

Roadmap to fossil-free transport

Government resolution on reducing domestic transport's greenhouse gas emissions

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Abstract According to the Government Programme, Finland will be carbon neutral by 2035. The targets for reducing emissions from transport must be in line with this goal. By 2030, Finland will reduce emissions from domestic transport by at least 50 per cent compared to the 2005 level. The aim is to achieve an entirely fossil-free transport sector by 2045.

In line with the Government Programme, the Ministry of Transport and Communications has prepared a Roadmap for fossil-free transport to reduce greenhouse gas emissions from transport. The Roadmap includes three phases. In the first phase, the Government will implement a wide range of aids and incentives to promote emission-free transport. Among these are the inclusion of biogas and electric fuels in the distribution obligation legislation, various aids related to the procurement and distribution infrastructure of electric and gas vehicles, support for promoting walking, cycling and public transport services, transport infrastructure maintenance and digitalisation in logistics.

In the second phase, more measures will be added to the range of instruments. Further information will be needed on their effects on emissions before decisions can be taken. The possible measures include raising the level of obligations in the distribution obligation act, increasing remote work, promoting both combined transport operations in freight transport and digital solutions for transport, and promoting transport services.

In the third phase, once the progress of EU-level measures, processes decided in other forums and the impacts of all measures of phases 1 and 2 are known, the Government will assess and decide on the possible need for additional national measures in the transport sector. Phase three of the Roadmap is conditional.

Keywords greenhouse gas emissions, climate change, transport, greenhouse gases, climate changes, climate policy

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Fossiilittoman liikenteen tiekartta

Valtioneuvoston periaatepäätös kotimaan liikenteen kasvihuonepäästöjen vähentämisestä

Liikenne- ja viestintäministeriön julkaisuja 2021:19

Julkaisija Liikenne- ja viestintäministeriö

Toimittaja/t Saara Jääskeläinen

Kieli Englanti **Sivumäärä** 56

Tiivistelmä Hallitusohjelman mukaan Suomi on hiilineutraali vuonna 2035. Liikenteen päästövähennystavoitteiden tulee vastata tähän tavoitteeseen. Suomi vähintään puolittaa kotimaan liikenteen päästöt vuoteen 2030 mennessä verrattuna vuoden 2005 tasoon. Vuoteen 2045 mennessä tavoitellaan kokonaan fossiilitonta liikennettä.

Hallitusohjelman mukaisesti liikenne- ja viestintäministeriössä on valmisteltu fossiilittoman liikenteen tiekartta liikenteen kasvihuonekaasupäästöjen vähentämiseksi. Fossiilittoman liikenteen tiekartta pitää sisällään kolme eri vaihetta. Ensimmäisessä vaiheessa hallitus panee toimeen lukuisia erilaisia tukia ja kannustimia, joilla edistetään liikenteen päästöttömyyttä. Näitä toimia ovat muun muassa biokaasun ja sähköpolttoaineiden sisällyttäminen jakeluvelvoitelakiin, erilaiset sähkö- ja kaasuautojen hankintoihin ja jakeluinfraan liittyvät tuet sekä kävelyn, pyöräilyn ja joukkoliikenteen tuet, infran kunnosta huolehtiminen ja logistiikan digitalisaatio.

Toisessa vaiheessa keinovalikoimaan lisätään keinoja, joiden vaikutuksista päästöihin tarvitaan vielä lisää tietoa ennen päätöksentekoa. Mahdollisia keinoja ovat jakeluvelvoitelain velvoitetason nostaminen, etätyön lisääntyminen, yhdistettyjen kuljetusten edistäminen tavaraliikenteessä ja liikenteen digitaaliset ratkaisut ja liikenteen palveluiden edistäminen.

Kolmannessa vaiheessa, kun EU-tason toimien, muissa yhteyksissä päätettävien prosessien ja vaiheiden 1 ja 2 kaikki toimet vaikutuksineen ovat tiedossa, hallitus arvioi ja päättää mahdollisesta kansallisten lisätoimien tarpeesta liikennettä koskien. Vaihe kolme on tiekartassa ehdollinen.

Asiasanat liikenne, kasvihuonekaasut, ilmastonmuutokset, ilmastopoliittikka, kasvihuonekaasupäästöt, ilmastonmuutos

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Färdplan för fossilfria transporter

Statsrådets principbeslut om minskning av växthusgasutsläppen från trafiken i Finland

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Utgivare Kommunikationsministeriet

Redigerare Saara Jääskeläinen

Språk engelska

Sidantal 56

Referat Enligt regeringsprogrammet ska Finland vara koldioxidneutralt 2035. Målen för att minska utsläppen från trafiken och transporterna ska motsvara detta mål. Minimum är att Finland ska halvera de inhemska trafikutsläppen fram till 2030 jämfört med nivån 2005. Målet är helt fossilfria transporter före 2045.

I enlighet med regeringsprogrammet har kommunikationsministeriet utarbetat en färdplan för fossilfria transporter som syftar till att minska växthusgasutsläpp i transporten. Färdplanen för fossilfria transporter omfattar tre olika faser. I den första fasen verkställer regeringen flera olika stöd och incitament som ska främja utsläppsfria transporter. Till åtgärderna hör bland annat att inkludera biogas och elbränslen i lagen om distributionsskyldighet, införa olika stöd för upphandling av elbilar och gasbilar och deras distributionsinfrastruktur samt att främja gång, cykling och kollektivtrafik, upprätthålla infrastrukturer och digitalisera logistiken.

I den andra fasen införs metoder vars inverkan på utsläppen det behövs mer kunskap om innan beslut fattas. Dessa metoder inkluderar möjligheten att höja nivån på distributionsskyldigheten, att öka distansarbete och att främja kombinerade transporter, digitala lösningar inom transport och transporttjänster.

I den tredje fasen utvärderar och bestämmer regeringen om det finns behov för ytterligare nationella åtgärder inom transport. Detta sker efter att åtgärder på EU-nivå, processer som beslutas i andra sammanhang och åtgärderna i fas ett och två har verkställts och deras effekter är kända. Fas tre i färdplanen är villkorlig.

Nyckelord växthusgasutsläpp, klimatförändring, transport, växthusgaser, klimatförändringar, klimatpolitik

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1 Introduction

According to the Paris Agreement of 2015, the increase in the global average temperature should be limited to 1.5 °C compared to pre-industrial times. To achieve this goal, rapid and radical emission cuts are needed in all sectors of society. Global carbon dioxide emissions should be halved by 2030 and net zero emissions should be achieved halfway through the century.

According to the current EU legislation, Finland should reduce greenhouse gas emissions in the effort sharing sector by at least 39% by 2030 from the levels in 2005. At the national level, Finland is committed to cutting domestic transport emissions in the effort sharing sector by at least 50% by 2030. The target has been agreed in the National Energy and Climate Strategy in 2016, in the Medium-term Climate Change Policy Plan in 2017 and in the Programmes of Prime Minister Antti Rinne's and Prime Minister Sanna Marin's Governments in 2019.

The long-term objective of the Government Programme is that Finland should be carbon-neutral in 2035. The targets for reducing emissions from transport must be in line with this goal. According to scenario assessments carried out in Finland in 2018 and 2019 (PITKO and PITKO continuation), this means that greenhouse gas emissions from transport must be completely eliminated by 2045.

As the EU's common emission reduction target was tightened at the end of 2020 from 40% to 55%, the target for the Finnish effort sharing sector may also be tightened in the next few years. If the effort sharing sector's target becomes more stringent, it is possible that even higher emission reductions will be required from traffic in 2030. For this reason, when planning emission reduction measures for transport, preparations should also be made for more stringent emission reduction targets.

According to the Government Programme, a roadmap for fossil-free transport will be prepared during this government term. According to the mandate, the roadmap presents the means by which greenhouse gas emissions from domestic transport will be halved by 2030 compared to 2005 levels, and transport will be converted to zero

emissions by 2045 at the latest. The Government Programme also outlines certain other measures to reduce transport emissions.

During this government term, measures will be implemented to enable the reform of vehicle propulsion technologies and the gradual transition to zero emissions of the vehicle fleet and to steer the use of sustainably produced liquid biofuels, in particular for use in heavy transport and aviation, and to assess the adequacy of sustainably produced biofuels in road transport. In addition, a cooperation network will be launched with the duty of developing emission indicators to be used, for example, as a basis for taxation. The roadmap for fossil-free transport also addresses these Government Programme guidelines.

In the preparation of the roadmap, the objective of knowledge-based decision-making pursuant to the Government Programme has been complied with. To support the work, extensive impact assessments have been prepared on measures considered central, and other measures have been assessed on the basis of existing research literature. The impacts have been assessed in terms of concrete and implemented measures, not in terms of the emission reduction potential of the achievement of a specific target. The aim of this approach is to ensure that the roadmap is correctly dimensioned, cost-effective and feasible in relation to the objective.

Based on research literature, the role of transport digitalisation and of the Mobility-as-a-Service concept has been assessed as part of the whole. These assessments are not as such commensurate with the actual impact assessments, as it has not been possible to identify any individual, concrete measure whose impacts would be assessed as a basis for the assessment. Thus, the assessment of the digitalisation of transport and the shifting of transport toward services is related to the emission reduction potential of these themes, not the effectiveness of a steering instrument. The emission reduction potential may not be realised automatically without new steering methods.

According to the Government Programme, emission reduction measures in the various sectors of society will be carried out in a way that is fair from a social and regional perspective and that involves all sectors of society. Particular attention has therefore been paid to social and regional sustainability in the preparation of transport measures. In the planning and implementation of measures, it must also be ensured that the possibilities of different special groups, such as persons with disabilities or memory disorders, to move and live in everyday life remain unchanged despite changes in vehicles, transport fuels and the transport system as a whole.

Climate change mitigation in itself receives strong support from citizens. According to the Climate Barometer carried out in 2019, 70% of Finns felt that mitigating climate

change should be one of the Government's key themes. Three out of four Finns supported the principle that those producing emissions should also pay for them. The citizens' support is important in the preparation of emission reduction methods for transport.

Reducing transport emissions and combating the dangerous effects of climate change are important also in emergency conditions during the exceptional circumstances of 2020. The COVID-19 pandemic, which began in spring 2020, has had a significant impact on the supply of transport services, traffic volumes and trade in transport equipment both in Finland and elsewhere in the world. Lower traffic volumes have resulted in a reduction in emissions on a global level, but longer-term effects are still difficult to estimate. Stimulating the economy is a precondition for coping with the recession caused by COVID-19. If the stimulation supports a transition to cleaner energy and more sustainable mobility in particular, both climate objectives and the construction of a more sustainable transport system can be promoted at the same time. Many of the measures proposed also serve as tools for recovery.

There are several new opportunities for reducing emissions. In the transport sector, the measures to combat climate change can be designed and implemented in such a way that the entire transport system will become not only fossil-free but also healthier, more pleasant and cost-effective as well as cheaper and easier to use. Measures aimed at reducing greenhouse gas emissions also open up entirely new business opportunities for companies. Transport climate policy can improve Finland's global competitiveness if we find cost-effective and exportable solutions, services and technologies here to reduce emissions.

