITS services*

2.2.1 Description of the national activities and projects

Priority area II: Continuity of traffic and freight management ITS services	
ITS Framework Architecture and FRAME NEXT	ARKTRANS is the official ITS framework architecture for Norway. The architecture is further developed in cooperation with EU projects, in particular EasyWay and EIP. FRAME NEXT is a project that extends the European ITS Framework Architecture (FRAME) with the activities of the different member states in Europe, with the priority areas concerned by the ITS directive (Directive 2010/40/EU) and with the methodologies and tools that make a modern ITS architecture attractive and appealing for its users. At the same time project partners from ten active EU Member States and Norway contribute their current developments and best practices and share their experiences with other stakeholders from public authorities and industry. The NPRA is currently a partner in the FRAME NEXT PSA and will give the project input from ARKTRANS, in particular with regards to multimodal ITS framework architecture and Heavy Goods Vehicles (HGV).
Tracking and tracing of freight across all modes of transport (freight transport logistics, eFreight)	No new development. Most freight operators have good tracking services for all types of freight as proprietary solutions with limited interoperability.
Road traffic management centers (TMCs)	Ongoing project to enhance interoperability between control systems for all TMCs. The project includes an integrated and incident-based user interface that offers minimal chances of error. The first new application, a state-of-the-art telephone and communications platform was deployed in the TMCs in 2018. The complete system will be deployed in all TMCs during 2021. Harmonised traffic management and tunnel control is part of the project. In addition to increased traffic safety and efficiency of rescue services, the system development for the TMCs will enhance incident and emergency detection and lead to higher quality for data required under the regulations 886/2013 and 962/2015. See also chapter 2.1.1.
Variable speed limits	The NPRA has used variable speed limits in connection with major road projects since the first implementation of a pilot in 2015 on sections of the motorway E18 South of Oslo.

2.3 Priority area III. *ITS road safety and security applications*

2.3.1 Description of the national activities and projects

Priority area III: ITS road safety and security applications	
Automatic emergency call (eCall)	The government has decided that the PSAP for the pan European eCall service in Norway will be Fire and Rescue service. Service start-up was established in 2018. See chapter 2.3.2
Information services for safe and secure parking places for trucks and commercial vehicles	The government aims to establish a substantial number of new rest areas in the coming years. When data collection is reliable and complete, Norway will reconsider starting the information service based on the ITS Directive priority action e) and utilise the EU Open Data Portal, probably in addition to the NAP for Norway. See chapter 2.3.3.
Reservation services for safe and secure parking places for trucks and commercial vehicles	No new development. See chapter 2.3.3
Automatic speed enforcement	Active use of automatic speed enforcement since the mid 1980's. Supplemented with average speed enforcement on road sections with higher speed related accident rates.
Automatic incident detection	AID is implemented in high volume road tunnels in combination with video monitoring. Testing of new technologies for AID is also on-going. AID is a mandatory requirement according to the security level, traffic volume and length of the tunnel explained in the NPRA manuals

2.3.2 112 eCall (priority action d)

Since April 2018, the PSAP infrastructure an organisation has been in operation. The responsibility lies with The Ministry of Justice and Public Security and the subordinate Directorate for Civil Protection and Emergency (DSB). The 112 eCall alarms are routed to the eCall PSAP operated by the call center for the Fire and Emergency Services. (in Norway there are three separate emergency numbers –police, health and fire –with their own separate emergency call centers).

The Norwegian government has decided that this implementation shall undergo an evaluation after the first 2 years of operation (the trial period). This evaluation will be published late in 2020. The DSB has registered that a high percentage of manually triggered alarms is not related to real emergency situations, but in need of road assistance or a result of pushing the alarm button unintentionally.

There is also in Norway a growing concern related to the eCall modems being based on 2G communication standards. This is now an obsolete technology and telecom operators consider closing this service. This may have immediate consequences for the eCall service.

2.3.3 Reporting obligation under Delegated Regulation (EU) No 885/2013 on the provision of information services for safe and secure parking places for trucks and commercial vehicles (priority action e)

Norway has **not yet started a service** for the Delegated Regulation 885/2013. However, in order to cater to legally imposed requirements for driving and resting times, rest stop areas for heavy transport are established where drivers can take breaks (45 minutes), night rest and weekly rest periods.