The roadmap for fossil-free transport has been prepared on the basis of the recommendations of the working group on fossil-free transport and the impact assessments described above. Low-carbon roadmaps prepared in the transport and logistics sector have also been utilised in the preparation. In addition, the preparation of the fossil-free roadmap has been coordinated with the preparation of the National Transport System Plan (Traffic 12). The National Transport System Plan for 2021–2032 focuses on improving the energy efficiency of the transport system in terms of emission reduction methods. One of the aims of the National Transport System Plan is to improve people's opportunities to choose more sustainable modes of transport, especially in urban areas.

2 Current state of greenhouse gas emissions from domestic transport, emission reduction targets and projected development

Greenhouse gas emissions in 2019 from Finnish domestic transport¹ totalled approximately 11.1 million tonnes of carbon dioxide equivalent. Transport emissions account for approximately one fifth of Finland's total greenhouse gas emissions and some 40% of emissions in the so-called effort sharing sector. Some 94 percent of emissions from transport in Finland were generated by road traffic. Some 54% of road transport emissions were caused by passenger cars, around 41% by vans and trucks and the rest by buses, motorcycles, mopeds and other motor vehicles.

Rail traffic accounted for less than 1 percent of domestic traffic emissions, and domestic waterborne traffic accounted for about 4 percent. Domestic air traffic accounted for about 2 percent of Finland's transport emissions, but it should be noted that these emissions are not counted as part of emissions in the effort sharing sector.

Compared with 2018, domestic traffic emissions decreased by about 3 percent in 2019 (0.3 million tonnes). With the exception of 2018 and a few other exceptional years, greenhouse gas emissions from transport have generally decreased since 2008. The increased share of biofuels in road transport fuels and improved energy efficiency of new cars have contributed to the reduction in emissions. However, the reduction of emissions has been very slow, and current measures do not reduce transport emissions in line with the targets set.

¹ Emissions from road, rail and domestic waterborne transport using different fuels are calculated as emissions from domestic transport. Emissions from electric transport are counted as part of emissions from electricity production in the emissions trading sector. Emissions from domestic aviation are treated as a separate source of emissions.

Anticipated development of greenhouse gas emissions from transport until 2045

According to the baseline forecast for greenhouse gas emissions from transport, carbon dioxide emissions from domestic transport will fall by a total of 37% by 2030 and by a total of 50% by 2045 compared to 2005 levels (see Figure 2 and Appendix 1)². The aim is to halve greenhouse gas emissions from transport by 2030 *compared to 2005*. Carbon dioxide emissions from road transport in 2005 were about 12.5 million tonnes, which means that in 2030, the emissions should total only about 6.25 million tonnes. In 2019, the emissions totalled around 11 million tonnes, which means that the need for additional emission reductions is still around 4.75 million tonnes.

With regard to road transport, it has been estimated that the existing measures will still achieve a reduction of approximately 3.1 million tonnes of CO₂, i.e. *the new measures should cover a further reduction of around 1.65 million tonnes by 2030* (see Figure 2). Achieving additional emission reductions can be challenging, as a number of effective measures have already been implemented and have therefore already been included in the baseline forecast. These measures include the 30% distribution obligation for biofuels, emission performance standards for the manufacture of new cars and the so-called clean vehicle procurements directive.

The baseline forecast for greenhouse gas emissions from transport is based on the vehicle-kilometre forecast of the Finnish Transport and Communications Agency (formerly Transport Agency) from 2018. The underlying projections for GDP and population growth are from 2017. The new GDP and population growth forecasts, updated last year, are considerably more moderate than the old ones. It has therefore been decided to update also the baseline forecast during spring and summer 2021. It is expected that reducing GDP and population growth forecasts in the vehicle-kilometre forecast will also reduce vehicle-kilometre growth in the baseline forecast. It is also expected that the vehicle-kilometre reduction in the baseline forecast will, to some extent, reduce the amount of greenhouse gas emissions in the baseline forecast and consequently influence the dimensioning of the additional measures needed in phase 3 of the roadmap. However, the overall impact on transport emissions is not directly proportional to the change in vehicle-kilometres, as the vehicle-kilometre decrease also reduces the reduction in emissions from biofuels, for example. The number of

² The baseline forecast for greenhouse gas emissions from transport has been prepared using the so-called ALIISA calculation tool developed by VTT Technical Research Centre of Finland. Due to the properties of the calculation tool, the forecast only examines CO₂ emissions, not other greenhouse gas emissions. Carbon dioxide emissions account for more than 95% of all greenhouse gas emissions in transport.

electric cars in the baseline forecast should also be reviewed. The update of the baseline forecast will be available in autumn 2021 when phase 3 is decided on.

Figure 1. Baseline forecast for greenhouse gas emissions from domestic transport 22 April 2020 (Source: VTT/Lipasto 2019 and Ministry of Transport and Communications) (due to the properties of the calculation tool, only carbon dioxide, not other greenhouse gas emissions, is included in the analysis).

CO₂ emissions from domestic transport, million tonnes, baseline projection

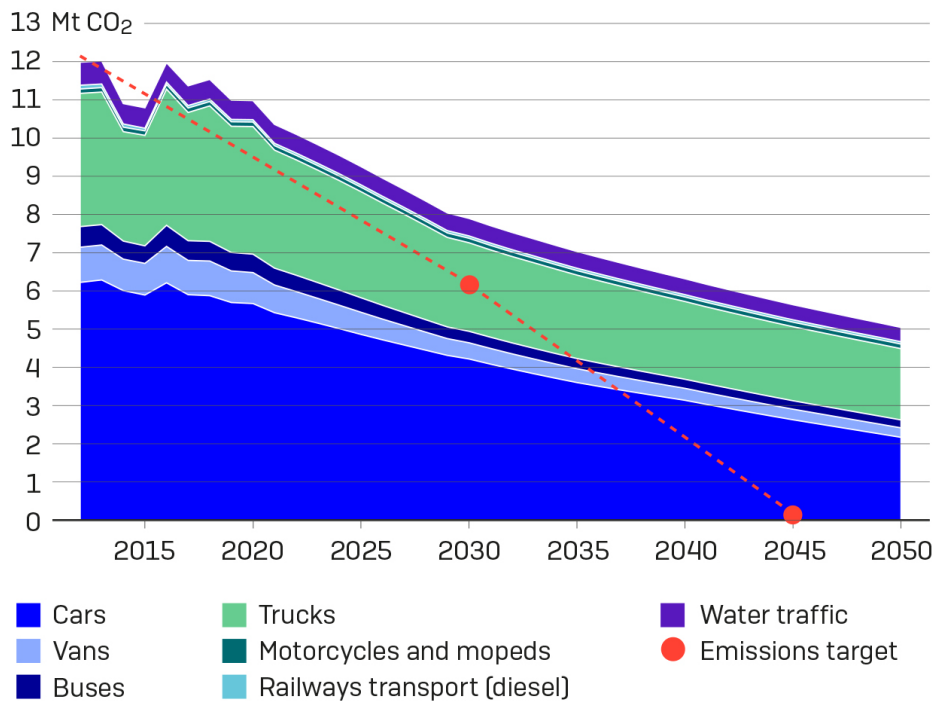
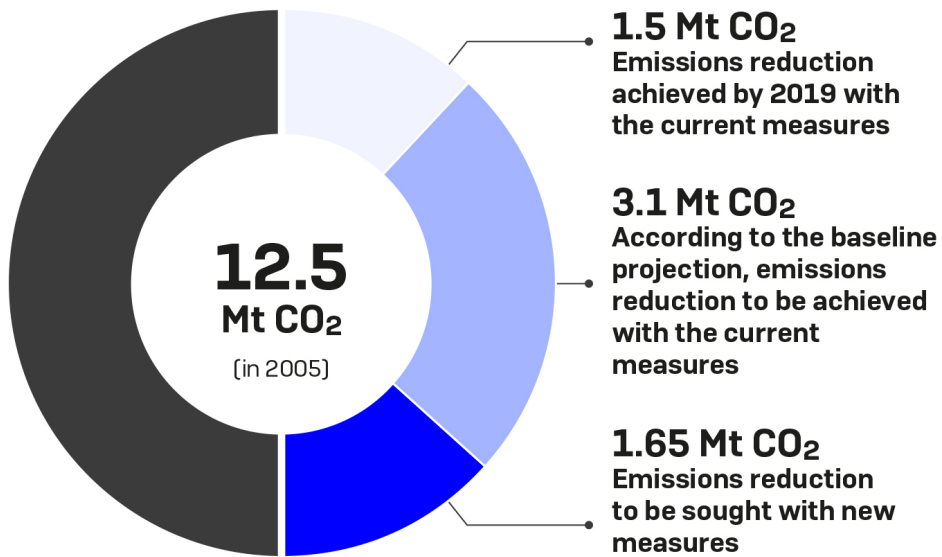


Figure 3. Halving carbon dioxide emissions from domestic transport by 2030; emission reductions already implemented, those anticipated and those still needed



3 Roadmap targets and measures to halve greenhouse gas emissions from domestic transport by 2030

The objectives and measures of the fossil-free transport roadmap are primarily targeted at road transport, as the majority of greenhouse gas emissions are generated in road transport, and thus the greatest emission reduction potential is in road transport. Some measures also target rail transport. The roadmap does not include domestic water transport measures, even though domestic water transport is included in the traffic counted for the effort sharing sector. Domestic water transport measures are defined in the draft resolution on greenhouse gas emissions from maritime and inland waterway transport.

The roadmap for fossil-free transport up to 2030 consists of three different phases, the third or last of which is conditional.

In the first phase of spring 2021, decisions will be made on subsidies and incentives 1–20, which will promote emission-free transport, with a calculated emission reduction of at least 0.62/1.65 megatonnes (Mt). Detailed assessments of the impact of these measures can be found (see Appendix 3).

In the second phase of autumn 2021, appropriate **additional measures** will be added to the toolbox after clarifying the decisions made by the Sustainable Growth Programme for Finland and the Ministry of Finance's transport taxation working group. Further information on the preconditions and impacts of the additional measures will be needed.

- Increasing the distribution obligation from the current 30% to 34% or even higher (e.g., 40%), if the availability of biodiesel and biogas through domestic sustainable production is strengthened and investments in industrial-scale production of electric fuels enable it. A report on the sustainability requirements needed by the distribution obligation will also be carried out.
- Prerequisites for increasing remote work
- Emission reduction potential of combined transport
- Digital transport solutions and promotion of mobility services

- Other credible, verifiable emission reduction measures that emerge

In the third phase, any further necessary measures will be decided. In summer 2021, the European Commission is expected to make a number of proposals to achieve the EU's climate objectives. Many of the expected proposals relate to transport emissions. The Commission may also submit a proposal to connect road transport to emissions trading. Finland considers the reduction of emissions to be a priority in the reform of the EU's climate and energy policy framework and cost-effectiveness a guiding principle for work. Finland thus influences in such a way that if road transport emissions trading were introduced, it would be created as a separate system or, alternatively, a separate emissions trading system covering road transport and separate heating of buildings would be investigated.

Once the progress of EU-level measures and that of both phases 1 and 2 are known by autumn 2021, the Government will assess and decide on the possible need for additional national measures for the transport sector. To this end, the Government will continue to prepare the various alternative measures, including national emissions trading for fossil fuels and the transport tax model based on kilometres and road categories, in case other national measures and solutions at EU level together are insufficient.

The assessment of additional measures will also take into account the progress of Finland's carbon neutrality objective in other sectors and, with regard to other measures, the cost-effectiveness of emissions reductions, the impact on competitiveness as well as regional and social fairness and the careful impact assessments carried out to support this work.