43 lay-bys have been established along the national roads in Norway as of February 2018 – see list in Annex 2.

Night rest areas are well marked by signs posted on the main road. The rest areas are normally located in the immediate vicinity of service companies offering food service and fuel sale. All of the rest areas have toilet facilities and well-lit parking sites. With a few exceptions, showers are also available, as well as 220V electrical hook-ups for cooler generators. The safety and service level of the rest stop areas is classified according to the EU LABEL scheme.

Pending the comprehensive establishment of night rest areas along the national roads, many of the ordinary rest areas with toilets can be used for breaks and night rest. It is to be noted that some of these are closed during winter

2.4 Priority area IV. *Linking the vehicle with the transport infrastructure*

2.4.1 Description of the national activities and projects

Priority area IV: Linking the vehicle with the transport infrastructure	
Nordic Way and C-Roads	The NPRA has been involved in the CEF supported NordicWay projects (1, 2 and 3) which have developed hybrid C-ITS services since 2015. The cloud-oriented NordicWay concept is relying on the use of existing cellular networks and stakeholder clouds to achieve cost-efficient C-ITS provision with the potential of covering most of the vehicle fleet already by 2030. The concept building on interchange nodes can via the federation of the interchange nodes be easily extended to cover all Europe and the whole TEN-T network, for instance. NordicWay 1 showed that the concept works for selected Day 1 C-ITS services with sufficiently low latencies and high reliability, good user acceptance, and expected safety impact. NordicWay 2 extended the service portfolio to cover relevant Day 1 and Day 1.5 C-ITS services and some automated driving use cases as well as the road network coverage. It also proved the feasibility of the federation of interchange nodes. The

	assessments focused now on user acceptance, technical performance, eco-systems and socio-economy. NordicWay 3 further extends the scope of C-ITS services to cities, changing thereby also the focus of service portfolio to include more traffic signal-oriented services such as GLOSA, TTG, SPAT-MAP etc. The NordicWay partners have been very active in European harmonisation activities within C-Roads, and in the forefront especially with regards to hybrid solutions and evaluation. For more information visit www.nordicway.net and www.c-roads.eu
Integration of different ITS in an open in-vehicle platform	Test Site Norway in Trondheim is equipped for testing of such communication platforms. Several pilots that includes C-ITS services was started in 2018. The present activities related to connected, cooperative and automated mobility are linked to the CEF-project Nordic Way and to the cross-border project on the E8 between Norway and Finland.
Road map for Automated Driving	As vehicles reaches higher levels of automation we see an increased need for new regulations concerning the use of automated transports in Norway. As a result, the NPRA is currently developing a road map describing measures that will enable us to make the necessary regulations. An example of these kind of measures is to map our existing infrastructure according to the ISAD levels. Developing the roadmap and the implementation of the measures both requires a high level of cooperation within the NPRA. The short-term plan is to identify as many needed measures as possible and to complete the road map. However, the process of making the necessary regulations is dynamic, and requires long term planning and continuous work.
Cooperative systems (vehicle-vehicle, vehicle-infrastructure, infrastructure-infrastructure)	Several pilots that includes C-ITS services was started in 2018. A Norwegian specification for ITS stations has been developed based on ETSI and CEN/ISO standards and will be tested out by Norwegian industry in the pilots. The ITS stations will establish hybrid communication (ITS G5 and 4G) and connectivity. A new national regulation for testing automated driving was adopted by Parliament in late 2017.
CCAM Single Platform and CCAM partnership	The Ministry of Transport and Communications and technical experts from the NPRA have participated in plenary meetings and working groups in the CCAM Single Platform and in all the clusters in relation to the preparations of the CCAM partnership.
DSRC-based multi-purpose infrastructure	The AutoPASS tolling system is fully interoperable, also cross-border. Tags are used to measure travel times in real-time. Other piggy-back applications are presently put on hold due a review to assess compliance with data privacy regulations. The NPRA will conduct studies to determine the criteria for investing in hybrid communication along the road network.