3.1 Measures to support a fair transition (Phase 1)³

3.1.1 Replace fossil fuels with alternative transport fuels

Fossil fuels in transport can be replaced by alternative transport fuels, such as electricity and hydrogen, or various renewable fuels such as liquid biofuels, biogas or electrofuels. The amount of energy consumed by traffic each year is so high that it is not possible to replace the entire energy consumption with only one single alternative propulsion system or fuel alternative. Both a reduction in the total energy consumption of transport and a number of different transport fuel options are needed to replace fossil fuels. Therefore, alternative transport fuels are not mutually exclusive options in traffic; alternative transport fuels and fossil fuels are. As a general rule, fossil fuels should, in the longer term, be eliminated. Mostly various vintage and recreational vehicles and vehicles used in rescue tasks or in exceptional circumstances can be an exception to this. The transport fuel reform must also pay careful attention to security-of-supply issues.

In order to halve greenhouse gas emissions from transport by 2030, fossil fuel consumption should be halved in almost the same time. Fuel consumption can be reduced by reducing the number of kilometres driven or the amount of fuel consumed by individual means of transport (see paragraphs 3.1.2 and 3.1.3). Fuel consumption can also be reduced by switching to electricity in transport⁴. In 2030, at least 30% of the remaining fuel consumption will be covered by renewable fuels, such as liquid biofuels produced from sustainable raw materials, biogas and possibly also hydrogen and/or electrofuels made from hydrogen⁵.

³ NOTE: The measures of the resolution will be implemented within the limits of the budget and the existing appropriations. Decisions on additional appropriations or other measures affecting the budget will be made separately within the central government spending limits and in the annual budgets.

⁴ In accordance with international statistical practices, electricity use is considered emission-free in transport, as emissions from electricity production are included in emissions trading.

⁵ Various biofuels are considered emission-free in transport because they do not increase the circulation of carbon in the atmosphere. For electrofuels, the calculation rules are still open. Electrofuels refer to fuel produced from hydrogen separated from water and carbon dioxide collected from the atmosphere through synthesis (synthetic fuel or electrofuel)

Liquid biofuels and electrofuels can mostly be mixed with existing conventional fuels and distributed at traditional distribution stations. On the other hand, a new distribution infrastructure is needed for electricity and gas, so that people and companies can switch to users of these transport fuels everywhere in Finland. The aim is to have at least one public fast-charging station per 100 electric cars in Finland in 2030 and that a charging point can be found for each electric car also for overnight charging. In 2025, the number of CNG refuelling stations would be 100 and the number for liquefied gas would be approximately 40. In the longer term, the number of stations should at least double.

The traffic use of hydrogen in Finland has not progressed on market terms. If the situation were to change and there would be more demand for hydrogen in the future, the use of hydrogen in transport would also require a new distribution infrastructure. For this reason, the demand for hydrogen must be carefully monitored and possible measures must be taken in the event of a change in demand.

Measures:

1. Include biogas and electrofuels in the distribution obligation.

Under current legislation, the share of transport biofuels in liquid road transport fuels will be increased to 30% by 2030 (“Act on the Promotion of the Use of Biofuels for Transport”). The Act on the Promotion of the Use of Biofuels for Transport only covers liquid biofuels used in road transport (ethanol, biodiesel and renewable diesel). It has been recorded in the Government Programme that sustainable biogas be included in the obligation to distribute biofuels. The inclusion of both biogas and electrofuels in the scope of the act has been examined in 2020 in a project commissioned by the Ministry of Economic Affairs and Employment⁶.

One of the key results of the study was that the inclusion of biogas in the obligation would produce extra trading value for it in the fuel market. This additional value could accelerate domestic investments in the production and use of biomethane in heavy-duty vehicles. In the future, electrofuels could also play a role in replacing fossil petrol and diesel. Based on the study, *both biogas and electrofuels must be included in the distribution obligation.*

- Emission reduction impact: Does not reduce greenhouse gas emissions from transport unless the level of the distribution obligation is increased

⁶ https://tem.fi/documents/1410877/2132212/Jakeluvoltteen_laajentaminen_loppuraportti_julkaisu.pdf/732b8c4d-c07d-b6ca-d4a7-8af1f2a00b37/Jakeluvoltteen_laajentaminen_loppuraportti_julkaisu.pdf?t=1599738665281

at the same time. It has been estimated that it would be possible to obtain approximately 2.5 TWh of biogas for transport use in Finland in 2030. If this amount is specifically intended to replace fossil fuels, not liquid biofuels, in transport, the distribution obligation should be increased by about 4 percentage points. The emission reduction would then be approximately 0.21 Mt. See item 21 below.

- Cost impact: No direct costs to the central government. With the distribution obligation, the fuel tax on biogas would increase the price of pure biomethane by about €0.08 per litre of petrol equivalent. The cost impacts of any increase in the distribution obligation should be examined, see item 21.

2. Continue and increase support to public distribution infrastructure for transport electricity and gas.

In order to enable people and companies across Finland to move away to other transport fuels from fossil petrol and diesel in transport in the coming decades, a nationwide public charging network for electric cars and a fuelling infrastructure for gas cars are needed. These are a prerequisite for a fair transition to solutions in transport that are better for the climate. As the number of cars moving with alternative transport fuels is still relatively small in Finland, the construction of a distribution infrastructure is not necessarily profitable yet. For this reason, state infrastructure support is needed at the beginning.

In 2018–2019, distribution infrastructure support totalled €3M/year. Half of the sum was used to construct electric car charging infrastructure and half for gas car refuelling infrastructure. Support for fuelling gas cars, support for high-power charging points for electric cars and support for charging electric buses alike were sought much more than support was available. The amount of the subsidy was therefore increased to €5.5M in 2020. According to the Energy Authority's estimate, the need for subsidies is still increasing, as the number of cars is also increasing. The Ministry of Transport and Communications has estimated that subsidies would be needed at least until the mid-2020s, after which the number of cars could already enable the construction of the distribution infrastructure on market terms.

€8.5M/year, or a total of €34M for 2022–2025, will be reserved to support the charging infrastructure of electric cars. Of the subsidy amount, €22M will be reserved for the construction of high-power charging points and €12M for the construction of charging infrastructure for electric buses and other heavy equipment. The size of the subsidy has been based on approximately 120,000 full-electric cars by 2025. A total of approximately 1,400 high-power charging points will be added (the number of points currently is about 300). Regional coverage will also be taken into account in the granting

of the aid so that a project that would be located in an area without a public charging point would receive additional points in the competitive bidding process. In the case of vans and trucks, the possibility of charging the vehicles must be arranged not only at the depot but also at the place where cargo is loaded or unloaded. In addition, consideration should be given to enabling taxis to be charged in an appropriate manner.

In the future, the construction of the charging infrastructure should be steered more towards intelligent systems that can also take into account the state of the electrical system in controlling the charging power.

€5M/year, or a total of €20M for 2022–2025, will be reserved to support the refuelling stations for gas cars. €9.2M (€2.3M/year) is reserved for compressed gas refuelling station projects and €10.8M (€2.7M/year) for liquefied gas refuelling station projects. The subsidy can contribute to the construction of a distribution infrastructure for approximately 65,000 CNG-powered cars and about 1,500 LNG vehicles by 2025. The total number of CNG refuelling stations in 2025 would be about 100 (now about 50). For liquefied gas, the target would be about 40 refuelling stations in 2025 (now 7). Regional coverage would also be taken into account in the granting of the aid, so that a project that would be located in an area without a public gas refuelling point would receive additional points in the competitive bidding process.

The adequacy and correct dimensioning of both subsidies in relation to the development of the vehicle fleet must be examined at least every few years.

- Emission reduction effect and emission reduction price (from the perspective of state economy): 0.013–0.026 million t CO₂ (estimated with current subsidy amounts; impact greater with increased subsidies), approx. €700/tCO₂ (calculated with current amounts)
- Cost to the central government: €54M in total in 2022–2025 (€13.5M/year); no direct costs for end users.

3. Continue and increase support for private charging infrastructure for housing companies. Expand the support to cover not only housing companies but also workplaces.

Chargeable cars are mainly charged at home and the workplace – public charging points are still rarely used. Nearly 85% of the holders of plug-in hybrid cars and about 60% of the holders of electric cars charge their car at home at least three times a week. In many reports, the lack of home charging has been identified as one of the worst bottlenecks in the electrification of transport. If one is unable to charge at home, an electric car is easily left unpurchased.

In order to realise the possibility of charging electric cars at parking lots on various residential properties, state aid is currently granted through the ARA Housing Finance and Development Centre. A total of €7M has been reserved for subsidies in 2020 and €5.5M in 2021. The subsidy is granted to organisations owning residential properties, such as housing companies and rental housing companies. Housing companies that have arranged resident parking through a parking company owned by them may also receive subsidy.

In spring 2020, ARA has assessed the adequacy of the subsidy in relation to the growth of the electric car fleet. The estimate is based on an approximate 67,000 electric cars in 2023⁷. ARA estimates that subsidy should be granted for the realisation of around 11,000 charging points annually in order to keep the number of charging points in line with the growth of the electric car fleet. Assuming that the average need for assistance per parking place would be approximately €750–800 (35% of the actual costs), *the amount of required state aid will total €34M in 2020–2023, or €8.5M/year. Based on this calculation, a total of €76.5M should be reserved for subsidies for 2022–2030*⁸. At the same time, the terms and conditions for granting the subsidy must be revised to make them more appropriate.

In addition, the adequacy of the subsidies must be reviewed every budget year, and the subsidy amounts will be decided on the basis of the growth of the electric car fleet and the amounts applied for.

In addition to support for housing companies, subsidies should also be targeted in the future to facilitate charging at the parking lots of workplaces. Almost one-third of the holders of rechargeable hybrids and about one-fifth of the owners of an electric car regularly charge their cars at the workplace. Charging at workplaces would help to fix any gaps that may remain in the home charging process. *€1.5M per year will be reserved for the construction of charging infrastructure at workplaces in 2022–2030.* Subsidy could be granted for the construction of charging points in cases where the number of points to be built would exceed the minimum obligations laid down in the energy efficiency legislation⁹ for buildings. The subsidy could also be extended to cover the various workplace properties of municipalities.

⁷ All in all, the number of electric cars is estimated to exceed 67,000 in 2023, but some of the cars are purchased for use in single-family houses where, according to the current estimate, there is no need to support the installation of charging points.

⁸ The amount reserved for 2020–2021 is €12.5M.

⁹ Act on Electrical Vehicle Charging Capabilities and Charging Points in a Building and on Building Automation and Control Systems

- Emission reduction effect and emission reduction price (with current subsidy amounts): Up to 0.11 million t CO₂ (even higher by increasing the support), the price of the emission reduction (from the perspective of state finances) is estimated at approximately €150/tCO₂
- Cost to the central government in 2022–2030: €10M/year, or a total of €90M in 2022–2030.

4. Assess possible ways of implementing the obligation concerning charging points for service station chains

It has been recorded in the Government Programme that an obligation be decreed for service station chains to provide a certain number of electric car charging points. The obligation would give users of electric vehicles added certainty about the development of the public charging network and the accessibility of charging opportunities in different parts of Finland. On the other hand, this entry of the Government Programme has already been partially implemented by means of an act prepared by the Ministry of the Environment on electrical vehicle charging capabilities and charging points in a building and on building automation and control systems. Government proposal HE 23/2020 VP has been adopted by the parliament in October 2020, implementing the new obligations of the EU's Energy Efficiency Directive (EPBD).

If the construction of electric charging points is promoted by an obligation arising from legislation, these projects could not be promoted through the distribution infrastructure support described in section 2). EU state aid rules prevent duplication of support measures.

Taking into account the aforementioned other control methods, *the possible implementation methods of the obligation on service stations* are assessed. In particular, the assessment should take into account the financial impact of the obligation on service station companies and the constitutional issues related to freedom to conduct a business and the protection of property. In addition, the relationship with other legislation, the appropriateness of regulation and the achievable climate objectives should be assessed.

- Emission reduction impact: To be assessed later, when the way of implementing the obligation is clear
- Cost impact: As above

5. Promote the fair and non-discriminatory sharing of charging services and roaming

In summer 2021, the Commission will submit an amendment to the Directive on the deployment of alternative fuels infrastructure (the Distribution Infrastructure Directive EU 2014/94). The Distribution Infrastructure Directive regulates, for example, the technical requirements for charging points and the information to be made available to consumers and its comparability.

In connection with the reform of the directive and using national measures, the functioning of the charging services market must be ensured. The aim of the joint use of charging services and the development of roaming is to ensure that consumers can seamlessly use the public charging network throughout Finland and the EU. In addition, the aim is to enable easy one-off charging and payment.

- Emission reduction impact: To be assessed later, when a proposal on reform of the Directive has been presented
- Cost impact: See above

3.1.2 Renewal of the car fleet

A rapidly progressing global transformation of vehicle technologies is currently underway in transport. Other technologies are now emerging in parallel with, and replacing, traditional combustion engine technologies. The number of electric cars in traffic in particular will increase radically. The energy efficiency and transport fuel of cars play a key role in reducing greenhouse gas emissions from transport.

On average, approximately 120,000 new cars are purchased annually in Finland¹⁰. In addition, approximately 45,000 used cars are imported to Finland each year from abroad. The majority of Finns never buy a new car, but instead acquire their cars from the second-hand car market. The number of second-hand cars sold in Finland is approximately 600,000¹¹ each year. According to the estimate of the car industry, the average value of a car in the Finnish car fleet is approximately €6,800, while the average price of a new car is approximately €34,000.

¹⁰ Due to the COVID-19 pandemic, sales volumes were lower in 2020 than these, but it is assumed that sales volumes will return to 2019 levels in a few years.

¹¹ Finnish Information Centre of Automobile Sector, referred to on 8 October 2020.

Cars stay on the road for an average of 20 years. It is therefore important to ensure that an increasing share of new cars sold and imported as used is as low-emission as possible and increasingly other than conventional diesel and petrol cars. When these vehicles running on alternative transport fuel eventually end up on the second-hand car market, they will allow more households to move away from fossil fuels. The transition can be facilitated by state measures.

In addition to private citizens, municipalities and companies also play an important role in the renewal of the car fleet. Each year, municipalities and joint municipal authorities order various transport services for approximately €880 million and, as customers, they can influence the type of equipment used to carry out transports. Industrial and commercial operators also have the opportunity to influence the characteristics of the transport services they have ordered and the vehicles that produce them. Companies, on the other hand, are each responsible for their own fleet choices and are thus a key player in the renewal of the car fleet.

The aim is to increase the share of zero-emission and low-emission new technologies¹² in new passenger cars from the current 20% to as close as possible to 100% by 2030. The share of plug-in hybrids in the sales of new cars would be highest around 2025, but it would then begin to decrease rapidly as the share of electric cars increases accordingly. It is estimated that the price of electric cars will reach the prices of conventional internal combustion engine cars in 2025.

For the entire fleet, the goal is that in 2030 there will be some 700,000 electric passenger cars and some 45,000 electric vans, of which at least half are all-electric cars. The gas vehicle target is about 130,000 cars and vans in 2030. In heavy-duty vehicles, the corresponding targets are about 4,600 electric vehicles and about 6,200 gas trucks and buses. It would be possible to achieve the targets without a major change in the number of new vehicles purchased. In the policy scenario, the number of new passenger cars sold will increase from 120,000 to 145,000 in 2045. The number of used passenger cars imported would decrease from the current 45,000 to some 35,000.

¹² Electric cars, plug-in hybrids, gas cars and fuel cell vehicles. NOTE: The Clean Vehicles Directive defines “clean vehicles” differently in part.

Measures:

6. Influence the preparation of CO2 emission performance standards for EU passenger cars and vans so that the legislation will bring maximum benefits to emissions reductions in transport also in Finland. Prepare for similar influencing on the limit values for heavy-duty vehicles.

The CO2 limit regulation binding on car and van manufacturers was adopted in the EU in January 2019. According to the regulation, the average CO2 emissions of new passenger cars registered in the EU must be 37.5% lower in 2030 than in 2021. Emissions from cars are measured as tank-to-wheels emissions, and the measurement does not take into account the fossil or renewable nature of fuels. Therefore, the limit value regulation strongly guides car manufacturers towards lower fuel consumption, greater energy efficiency and electricity. The limit value regulation will have a strong impact on what types of cars will be available in European car shops in the future and at what prices.

In 2019, the EU also adopted a regulation on binding CO2 limit values for heavy-duty vehicles. The regulation ensures that, between 2025 and 2029, emissions from new trucks will decrease by an average of 15% compared to the 2019 emission levels. From 2030, CO2 emissions from new trucks are required to decrease by an average of 30%.

In the coming years, the objectives of the limit values regulations will probably be tightened. The Commission has announced that limit values legislation for cars and vans will be opened as part of the EU Green Deal package for green development. When the regulation is opened, Finland may influence the fact that the limit values would be tightened as much as possible and that gas-powered passenger cars and vans would be taken into account as a section of their own in the limit values for passenger cars. Finland is also prepared to support the tightening of the limit values for heavy-duty vehicles if the Commission proposes a regulation.

- Emission reduction impact: 0.106 million t CO₂, if the average CO₂ emissions of new passenger cars would be 40% lower in 2030 than in 2021. If the negotiations were to reach a higher percentage, the emission reduction effect in Finland would also be higher than estimated.
- Cost impact: No direct state economy costs in Finland. The prices of new cars could initially increase due to legislation, but it has been anticipated that, for example, the prices of electric passenger cars will reach the prices of conventional combustion engine cars around 2025.

7. Continue the current purchase subsidy for all-electric cars and increase the support amount

It has been estimated in Finland that support measures to strengthen the growth of the electric car fleet will be needed until price parity is achieved. It has been estimated that the purchase prices of electric cars will be at the same level as similar internal combustion engine cars around the mid-2020s. Subsidies make it easier to move away from fossil fuels when the purchase of a new electric car is possible for more consumers. In particular, subsidies are needed to make *fully* electric cars more widespread. All-electric cars account for only about 16 percent of all electricity-powered passenger cars in Finland, compared with around 60 percent internationally.

In 2018, a purchase subsidy for all-electric cars was introduced in Finland. The subsidy for the purchase or long-term rental of an all-electric car is €2,000. The subsidy is available in 2018–2021, and €6M/year of state money has been reserved for it (together with conversion subsidies, see measure 9 below). By 31 December 2020, a total of 3,499 subsidised electric cars had been purchased or long-term rented¹³. Only 35.87% of the total appropriation (€24M) for four years (2018–2021) had been spent by the end of 2020.

Higher support per car can help improve the demand for the support. Enable the use of the subsidy also in connection with the scrapping premium. A total of €6M/year will be reserved for purchase subsidy and conversion subsidy, a total of €24M for 2022–2025.

- Emission reduction effect and emission reduction price: Between 0.0001 and 0.001 million t CO₂ (calculated with the current subsidy amount), the price of the emission reduction (from the perspective of state economy) is estimated at approximately €10,000/tCO₂ (calculated with the current subsidy amount). The costs for consumers/businesses may even be negative. It has been estimated in Finland that electric cars will bring savings to their users at the current procurement prices if the cars are driven approximately 30,000 km/year¹⁴.
- Cost to the central government: €6M/year and transfer appropriations for 2020–2021 (= existing appropriation); €6M/year, or a total of €24M in 2022–2025.

¹³ 247 electric cars in 2018, 1,046 cars in 2019 and 2,206 in 2020.

¹⁴ <https://www.traficom.fi/fi/ajavaihtoehtoa/ajamisen-hinta>

8. Continue the present conversion subsidies to convert petrol cars to ethanol or gas. Explore and implement measures to further promote conversion.

Conversion subsidy was introduced in 2018 to convert an old petrol car to use ethanol or gas. Conversion subsidies can also help people and households to move away from fossil fuels if they do not have the opportunity or desire to acquire a new car.

The conversion subsidy is €1,000 for gas cars and €200 for ethanol cars. The subsidies are valid for the period 2018–2021 and have been allocated €6M/year together with the purchase subsidy for all-electric cars (see section 1.3.2 above). By 31 December 2020, a total of 3,907 conversion subsidies had been granted for ethanol conversions and a total of 367 for gas conversions.

Continue granting conversion subsidies also in 2022–2030. Explore and implement measures to further promote conversion. These measures include, at least, developing and streamlining the procedure for approving close emissions from ethanol conversions, enabling conversions for vehicles other than passenger cars, and enabling applications for conversions also for cars under company control. In addition, the possibility of supporting the electric conversion of trucks will be investigated.

- Emission reduction impact: Modest
- Cost impact: As part of the purchase and conversion aid package, see measure 7 above. The estimated share of conversion subsidies in the aforementioned annual aid amount of €6M is less than €1M/year

9. Implement a scrapping premium campaign or campaigns.

In the scrapping premium campaign, the buyer of a new car who will give their old car to recycling will receive a scrapping premium. Scrapping-premium campaigns speed up the renewal of the car fleet and reduce emissions from the car fleet as old cars are replaced with new low-emission cars.

So far, two scrapping premium campaigns have been implemented in Finland, and one is currently under way. In the 2015 campaign, the consumer received a €1,500 discount on a new car if they scrapped a car over 10 years old and bought a new car with CO₂ emissions of at most 120 g/km. The scrapping premium was used to replace 8,000 cars. In the 2018 campaign, the consumer received a €1,000 discount on a new car with emissions lower than 110 g/km and €2,000 on a passenger car whose transport fuel was either solely or secondarily high-level ethanol blend, electricity or a methane fuel. The scrapping premium was used to purchase 6,677 new cars. New

cars purchased with the scrap premium were mainly petrol-powered cars. Of the alternative transport fuels, 105 were plug-in petrol hybrids, 5 all-electric cars and 290 gas cars.

According to the act on scrapping premiums, which entered into force in December 2020, a scrapping premium is granted to a natural person for replacing an old car to be scrapped with a new car, an electric bicycle, a season ticket for public transport or integrated mobility services, including the right to travel on public transport. The new passenger car to be procured in place of the car to be scrapped must be a gas car, a rechargeable hybrid car with emissions less than 95 grams per kilometre, an all-electric car or a car with maximum emissions of 120 grams per kilometre. Depending on the transport fuel of the car purchased, the state will pay a scrapping premium of €1,000–€2,000 or a maximum of €1,000 for the purchase of a public transport season ticket, an integrated mobility service with the right to travel with public transport or an electrically assisted bicycle. The campaign is valid from 1 December 2020 to 31 December 2021.