3 Key Performance Indicators (KPIs)

All the KPIs in this report are, unless otherwise stated, calculated based on the Comprehensive TEN-T Road network in Norway which covers 4852 km. Further, the KPIs are in most cases also reported for the state road network which covers the Comprehensive TEN-T Road network plus the main roads in Norway (length is 10280 km in 2020).

In order to have comparable data regarding deployment and benefit KPIs for the future, all numbers are based on values from either end of 2019 (for deployment KPIs) or from the period January-December 2019 (for benefit KPIs) as statistics do not yet exist for 2020.

3.1 Deployment KPIs

KPI	East		South		West		Mid		North		Norway in total		
	TEN-T	Nat. roads	TEN-T	Nat. roads	TEN-T	Nat. roads	TEN-T	Nat. roads	TEN-T	Nat. roads	TEN-T	% of TEN-T	Nat. roads
Number of km in total	802	1299	586	1261	848	1101	884	330	1732	1437	4852	N/A	5428
Number of km with real time registration of travel time	210	32	225	0	69	49	13	13	0	34	517	10,7	128
Number of km with camera surveillance	427	36	48	44	39	58	70	25	15	5	599	12,4	168
Number of km with automatic incident detection (AID)	59	7	29	18	37	28	19	23	16	13	160	3,3	89
Number of km with traffic management and traffic control measures	428	43	N/A	N/A	150	400	21	58	N/A	N/A	599	12,3	501

The KPI for "*Number of km with traffic management and traffic control measures*" are available only for 3 out of the 5 regions.

3.1.1 Information gathering infrastructures / equipment (road KPI)

Different types of data collection equipment are installed on parts of the Norwegian road network with high traffic volumes, high incident rates and demanding weather conditions. In addition, more than six hundred road tunnels are equipped with various degrees of data collection and traffic management equipment. The table above shows the total length of roads by type (TEN-T comprehensive network and the rest of the national road network, county roads are not included). The length of road equipped with the different kinds of equipment are distributed on the five regions and for the country in total. These numbers are the source for calculating the deployment KPIs for Norway. The numbers are collected by the regional offices and based on different statistics. There is on-going work to establish higher quality data of this kind in our National Road Data Base (NRDB).

2017: KPI for real time travel time registration = 6,9

2020: KPI for real time travel time registration = 10,7 (comprehensive TEN-T road network)

KPI for all types of data collection equipment is not available as a fixed number. On the Norwegian road network there is traffic counting equipment measuring traffic volumes, speed and vehicle length on the entire road network. On TEN-T roads there are 505 traffic counting stations and on the rest of the national road network there are 365. This registration equipment is online with the central database and the data can be used in real time by ITS services.

3.1.2 Incident detection (road KPI)

National guidelines for tunnels in Norway require an AID system installed in tunnels longer than 3 km and AADT above 8000 veh/day, and for tunnels longer than 5 km and AADT above 4000 veh/day. There are no installations of AID systems on road stretches outside tunnels in Norway. In addition to the AID systems in tunnels, roadside video cameras for traffic monitoring and manual incident detection are installed.

2017: KPI for automatic incident detection = 1,2

2020: KPI for automatic incident detection = 3,3

2017: KPI for incident detection based on cameras = 3,2

2020: KPI for incident detection based on cameras = 12,4

3.1.3 Traffic management and traffic control measures (road KPI)

Parts of the national road network, and in particular the comprehensive TEN-T, are equipped with ITS-systems for traffic management. The main purposes are mainly related to e.g. critical road segments, motorways with high traffic volume or mountain crossings. These road segments are mainly parts of national corridors connecting regions that demands a higher level of traffic monitoring and management in order to keep traffic flow and safety at acceptable levels.

2017: KPI for traffic management and traffic control measures = 5

2020: KPI for traffic management and traffic control measures = 12,3 (3 out of 5 regions)

3.1.4 Cooperative-ITS services and applications (road KPI)

Through the CEF supported NordicWay projects, all safety related messages that are available from the NPRAs DATEX II-node are disseminated to the common NordicWay Interchange system and thereby made available to all project partners for C-ITS applications. In the same manner, messages from all partners can be shared through the NordicWay Interchange Node. However, it is to be understood that NordicWay is still a pilot project and not a fully operational production system which is available to every road user and every service provider, so seen from the average traveller's point of view the coverage would be 0%.