Scrapping premium campaigns should be repeated from time to time. If necessary, the terms and conditions of the campaign should be amended so that the criteria for the cars to be subsidised are as similar as possible to the changing situation in the car market. In other words, the campaign criteria should be tightened sufficiently over time, as the limit values for car manufacturers will also be tightened by 2030. Supporting petrol and diesel cars will no longer be appropriate closer to 2030, as petrol and diesel must be completely eliminated in the long term.

- Emission reduction effect and emission reduction price (from the perspective of state economy): Approx. 0.005 Mt/campaign, estimated emission reduction price approx. €1,600/tCO₂
- Cost to the central government: €8M/campaign

10. Introduce new purchase subsidy for electric and gas-powered vans.

Approximately 96% of vans used in traffic were diesel vehicles at the end of 2020. Alternative transport fuels (electricity, gas, plug-in hybrids and high-level ethanol blend) accounted for about 0.4%. Further measures are needed to increase the share of alternative transport fuels.

For 2022–2025, a new purchase subsidy for vans will be introduced, in which the subsidy will be paid to an individual for the purchase or long-term rental of a van powered by gas or electricity. Determine whether it is also possible to pay subsidy to companies in the light of state aid provisions, and seek the Commission's approval for the subsidy, if necessary.

- Emission reduction effect and emission reduction price (from the perspective of state economy): 0.004 million t CO₂, the cost of the emission reduction is estimated at approximately €1,500/tCO₂ (if the subsidy amount for new gas-powered vans were to be €2,000 and the subsidy amount for new electric vans were to be €2,000–€6,000, depending on the vehicle's transport capacity); the costs for consumers/businesses may even be negative if the purchase prices of the vehicles fall and their use remains as affordable as today.
- Cost to the central government: €6M in total between 2022 and 2025

11. Introduce a new purchasesubsidy for electric trucks. Continue and increase the purchase subsidy for gas-powered trucks.

Trucks account for a large share of greenhouse gas emissions from transport because they consume a lot of fuel due to their size, and they are also driven a lot. At the end of 2020, there were 100,918 trucks in traffic use, of which only about 0.3 per cent had a transport fuel other than petrol or diesel. There were five electric trucks and 223 gas-powered trucks in transport. Various purchase subsidies can help companies move away from fossil diesel towards alternative transport fuels in transport.

An act entered into force on 1 December 2020 that will enable support for the procurement of gas-powered trucks. €5,000 of procurement subsidy may be granted for the purchase or long-term rental of a lorry powered by compressed gas (CNG), and €12,000 for the purchase or long-term rental of a lorry powered by liquefied gas (LNG). Procurement subsidy can be applied for between 1 December 2020 and 30 November 2022.

Alternative transport fuels should also be supported in the longer term towards the transition of heavy goods vehicles, and the use of electricity in trucks should also be promoted. *Introduce a new procurement subsidy for electric trucks in 2022–2030, and continue the procurement subsidy for gas-powered trucks until 2030.*

- Emission reduction effect and emission reduction price (from the perspective of state economy): 0.033 million t CO₂, the cost of the emission reduction is estimated at approximately €300/tCO₂ (if the subsidy amount for gas-powered trucks were to be €7,500–€15,000 and the subsidy amount for new electric trucks were to be €50,000 and if a total of €10M/year was available for the subsidies); the costs for businesses may even be negative if the purchase prices of the vehicles fall and their use remains as affordable as today.
- Cost to the central government: €10M/year, or a total of €90M in 2022–2030

12. Start resolutely implementing the Clean Vehicles Directive in Finland.

In June 2019, the EU adopted the Directive amending the Clean Vehicles Directive, the aim of which is to promote the share of clean and energy-efficient vehicles in public sector vehicle and transport service procurement. The updated directive defines clean vehicles and sets a minimum percentage of procurement targets for the services and procurements of these vehicles for two procurement periods. The first procurement period begins on 2 August 2021 with the entry into force of the Directive and ends at the end of 2025. The second procurement period starts in 2026 and ends in 2030. Finland's goal during the first procurement period is that 38.5 percent of all new vehicle and service procurements for passenger cars and vans are clean. 41% of bus vehicle and service purchases must be clean, while the figure for truck purchases is 9%. The second procurement period aims at proportions of 38.5%, 59% and 15%.

The national implementation of the directive will start at the beginning of 2021. In setting national requirements, the aim is to take into account regional special characteristics, such as the availability of charging infrastructure, the financial position of municipalities and differences in transport lengths. *Ensure that all procurement units receive information about national legislation and the tightened targets. In addition, ensure that, if necessary, instructions and guidance are available for procurements.*

- Emission reduction impact: 0.02 million t CO₂; estimated as part of the baseline forecast for greenhouse gas emissions from transport.
- Cost impact: Costs for the public sector/businesses may even be negative if the purchase prices of electric and gas-powered vehicles fall and their use remains as affordable as today.

13. Launch an extensive research programme on vehicles and alternative transport fuels.

There are still challenges related to alternative fuels and their widespread use. These include issues related to charging electric cars, such as increasing kerbside charging, charging payment practices and charging systems for buses and trucks. As regards the electrification of heavy-duty vehicles, the possibilities of starting to implement a separate electric road pilot in Finland should also be assessed. In addition, open questions remain concerning the production, development and use of biofuels and electrofuels.

Launch a research programme on alternative transport fuels and allocate €2M/year of funding, or a total of €10M, for 2022–2026.

- Emission reduction impact: No estimate

- Cost impact: €2M/year, or a total of €10M in 2022–2025.

3.1.3 Improving the efficiency of the transport system

Finland is a sparsely populated country, and a car is a vital means of transport for many people now and in the future. However, especially in urban areas and traffic between them, there are also alternatives to cars, such as public transport, shared transport, walking and cycling. Through their own actions, the state and municipalities can guide people to increasingly shift to these sustainable modes of transport. Goods transport can also be made more efficient or moved from roads to tracks or waterways. The vehicle kilometres will decrease as transports become more efficient and partly shift to more sustainable modes of transport. Sustainable mobility or transport usually means mobility that minimises environmental harm and the use of resources. In most cases, it is considered to include at least pedestrian, cycling and public transport as well as other mobility services in passenger transport as well as water and rail freight transport.

In urban areas and interurban transport, a determined shift away from the current car-centric system must be made toward a sustainable mobility system. This is a significant systemic change in the way of managing the needs of mobility and transport. In a system of sustainable mobility, mobility and transport needs are managed by utilising and combining various transport modes and services. Digitalisation and transport-related information play a crucial role. Automation can also help achieve transport emission reduction goals, if it can be used to improve, for example, the competitiveness and attractiveness of public transport.

Measures related to improving the efficiency of the transport system have been prepared in connection with the preparation of the National Transport System Plan. They have been complemented in the roadmap for fossil-free transport, especially in terms of funding. In accordance with the Highways Act, the National Transport System Plan must be coordinated with the General Government Fiscal Plan. The National Transport System Plan examines the transport system as a whole, and the objectives of the plan are, in addition to sustainability, related to accessibility and efficiency.

The objective of the roadmap for fossil-free transport is that the vehicle-kilometres of passenger cars will no longer increase in the 2020s. If people's mobility needs continue to increase, the aim is to direct this growth towards sustainable modes of transport in urban areas and interurban transport. This would mean a growth of about 10% in the vehicle-kilometres of each sustainable transport mode in 2030. For individual households in rural areas, car vehicle-kilometres may continue to increase, but as

the population concentrates in urban areas, the combined vehicle-kilometres of households throughout the country will remain at the 2019 level.

The objective for freight transport is that the increase of the vehicle-kilometres will slow down for vans and trucks in the 2020s. The objective does not mean reducing freight transports or economic activity, but rather that goods are transported more efficiently in road transport or that transports are shifted to more sustainable modes of transport.

Measures:

14. Promote, in cooperation with the state and municipalities, sustainable transport, such as walking and cycling, public transport and various mobility services.

A dense and cohesive urban structure supports the organisation of public transport and the use of mobility services. In order for sustainable modes of transport to be truly an alternative to the use of a car, its various functions must be easy and affordable to achieve. Travel chains must be easy and competitive in terms of time use compared with the use of a passenger car. Walking and cycling routes must be safe, smooth and attractive, and park-and-ride must be arranged and working. Information on travel chains and routes must be easily accessible. The quality of the local environment, infrastructure and services also play a role in the choice of means of transport.

The transport network lays the foundation for the efficient organisation of mobility and transport services. From the perspective of transport emissions, it is important that the transport network attracts the use of sustainable modes of transport with respect to connections, prices and service quality. The aim should be a system that enables sustainable mobility and makes the most of the existing transport infrastructure, in which different modes of transport complement each other.

In the development of sustainable transport, it is important to pay attention to the fact that the development conditions depend on cooperation between many different parties and operators. Sustainable transport can be promoted, for example, through MAL agreements or other contractual procedures, as well as urban transport system plans and the related funding. For the state, concrete measures to promote sustainable transport are recorded in the National Transport System Plan for 2021–2032 (Trafic12).

- Emission reduction effect, transport system plans for urban regions until 2030: Up to 0.1 million t CO₂ in 2030. For aspects other than transport system plans, the emission reduction impacts will be determined in more

detail as part of the implementation of the Traffic 12 work. The emission reduction effect may partly overlap with measures 15, 16 and 17.

- Cost impact: Assessed as part of Traffic12 work

15. Continue implementing the investment programme for walking and cycling and improving the conditions for walking and cycling along highways and at traffic nodes.

High-quality pedestrian and bicycle infrastructure is one of the most important means of influencing the choice of modes of transport and increasing the volume of pedestrian and bicycle traffic. In terms of reducing transport emissions, the most effective projects include high-traffic bicycle projects and new pedestrian and bicycle connections, bicycle lanes and quality corridors. These have been estimated to increase cycling most while reducing driving. Increasing walking and bicycle traffic will also bring significant impacts on public health, the operation of the transport system and the comfort and safety of urban environments.

State funding will be directed through the investment programme for walking and cycling to municipal walking and cycling projects that have an impact. The projects improve the conditions and attractiveness of walking and cycling, thus increasing the number of walking and cycling trips and their proportion in the modes of transport. The state will direct €30 million/year of funding for the investment programme for walking and cycling in 2022–2024. The precondition for the funding is that municipalities use the corresponding amount to finance projects in walking and bicycle transport. The subsidy levels after 2024 will be decided on as part of the Traffic12 work.

Improving the conditions of walking and cycling infrastructure on highways and traffic nodes can also increase the volume of walking and cycling traffic and also improve the preconditions for cycling tourism. At least €10M/year of funding for improving the conditions of walking and cycling infrastructure on highways and traffic nodes will be allocated for 2022–2024. The subsidy levels after 2024 will be decided on as part of the Traffic12 work.

In addition, ensure the good condition of the walking and cycling infrastructure and high-quality winter maintenance by providing the necessary funding as part of road maintenance and repairs.