Furthermore, the EC document on "ITS KPIs for the EU" states that Cooperative-ITS services or applications means road based ITS infrastructure enabling services or applications using infrastructure to vehicle or vehicle to infrastructure communication. In Norway, the NordicWay activities related to the TEN-T network are based on cellular communication and in some of the pilots ITS G5 with roadside ITS stations Since there is C-ITS operation only in pilots and no real services implemented, there is not enough data to calculate the KPI.

3.1.5 Real-time traffic information (road KPI)

Real-time traffic information can be obtained for the entire comprehensive TEN-T Road network and other national roads through the Norwegian NAP or via existing road user services in Norway.

2017: KPI for real-time traffic information =100

2020: KPI for real-time traffic information = 100 (state road network)

3.1.6 Dynamic travel information (multimodal KPI)

Not available

Oslo and many other Norwegian cities have dynamic travel information for public transport. The information is available on APIs and on stops and terminals. The quality and geographic coverage of these services has been extended since the last report. No KPI is calculated because the services are not linked to roads and road length.

3.1.7 Freight information (multimodal if possible or road KPI)

Not available

More work has to be performed in order to determine data sources and calculate KPIs.

3.1.8 112 eCalls (road KPI)

N/A – will be provided through the COCOM 112 questionnaire.

3.2 Benefits KPIs

As the benefits of the services cannot be directly measured, they will have to be estimated. The benefit calculations for road transport regarding change of travel time, fatalities, injury accidents and emissions are based on estimates by the NEXT-ITS Evaluation group made within the CEF supported projects NEXT-ITS and NEXT-ITS2[1] .

It is primarily the state road network that benefit from these services. Due to this the benefit KPIs are calculated for the state road network with the length of 10280 km (length in 2019). The state road network includes the TEN-T Comprehensive Road network and the national main roads in Norway.

The network and accident statistics as well as the estimated values for vehicle hours and vehicles hours spent in congestion for the year 2019 are shown in the table below.

THE STATE NETWORK – 10280 km	**2019**
Vehicle kilometres driven (million/year)	20299,6
Vehicle hours driven (million/year)	265,7
Vehicle hours spent in congestion (million/year)	4,5
Fatalities (number/year)	Ref. 3.2.2
Non-fatal injury accidents (number/year)	Ref. 3.2.2
CO_2 emissions (million tonnes/year)	6,5

Vehicle km driven and vehicle hours driven are calculated based on data for NRDB.

Vehicle hours spent in congestion are based on registrations from the travel time system. Delay for the road network without an implemented travel time system are set to 0.

[1] NEXT-ITS Evaluation Report, Final version, January 2016 (Lone Dörge et al.), NEXT-ITS 2 Evaluation Report, Version 1.0 Final, January 2018 (Lone Dörge et al.)

CO_2 emissions are calculated for the state road network, based on data from NVDB, vehicle fleet and emission factors per vehicle type.

3.2.1 Change in travel time (road KPI)

ITS measures deployed are mostly supported by TEN-T and CEF programmes (VIKING, EasyWay, NEXT-ITS). The measures and services have been roughly estimated to reduce total travel times on the state road network by approximately 131 000 vehicle hours in 2019.

- KPI (road) for change in travel time on the state road network
  -0.131/265.7*100% = -0.05%

The KPI for change in delay time has also been estimated with a reduction of total delays (= vehicle hours spent in congestion) of 10 200 vehicle hours in 2019 (excluding the motorway ITS systems).

- KPI (road) for change in delay time on the state road network
  -0.0102/4.5*100% = -0.23%

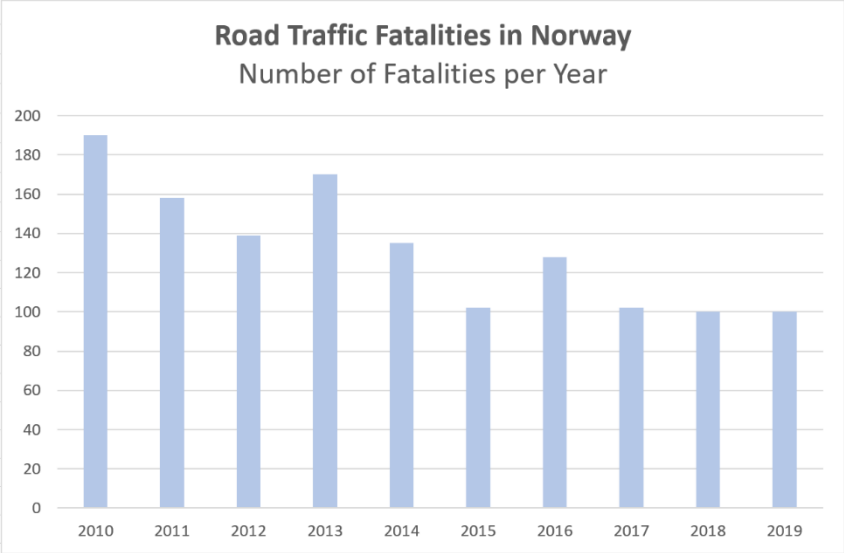
However, it should be noted that the impacts of the information services are extremely difficult to estimate, especially in this era of technology disruption due to connected and automated driving, the internet of things, digitalisation etc.

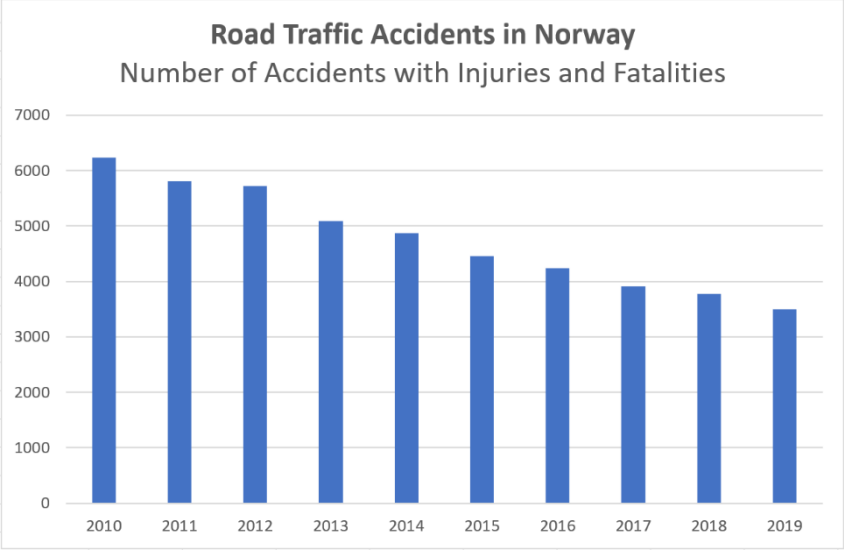
The KPI for public transport in relation to dynamic travel information has not been calculated/estimated.

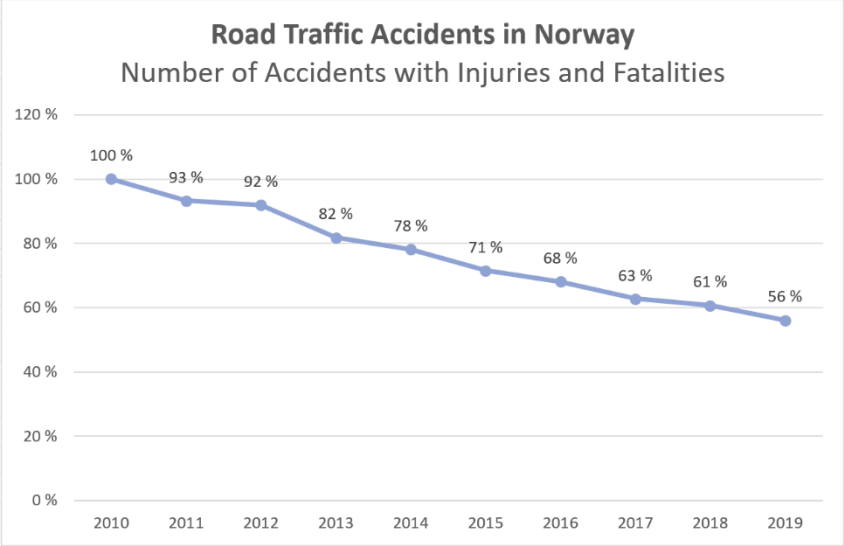
3.2.2 Change in road accident resulting in death or injuries numbers (road KPI)