- Emission reduction effect and emission reduction price (from the perspective of state economy): 0.004–0.015 million t CO₂ in 2030, estimated emission reduction price approximately €2,000/tCO₂ (on the

other hand, the measure has significant benefits from the perspective of public health)

- Cost to the central government: At least €26.5M/year in addition to the funding of the current investment programme and funding reserved for the road network, a total of €40M/year in 2022–24, or a total of €120M, of which €79.5M would be additional funding. Cost impact for municipalities: investment programme at least €30M/year, or €120M in 2022–2024.

16. Increase the level of government funding for public transport in large and medium-sized urban areas¹⁵.

In addition to walking and cycling, public transport is the foundation of sustainable urban transport. Every year, the state supports public transport in large and medium-sized urban areas. In 2020, public transport support for large urban regions totalled €13.25M and support for medium-sized urban regions €8.125M. In addition, a total of €20M was allocated to urban regions to implement climate-based measures.

As an individual measure, increasing public transport subsidies will have little impact on reducing greenhouse gas emissions from transport, but together with other measures, such as carbon pricing, the impacts on emissions will be greater. If measures increasing the price of carbon are introduced in the transport sector, public transport subsidies can be used to increase the supply of public transport. This is important in order to prepare for increasing passenger volumes, especially in large and medium-sized urban areas, where the emission-reduction potential of public transport is greatest.

As part of a fair transition towards a more sustainable transport system, public transport subsidies for large and medium-sized urban areas will be doubled for 2022–2024¹⁶. A total of €24.875M/year, or a total of €74.625M in 2022–2024, of additional funding will be reserved for these subsidies. The amount of the subsidy would thus be €42.75M/year, or €128.25M in 2022–2024. The subsidy levels after 2024 will be decided on as part of the Traffic12 work.

- Emission reduction effect and emission reduction price (from the perspective of state economy): approx. 0.008 million t CO₂, emission reduction price estimated at approx. €5,300/tCO₂
- Cost to the central government: In addition to the current subsidies, approx. €24.875M, a total of €42.75M/year between 2022 and 2024, or a

¹⁵ See also section 4.3 on public transport subsidies.

¹⁶ Compared to 2020

total of €128.25M, of which slightly more than half, €74.625M, would be additional money. Cost impact for municipalities: €128.25M in 2022–2024.

17. Increase the level of the central government transfers for mobility management.

The transition of people towards sustainable transport can be made easier through, among other things, advice, marketing, mobility planning, and the coordination and development of services. €0.6–€0.9 million per year is currently spent on central government transfers for mobility management. Increase the appropriation for central government transfers to municipalities and non-profit organisations to €2.5 million per year. In addition, extend the grant to private employers to manage the mobility of workplaces.

- Emission reduction effect and emission reduction price (from the perspective of state economy): 0.005 million tCO₂, estimated emission reduction price approx. €5,000/tCO₂
- Cost to the central government: €2.5M/year, or a total of €7.5M in 2022–2024. Cost impact for municipalities/companies: at most €7.5M in 2022–2024 (if the state subsidy share is 50%, less if the share is higher). The subsidy levels after 2024 will be decided on as part of the Traffic12 work.

18. Full use of the large lengths and masses for road transports permitted by law in Finland.

The energy efficiency and, at the same time, the cost efficiency of heavy-duty equipment can be enhanced by increasing the size of transports. High capacity transport (HCT) combinations and full-load driving can achieve the best results in terms of energy efficiency. Increasing the dimensions and masses of heavy vehicle combinations can reduce highway vehicle-kilometres of freight transport on busy routes. The bulk of transport emissions are generated by heavy combinations, which are used to drive very high vehicle-kilometres and long distances.

In 2019, a government decree entered into force, based on which the maximum permissible length of vehicle combinations in road traffic increased from 25.25 to 34.50 metres. The maximum permissible mass remains at 76 tonnes. In addition, new types of vehicle combinations that differ from those previously permitted may be used on the road. *In cooperation with municipalities, investigate the bottlenecks in the road and street network for existing HCT transport and, if possible, ensure their elimination.*

- Emission reduction impact: 0.06 million t CO₂ in 2030
- Cost impact: Will be assessed later

19. Improve the maintenance of routes.

Highway maintenance has its own impact on CO₂ emissions from transport. Uneven and rough road surfaces have been found to increase rolling resistance and thus increase fuel consumption and emissions from traffic. The unevenness and roughness of road surfaces can be reduced to some extent, if additional funding is directed to the basic maintenance of the transport infrastructure. At the same time, however, care must be taken to ensure that the improvement in road quality does not lead to higher traffic speeds or traffic volumes. These cancel out the emission reductions generated by better road condition in the form of increased fuel consumption.

In the preparation of the Traffic12 plan, it has been proposed that the road repair deficit should also be reduced outside the main route network. If the repair deficit of the road network were to be eliminated in such a way that €40 million of the additional €100 million proposed for basic infrastructure maintenance would be spent on repaving low-traffic roads, the measure would, according to the Finnish Transport Infrastructure Agency's estimate, achieve a reduction of about 0.04% in the total road traffic emissions. This would mean an estimated emission reduction of approximately 4000 tonnes in 2030 if traffic volumes and/or speeds would not increase as a result of the measure.

- Emission reduction effect and emission reduction price (from the perspective of state economy): 0.004 million tCO₂ in 2030, estimated emission reduction price approx. €10,000/tCO₂.
- Cost to the central government: €40M. The cost impact for companies may even be negative if the fuel costs are reduced as a result of the measure.

20. Implement the digitalisation of logistics strategy and a government resolution to be prepared on the basis of it.

Digitalisation creates new opportunities for changing the operating models in freight logistics and increases the seamless flow of information between different actors. Digitalisation also increases operational efficiency and the smoothness of transports, and facilitates the optimisation of transports at the level of both an individual supply chain and the entire transport system. The introduction of new solutions and cooperation within and between sectors bring efficiency and cost benefits to several actors and

may reduce emissions at the same time. In a digital society, cyber and information security also play an increasing role in the quality and reliability of equipment and services.

Situational overview on logistics, availability of information and interoperability between logistics actors should be promoted. It is essential to improve the availability and utilisation of monitoring, statistics and emissions data from the sender to the recipient and to the end user. As a general rule, it can be required that information on emissions be provided between operators by means of agreements between companies and, if necessary, legislation. Funding, piloting and cooperation are also key measures.

The digitalisation of logistics will be discussed as part of the digitalisation strategy for logistics published in October 2020. A government resolution on this will be prepared later in 2021. No single measure has been identified for promoting digitalisation, but the introduction of opportunities for digitalisation is influenced by many different factors and different capabilities in transport companies.

In the digitalisation strategy for logistics, the potential of digitalisation for reducing emissions (Ramboll 2020) has been estimated at 0.09–0.24 million tonnes in 2030. However, this is not about the emission reduction effect of an individual measure, but about the potential of digitalisation to reduce emissions *if* new steering instruments are introduced. By intensifying logistics through digitalisation, rising costs in the transport sector can be curbed.

- Emission reduction impact: 0.09–0.24 million t in 2030.
- Cost impact: No direct costs to the central government. The cost impact for companies may even be negative if the fuel costs are reduced as a result of the measure.

3.2 Additional means of achieving transport emission reduction targets (Phase 2)

In addition to the measures of the first phase, possible additional measures may include increasing the distribution obligation for renewable fuels, reducing speed limits and more efficient use of different emission reduction potential. The potential for emission reductions is related, among other things, to the promotion of various transport services and remote work. With regard to these measures, it is important to identify their actual emission reduction impacts and concrete measures that the state can use

to promote their introduction. More detailed evaluations of the potential of different emission reductions will be prepared by autumn 2021.

21. Increasing the distribution obligation

Under existing legislation, the proportion of biofuels in liquid fuels for road transport will be increased to 30% by 2030 (“Act on the Promotion of the Use of Biofuels for Transport”). It is proposed to amend the Act on the Promotion of the Use of Biofuels for Transport in phase 1 to include biogas and electrofuels. In order to ensure that biogas replaces fossil fuels and not already existing biofuels in the distribution obligation in the future, but, rather, fossil fuels, *the 2030 distribution obligation should be increased by the same amount as biogas would be estimated to be available for transport use in the same year*. It has been estimated in Finland that up to 2.5 TWh of biogas could be available for transport by 2030¹⁷. In order to prevent the increased use of biogas from reducing the emission reduction from liquid biofuels, the distribution obligation should be increased by an estimated 4 percentage points to a total of 34% in 2030.

In further work, the availability, costs and impacts on fuel prices of biogas and also electrofuels should be assessed. On the basis of such a comprehensive study, it may be decided in autumn 2021 that the level of the distribution obligation be increased to above 34% or even higher, if the availability of liquid biofuels and biogas through sustainable domestic production is strengthened and if investments in industrial-scale production of electrofuels enable it. According to preliminary estimates, increasing the distribution obligation by 4 percentage points would result in a reduction of about 0.21 million tonnes in traffic.

Particular attention must be paid in the report to the maximum sustainable availability of biofuels. In this context, it should be borne in mind that there are needs for the use of biofuels not only in road transport but also in other modes of transport. Particular attention must be paid to the Government Programme, according to which air traffic will aim for a 30% proportion of sustainable biofuels in 2030.

The report should also assess the possibility of including the use of transport electricity in the distribution obligation.

¹⁷ 2.5 TWh of biogas would, for example, enable approximately 100,000 to 130,000 gas cars and vans and approximately 6,000 other gas-powered vehicles to operate with 100% biogas.

By autumn 2021, a comprehensive study will be carried out and the necessary decisions will be made on whether it will be possible to increase the distribution obligation from the current 30%.

22. Enabling the digitalisation of transport and developing new services and travel chains

The aim of the Mobility-as-a-Service concept is to improve the service level of transport by combining public and private transport services, from new cars to taxis, rental cars, trains, buses and city bikes. The entity includes both existing services that have already been established (such as public transport and taxis), and also new services that are still under development or becoming established (such as shared-use cars or peer rental). In any case, the availability of information and the interoperability of information systems and the extensive use of digitalisation play a key role in promoting mobility services. The preconditions for mobility services will be developed, for example, by improving the interoperability of information, ticket and payment systems so that sustainable travel chains are easy and smooth for customers to use. By using this information, it is possible to improve vehicle filling and utilisation rates, create new service packages and optimise transports, for example, with more efficient routes. The necessary development can be promoted, for example, by improving the coverage, quality and analysis of static and dynamic data. The development of information and payment services related to parking is also essential. It is important that the availability of real-time information is also invested in to improve traffic control and enable automation in all modes of transport. In the cooperation between the public and private sectors, it is necessary to define the principles, processes and roles of information sharing and use, as well as the division of responsibilities, taking into account the development of EU legislation.

More and more demand-responsive services that combine different transport services should be introduced in public procurement of mobility services and in the transport of public operators themselves. Various experiments and co-development between municipalities and service providers also bring new service models to sustainable mobility. Some mobility needs may also be completely eliminated if a service or function can be handled via the Internet, for example, without the need for physical moving. It is therefore important to make extensive use of the possibilities of remote working practices and technologies to reduce transport emissions.

The environmental impacts of promoting mobility services depend on the way that solutions are implemented and steered, and other operating environments. So far, there is no scientific and comparable data available on emission reduction impact of Mobility-as-a-Service. Studying the matter is hampered by the fact that the new business models are still in development stages in many respects, and the use of new services

is still relatively limited. However, in an international study by ITF, the impact of shared mobility services in 2030 has been estimated to be either a 3% reduction or a 15% increase in total transport emissions. The range of variation of the emission reductions is strongly influenced, among other things, by the extent to which public transport is available, the types of steering instruments available at national level, and the prerequisites for the use of digitalisation in each country. Country-specific information on this study is not available.

With respect to a positive impact, it is essential that MaaS solutions mainly reduce the vehicle-kilometres of cars and enable an increase in the proportion of public transport modes. Customer-oriented coordination of services with public transport is an essential tool for this. To support positive development, comprehensive cooperation is needed between actors in the sector, such as the public and private sectors, and transport policy guidance.

Measures promoting the integration of different mobility services and new services will be specified in more detail as part of the preparation and implementation of the Traffic12 plan. The programme for sustainable growth in the transport sector promotes the growth of investments in the sector and business-driven and export-driven growth as cooperation between the public, private and research sectors, based on ecologically, economically and socially sustainable solutions.

Assess the realistic impacts of the development and coordination of mobility services on emissions reductions and identify and implement measures through which the state can promote the servicisation of transport.

23. Promotion of remote work

Remote work refers to a flexible way of organising work, based on voluntary action. The work is done where it is most efficient and appropriate for the work of the employee, for the employer and for the task. Remote work is done outside the workplace, for example at home, at a cabin or on the move. Remote work is done especially in staff and supervisory professions in the Helsinki metropolitan area and, to a large extent, in the service of the state, municipalities and organisations.

Remote work can have significant emissions reduction potential if it reduces the number of car trips. As the COVID-19 pandemic began in spring 2020, the amount of remote working in Finland grew significantly. It has been estimated that in spring 2020, about half, or about one million Finnish employees, worked remotely. Vehicle-kilometres also dropped radically at the time.

In autumn 2020, the Finnish Transport and Communications Agency Traficom assessed the impacts of increased remote work on transport emissions. Passenger car traffic decreased significantly in spring 2020, and the traffic volume of the last 12 months was almost 10 percent lower at the end of 2020 than a year ago. However, not all of the reduction in transport is the result of an increase in remote work; it is also accompanied by restrictions on movement in exceptional circumstances, a reduction in hobbies and travel, layoffs and a rise in unemployment. According to Traficom's estimate, commuting by cars is expected to have decreased by about 7% in 2020 as a result of remote work, which means that the emission reduction caused by remote work would be approximately 0.095 Mt CO₂.

Based on Taloustutkimus' and its own data, the University of Turku has also assessed the impacts of the increasing volume of remote work on the number of commutes by car last year. According to this estimate, passenger car commuting traffic would decrease by about 6%, and commuting traffic as a whole by about 13%, if remote work were implemented as a more permanent solution and as an operating model supported by employers in the future after the pandemic.

The impact of remote work on transport emissions will be investigated in more detail by autumn 2021. Identify and implement measures that the state government can use to promote remote work even after the exceptional circumstances.

24. Combined transport

Combined transport is an effective way to reduce CO₂ emissions from goods transport. The number of combined transports has increased on European railways, but combined rail/truck transports in Finland were discontinued between Turku and Oulu in 2011 and between Helsinki Pasila and Oulu at the beginning of 2014. *Launch a project to investigate the emission reduction potential of combined transport in Finland and the necessary measures to restart combined transport.* The project also examines different ways of implementing combined transport and transport units that would suit the needs of Finnish business life.

The potential for emission reductions in combined transport and the necessary measures to restart them in Finland will be examined.

3.3 Other emission reduction measures (phase 3 as a conditional measure)

In summer 2021, the European Commission is expected to make a number of proposals to achieve the EU's climate objectives. Many of the expected amendments to directives and regulations are related to transport emissions. The Commission may also submit a proposal to connect road transport to emissions trading. Finland considers the reduction of emissions to be a priority in the reform of the EU's climate and energy policy framework and cost-effectiveness a guiding principle for work. Finland thus influences in such a way that if road transport emissions trading were introduced, it would be created as a separate system or, alternatively, a separate emissions trading system covering road transport and separate heating of buildings would be investigated.

Once the progress of EU-level measures and that of both phases 1 and 2 are known by autumn 2021, the Government will assess and decide on the possible need for additional national measures to halve transport emissions by 2030. To this end, the Government will continue to prepare the various alternative measures, including national emissions trading for fossil fuels and the transport tax model based on kilometres and road categories, in case other national measures and solutions at EU level together are insufficient.

The assessment of additional measures will also take into account the progress of Finland's carbon neutrality objective in other sectors and, with regard to other measures, the cost-effectiveness of emissions reductions, the impact on competitiveness as well as regional and social fairness and the careful impact assessments carried out to support this work.

4 Measures to be decided in other contexts

This section contains a number of measures that will also be needed to halve greenhouse gas emissions from transport in 2030, but the decisions on which will be made in contexts other than the Roadmap to fossil-free transport. These processes to the roadmap include the Sustainable Growth Programme for Finland, the working group on the reform of transport taxation, the National Transport System Plan (Traffic12), the National energy and climate strategy and the Medium-term climate change policy plan (Kaisu).

1. The Sustainable Growth Programme for Finland promotes a rapid recovery from the COVID-19 pandemic and the long-term reform of business structures and public services. The Sustainable Growth Programme for Finland is financed using funding provided from the EU stimulus package in 2021–2023. The aim is that the appropriations for the investment and development projects related to the Sustainable Growth Programme for Finland for 2021 would be discussed in the supplementary budget procedure, in which the allocation of appropriations to the most significant projects or support programmes containing projects would be specified and the appropriations required for the parliament's approval and the criteria for their use would be presented. For further years, the appropriations would be taken into account in the plan for public finances for 2022–2025.
2. The transport tax working group led by the Ministry of Finance investigates the need to reform transport taxation from the perspective of climate objectives and state finances. The review concerns a period longer than the government term. The task of the working group is to assess the effectiveness and impacts of the existing transport taxation system and other tax instruments and tax-like fees. The working group will submit recommendations for tax measures for more effective emissions steering and for safeguarding the tax base. The term of the working group ends on 19 May 2021.
3. The first National Transport System Plan will be prepared for 2021–2032, and decisions on it will be made in spring 2021. The National Transport System Plan will present an analysis of the current state and operating environment of the transport system, a vision of the development of the transport system up to 2050 and the objectives of the transport system

plan. The plan includes a twelve-year action plan which contains measures by the Government and municipalities as well as a state funding programme for the transport system. The plan also describes the impacts of implementing the transport system plan.

4. For several decades now, there has been a practice in Finland according to which every government will prepare an energy and climate policy strategy during its term. The preparation of the energy and climate policy strategy of Prime Minister Sanna Marin's Government began in April 2020. The national energy and climate strategy outlines measures with which Finland will achieve the objectives agreed in the Government Programme and in the EU for 2030 and will proceed consistently towards carbon-neutral Finland by 2035.
5. Since 2017, Finland has been preparing its own emission reduction plan for the effort sharing sector, separate from the national energy and climate strategy. The Medium-term Climate Change Policy plan is based on the Climate Change Act that came into force in 2015. The plan is drawn up during each electoral term, and it includes an action programme to reduce emissions in the non-emissions trading sectors, i.e. the effort-sharing sector.

Measures:

4.1 Replace fossil fuels with alternative transport fuels

25. Support the start-up of biogas production through energy grants and nutrient cycling compensation.

According to the biogas programme, the most significant slowdown in the development of the sector in the 2020s is the poor profitability of biogas production plant projects. In order to improve profitability, biogas production should be supported at least in the early stages. Possible forms of support include energy subsidies on the one hand and nutrient cycling compensation on the other. Decisions on funding should be made as part of the decision-making of the national energy and climate strategy 2021.

26. Support the start-up of electrofuel production with R&D&I funding and energy supports.

In the future, electrofuels as such can be used to replace fossil fuels without new vehicles or new distribution infrastructure. Their development is highly promising, and Finland has competitive expertise in the field. However, the development of the technology is only in its early stages, and there are no commercial production facilities yet. The launching of commercial-scale production can be supported with state R&D&I funding and energy subsidies. Decisions on funding should be made as part of the decision-making of the national energy and climate strategy 2021.

The role of electrofuels in reducing emissions from transport is assessed as part of the Government's joint HIISI project. This will include an assessment of the price and availability of electrofuels in both the short and long term. Its results will be available in autumn 2021.

4.2 Renewal of the car fleet by means of transport taxation measures

Possible amendment of car and vehicle taxes

Possible changes in car and vehicle taxes could speed up the renewal of the car fleet and also affect the types of cars that consumers will buy in the near future. Based on the assessment of the effects of fossil-free transport, the total abolition of car tax would increase the market share of combustion engine cars, which would increase transport emissions marginally. Similarly, the abolition of car tax-ation only for low-emission cars would moderately reduce transport emissions. On the other hand, vehicle tax increases for cars powered by petrol and diesel could achieve slightly higher emission reductions, but the levels of tax increases could become high.

Abolishing the power source tax on electric and gas cars could also increase the attractiveness of these cars and thus promote their share in the car fleet. On the other hand, reductions in the power source tax of trucks could at least in some respects compensate companies for the disadvantages caused by possible increases in fuel prices.

It should be noted that concrete proposals concerning transport taxation will be made in the transport tax working group led by the Ministry of Finance in spring 2021. The

working group may also utilise impact assessments prepared for the roadmap for fossil-free transport.

27. Developing taxation of transport-related employee benefits

At the beginning of 2021, a tax reform of the employment benefits of transport was implemented, which supports the transition to low-emission transport. The tax value of all-electric cars used as an employment vehicle was reduced by €170 per month for the period 2021–2025. The charging of electric cars at the workplace and at public charging points was declared a tax-free benefit for 2021–2025. An electric vehicle charger is considered part of the accessories of an employee-benefit electric vehicle. The taxation of employee travel tickets was simplified by setting the maximum tax exemption to €3,400 while removing the component between €300 and €750 that was considered tax-able income. Employee-benefit bicycles were declared a tax-free benefit up to €1,200 per year. It was decreed that the tax-exempt part of the so-called mobility service package be determined in accordance with other tax-free employment benefits. Thus, the package may include both a public transport ticket as an employee benefit and a bicycle benefit up to the above-mentioned euro amounts.

In the spring 2020 budget negotiations, it was also agreed that the reform of the taxation of employee cars will also be further prepared in 2020–2021. The aim of the reform would be that taxation would guide the choice of employee benefit car toward an all-electric car or a low-emission car, such as a gas car or a plug-in hybrid. The aim is that in the next few years a significant number of affordable, little-used, low-emission vehicles would be released onto the market after being used as company cars. In addition, more equal treatment of mobility services within the scope of employment benefits should be taken into account.

The reform will be prepared by the spending limits discussion of 2021.

4.3 Improving the efficiency of the transport system

28. Direct state transport infrastructure investments to sustainable mobility and transport.

A smooth, safe and functional transport network lays the foundation for the efficient organisation of mobility and transport services. From the perspective of reducing transport emissions, it is important that the transport network attracts sustainable modes of transport. The aim should be a system that enables sustainable mobility

and makes the most of the existing transport infrastructure, in which different modes of transport complement each other.

In accordance with the Government Programme, the number of rail investments will be increased from the current level. In accordance with the Traffic12 plan, investments will be made in the capacity of railway lines between large urban regions with improvements of the existing rail network. Improve the energy efficiency of rail transport by investing in the rail network, especially in sections most important to work and business life, and by implementing individual improvement projects aimed, for example, at increasing axle weights in order to improve the efficiency of rail freight transport.