The impact of the measures and services on road accidents resulting in death or injuries cannot be directly measured because a range of factors are influencing this KPI. As the accident numbers vary during the years, there is a large statistical uncertainty and various attempts of statistical analyses on accident numbers have been inconclusive. However, rough estimates can be made and the NEXT-ITS projects performed such effect estimations, but due to a cautious approach principle with very conservative safety effect estimates the resulting change in personal injury accidents was very limited.

Although the total number of road traffic accidents and fatalities in Norway are decreasing. The figures below show how the number of road traffic accidents in Norway have developed from 2010 to 2019.


Road Traffic Fatalities in Norway
Number of Fatalities per Year
200
180
160
140
120
100
80
60
40
20
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Road Traffic Accidents in Norway
Number of Accidents with Injuries and Fatalities
7000
6000
5000
4000
3000
2000
1000
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Road Traffic Accidents in Norway
Number of Accidents with Injuries and Fatalities
120 %
100 %
80 %
60 %
40 %
20 %
0 %
100 %
93 %
92 %
82 %
78 %
71 %
68 %
63 %
61 %
56 %
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

3.2.3 Change in traffic-CO2 emissions (road KPI)

The measures and services have been roughly estimated to reduce CO_2 emissions on the state road network by 3200 tonnes in 2019 (excluding the motorway ITS systems).

- KPI (road) for change in CO_2 emissions on the state road network
  -3200/6 500 000*100% = -0.05%

3.3 Financial KPIs

Annual investment in road ITS (as a % of total transport infrastructure investments): **Not available**

Annual operating & maintenance costs of road ITS (in euros per kilometre of network covered): **Not available**

4 Annex 1: Datatypes required in (EU) 1926/2017 available in Transportportal.no today

Scheduled timetables

- Air
- rail including high speed rail
- light rail
- long-distance coach
- maritime including ferry
- metro, tram, bus, trolley-bus

Demand-responsive

- Shuttle bus, shuttle ferry, taxi, car-share, car-pool, car-hire, bike-share, bike-hire (partially)

Personal

- Car, motorcycle, cycle

The types of the static travel data
Service level I- 1.12.2019

Location search (origin/destination)

- Address identifiers (building number, street name, postcode)
- Topographic places (city, town, village, suburb, administrative unit)
- Points of interest (related to transport information) to which people may wish to travel

Trip plans

- Operational Calendar, mapping day types to calendar dates

Location search (access nodes)

- Identified access nodes (public transport stops incl. bus, tram and metro, railway stations, airport terminals, ferry terminals, taxi ranks) (partially)
- Geometry/map layout structure of access nodes (all scheduled modes) (partially)

Trip plan computation – scheduled modes transport

- Network topology and routes /lines (topology) (partially)
- Transport operators
- Timetables
- Planned interchanges between guaranteed scheduled services (partially)
- Hours of operation
- Accessibility of access nodes, and paths within an interchange (such as existence of lifts, escalators) (partially)

Trip plan computation – road transport

- Road network
- Cycle network (segregated cycle lanes, on-road shared with vehicles, on-path shared with pedestrians) (partially)
- Pedestrian network and accessibility facilities

Service level II-1.12.2020

Location search (demand responsive modes)

- Park & Ride stops(partially)
- Bike sharing stations

Service level III-1.12.2021

Information service (all modes)

- How to book car sharing, taxis, cycle hire etc. (incl. retail channels, fulfilment methods, payment methods) (partially)

Trip plans

- Detailed cycle network attributes (surface quality, side-by-side cycling, shared surface, on/off road, scenic route, 'walk only', turn or access restrictions (e.g. against flow of traffic) (partially)

Types of the dynamic travel and traffic data
Service level I- 1.12.2019

Passing times, trip plans and auxiliary information

- Disruptions (all modes)
- Real-time status information – delays, cancellations, guaranteed connections monitoring (all modes)

Service level II- 1.12.2020

Passing times, trip plans and auxiliary information

- Estimated departure and arrival times of services

Availability check

- Estimated departure and arrival times of services (partially)
- Car parking spaces available (on and off-street), parking tariffs, road toll tariffs (partially)

Annex 2: Lay-bys established along the national roads in Norway as of February 2018

Eastern Norway

- E6 Svinesundparken, Halden, Østfold, 27 sites
- E6 Fugleåsen, Ski, Akershus, 100 sites
- E6 Ormlia, Eidsvoll, Akershus, 47 sites
- E6 Circle K Minnesund, Eidsvoll, Akershus, 25 sites
- E6 Biri travpark, Gjøvik, Oppland, 30 sites
- E6 Vinstra vegpark, Nord-Fron, Oppland, 60 sites including 18 sites for short-term parking
- E6 Dovreskogen, Dovre, Oppland, 14 sites
- E18 Ørje, Marker, Østfold, 10 sites
- NR 3 Myklagard, Løten, Hedmark, 20 sites
- NR 3 Shell Koppang, Stor-Elvdal, Hedmark, 13 sites
- NR 3 Alvdal, Hedmark, 20 sites

Western Norway

- E16 Shell Dale, Vaksdal, Hordaland, 10 sites
- E16 YX Skulestadmo, Voss, Hordaland, 10 sites
- E16 Shell Gudvangen, Aurland, Sogn og Fjordane, 15 sites
- E16 Steinklepp, Lærdal, Sogn og Fjordane, 10 sites
- E39 Esso Vikeså, Bjerkreim, Rogaland, 10 sites
- E39 Søylandskiosken, Gjesdal, Rogaland, 9 sites
- E39 Heiane, Stord, Hordaland, 9 sites
- E39 Bergen travpark, Vågsbotn, Hordaland, 25 sites
- E39 Haugsvær, Masfjorden, Hordaland, 10 sites
- E39 Esso Skei, Jølster, Sogn og Fjordane, 10 sites
- E134 Best Kyrping, Etne, Hordaland, 10 sites

Southern Norway

- E18 Kjellstad, Lier, Buskerud, 15 sites (southbound)
- E18 Furulund Kro & Motel, Stokke, Vestfold, 20 sites
- E18 Horisonten Lillesand, Aust-Agder, 18 sites
- E18 YX Lillesand, Aust-Agder, 25 sites
- E18 Circle K Lillesand, Aust-Agder, 10 sites
- E39 Circle K Livold, Lindesnes, Vest-Agder, 10 sites

Central Norway

- E6 Oppdalsporten, Oppdal, Trøndelag, 15 sites
- E6/E39 Circle K Klett, Trondheim, Trøndelag, 22 sites

- E6 Stav Gjestegård, Malvik, Trøndelag, 25 sites
- E6 YX Gråmyra, Levanger, Trøndelag, 10 sites
- E6 Best Brekkvasselv, Namsskogan, Trøndelag, 8 sites
- E39 Digerneset, Skodje, Møre og Romsdal, 15 sites
- NR 70 Håsøran, Sunndalsøra, Sunndal, Møre og Romsdal, 12 sites

Northern Norway

- E6 Mosjøen, Vefsn, Nordland, 16 sites
- E6 Fauske, Nordland, 12 sites
- E6 Innhavet, Hamarøy, Nordland, 5 sites
- E6 Buktamoen, Målselv, Troms, 12 sites
- E6 Circle K Storslett, Nordreisa, 10 sites
- E6 Shell Talvik, Alta, Finnmark, 10 sites
- E6/E75 Tana bru, Finnmark, 10 sites
- NR 80 Bodø havn, Nordland, 9 sites