It is also possible to transfer transports from wheels to water to some extent. The already decided project to extend the locks of the Saimaa Canal can improve the operating conditions of the Saimaa Canal and Lake Saimaa waterway traffic and reduce transport costs by enabling longer vessels and a greater draught on the Saimaa Canal.

The measures and funding levels for the development of transport infrastructure will be specified as part of the preparation and implementation of the Traffic12 plan. The impact of the measure on emissions reductions and costs will be specified in further detail as part of the implementation of the Traffic12 plan.

29. Increase allocation of existing public transport support for large and medium-sized urban areas beyond 2024.

By increasing the subsidies for public transport, preparations can be made for increasing passenger volumes, especially in large and medium-sized urban areas, where the emission-reduction potential of public transport is greatest. The funding levels for public transport after 2025–2032 will be specified in further detail as part of the preparation and implementation of the Traffic12 plan. The Traffic12 plan also defines other measures necessary for organising mass transport and the entire public transport as efficiently as possible.

30. The operational preconditions of public transport will also be ensured during the exceptional times following the COVID-19 pandemic.

In 2021–2024, the state will prepare for reflationary measures in the public transport sector. With the support, the use and operation of public transport services will be revived, aiming at restoring the attractiveness of public transport and the growth trend

preceding the COVID-19 epidemic. The need for support and the distribution and impacts of the support are monitored and evaluated regularly. The support measures will be financed in excess of the General Government Fiscal Plan.

31. Implementation of the digital railway project, i.e., modernisation of the train control system.

The rail traffic control system currently in use in Finland will reach the end of its service life at the end of the 2020s. The comprehensive digitalisation of Finnish rail transport and the introduction of the new ERTMS system, the digital railway project, are a key precondition for ensuring the service level and operation of rail transport in the future. The new control system will streamline traffic, increase the energy efficiency of the rail network, enable higher rail accessibility, improve service levels and save money for basic infrastructure maintenance in the future. With the help of the digital railway, the aim is to increase the capacity and attractiveness of rail transport, which would accelerate the transition of traffic from wheels to tracks. The increase in the proportion of rail transport contributes to the achievement of the emissions targets.

The development of the railway network will be outlined as part of the Traffic12 plan. The total cost estimate of the digital railway project is €1.63 billion (€1.37 billion for infrastructure and €257 million for equipment).

32. Electrification of rail traffic and track charges

Currently, slightly over 90% of train kilometres are managed by electric hauling in Finland. The proportion of electric hauling is 95% of passenger traffic and 78.3% of freight traffic. In principle, it would be possible to electrify the entire rail network. Even though traffic on all sections is not very busy, full electrification would enable uniform locomotive equipment and also the majority of shunting with electric locomotives. The national distribution infrastructure programme for alternative transport fuels (2017) has set the target that rail transport vehicle-kilometres would be done in 2050 almost 100% by electricity.

The promotion of electrified rail traffic also involves factors moving in the opposite direction. In 2021, track charges will increase more with electrified traffic than with diesel-driven traffic due to the pricing of the costs of the electricity supply system in accordance with EU legislation. In the future, however, the possibilities of developing the guiding nature of the track charges should be examined so that it would encourage more electric hauling.

33. Introduce legislation in line with the Government Programme, enabling traffic congestion charges to be introduced in city regions, with the aim of managing traffic.

Congestion charges can reduce traffic emissions in large urban areas. Congestion charges reduce congestion, reduce travel times and make the transport system smoother and safer. The competitiveness of public transport, walking and cycling will improve. It has been recorded in the Programme of Prime Minister Sanna Marin's Government that a law will be passed this government term, enabling the introduction of congestion charges.

However, decisions on the introduction of congestion charges are always made separately in urban areas. The emission reduction effect of the measure would be 0.05–0.07 million t CO₂ if congestion charges were introduced in the Helsinki region and 0.062–0.095 if congestion charges were introduced in the Helsinki, Turku and Tampere regions. The revenue increase to the state would amount to approximately €150–184 million annually.

5 Roadmap objectives and actions up to 2045

Replace fossil fuels with alternative transport fuels

In the longer term, *all* fossil fuels in transport must be replaced by renewable or zero-emission fuels and power sources such as electricity, biofuels and electrofuels. *The aim is to end the sale of fossil transport fuels for domestic transport in 2045.* If fossil fuels continue to be used in transport in 2045, the objective of fossil-free transport cannot be realised.

In light of current information, the replacement of fossil fuels in transport will not succeed with any single alternative fuel. For example, it is impossible to replace all transport fuels with liquid biofuels at the global level because the total amount of energy consumed by transport each year is too high and also because petrol-replacing biofuels as such are not yet available on the market. In principle, Finland could buy enough biofuels from the world to replace the fossil diesel consumed in Finland, but this may be an expensive solution in the longer term if biofuels become scarce and their prices rise. In addition, the production and use of biofuels involves significant risks from the perspective of the sustainability of raw materials.

Since only a limited amount of sustainable raw materials is available each year, *the objective is that the absolute amount of liquid biofuels in road transport (around 10 TWh) will not increase after 2030, even though their relative share of (liquid) fuel used will increase.* To achieve this, significant investments in improving the energy efficiency of both the transport system and vehicles will be required. With the 2030 amount of biofuel, it will be possible to replace the total amount of energy required for heavy goods vehicles in 2045, if the energy efficiency of transport is also improved and passenger cars are almost entirely shifted to electricity and biogas. In 2045, only some 7 TWh of biofuels would be used in road transport. If production volumes at the same time remain at the same level or grow, biofuels can increasingly be shifted to aviation and shipping.

Increasing the use of electricity plays a very important role in transport in the long term. Compared to different fuel alternatives, the advantage of using direct electricity is better energy efficiency than with the alternatives and lower overall energy consumption. In addition, electricity enables detaching from the combustion of fuels and the limitation of biomass-based raw materials. *The aim is that in 2045 at least 35% of the total energy consumption of transport would be managed by electricity.*

Biogas is also a technology that has already been tested with respect to its production methods, and its use in transport can also be increased after 2030. The biogas programme completed in 2020 estimated that the energy potential of biomasses formed in Finland, suitable for biogas production and nutrient recycling, would be approximately 16 TWh per year. *The aim is that in 2045, at least 5–6 TWh of biogas would be available for transport.*

The traffic use of hydrogen in Finland has so far been very low, but the vehicle market for heavy traffic, for example, seems to be increasing in the coming years. Direct use of hydrogen as a driving force for transport would require extensive investments in hydrogen distribution and transport infrastructure. It is possible that it would be most sensible to direct hydrogen in transport to areas where there is no need for a nationwide distribution network (e.g. maritime ports).

Renewable synthetic fuels, i.e., electrofuels, can be used as such or as mixtures in existing combustion engines. The production of synthetic fuels uses hydrogen and, for example, carbon dioxide recovered from industrial plants. In order to maximise the climate benefits, the electricity used for the production of hydrogen must be as low-carbon as possible, such as electricity produced with renewable energy or nuclear power.

Both electrofuels and possibly the direct use of hydrogen are considered to have major potential in transport in the longer term. In particular, in modes of transport where direct electrification does not yet appear to be possible (heavy goods transport, aviation and shipping), hydrogen as a fuel or electrofuels refined from it are very important alternatives. *In 2045, electrofuels and/or direct use of hydrogen could potentially replace about 4 TWh of fossil energy.*

Several studies and research projects are currently underway in Finland in connection with the development and use of both hydrogen and synthetic fuels. Various electrofuel manufacturing technologies are in development, and it is estimated that broader commercial production could be expected to begin within five to ten years. Today, manufacturing costs and investment needs are significant, but as technologies develop, there is a lot of potential.

Finland also has internationally significant expertise in biofuels, hydrogen and electrofuels. We are particularly advanced in the processing of biofuels, but there are also great expectations in the production of hydrogen and electrofuels. In the longer term, it is essential to convert competence in these fields into business activities and exports that benefit Finland.

Modernisation of the car fleet

With regard to the car fleet, the long-term objective is to almost completely eliminate petrol and diesel cars from the car fleet. This would enable renewable fuels produced from sustainable raw materials to suffice better for the needs of heavy equipment, air traffic and shipping. Sales of new cars and the transport fuels of new cars are at the centre of the modernisation of the car fleet. As the Finnish car fleet will only modernise slowly and the same cars will remain in the fleet for as long as 20 years, *the aim is that the proportion of alternative technologies (electricity, gas) in new cars will quickly be high and that their proportion in the entire car fleet will increase as close as possible to 100% in 2045*. Cars using alternative fuels will eventually also be available on the second-hand car market, allowing more consumers to move away from cars using fossil fuels.

The elimination of transport emissions in 2045 will succeed if, *for example, there are about 2 million all-electric cars in traffic at that time and, in addition, about half a million gas-powered passenger cars and plug-in hybrids*. In 2045, the number of petrol and diesel passenger cars and vans in the car fleet will be less than 500,000. In the case of trucks and buses, diesel vehicles will also remain in the fleet, but they will be accompanied by other vehicles using other driving forces. With trucks, both gas and electricity would become more common, while with buses, electricity would become more common.

Improving the efficiency of the transport system

As the use of biofuels and other renewable fuels in transport involves different limitations (such as availability and price), measures are also needed to reduce the total energy consumption of transport. Energy consumption can be reduced either by modernising the car fleet or by improving the energy efficiency of the transport system, i.e., by reducing the number of vehicle kilometres. In the roadmap for fossil-free transport, the targets for the numbers of both renewable fuels and electric cars and other more energy-efficient cars in 2020–2030 have been set at the highest possible level. Despite this, halving or eliminating traffic emissions cannot be achieved without curbing the increase in vehicle kilometres.

Curbing the increase in vehicle kilometres does not mean limiting the mobility of people or goods or reducing economic activity. Traffic growth can be steered toward so-called sustainable modes of moving or transport or replaced by various remote practices. The utilisation and filling rates of vehicles can be increased. The digitalisation of transport and the development of transport services are good tools for this. Wider use of data will enable more efficient and also more environmentally friendly and safer mobility and freight logistics. If open access is provided to transport and mobility data

and a solution has also been found for rights of use to private sector data, data can be used more efficiently to create new, environmentally friendly transport services both for passengers and freight. Public transport often represents a major part of the travel bundles that are currently available or under development. To ensure that sustainable modes of transport, such as public transport, will be attractive also as part of the new mobility services, ensuring the interoperability of the services must be taken care of (for example, open application programming interfaces, shared travel chain practices, service package taxation).

The aim is to improve the energy efficiency of the transport system so that vehicle kilometres of passenger cars will no longer increase between 2020 and 2045 compared to 2019. In the baseline forecast for greenhouse gas emissions from transport, it has been assumed that the vehicle-kilometres of passenger cars would increase by a total of 22% between 2017 and 2050. *In the objective scenario, this growth would be directed towards sustainable modes of transport instead of the use of cars.* The vehicle-kilometres of each sustainable means of transport would therefore increase by about 23% by 2045. This change will also have significant impacts on transport infrastructure investments that serve sustainable transport. In the future, infrastructure investment planning should be based on the set target, not on vehicle-kilometre growth forecasts.

With respect to freight transport, the aim is also to significantly improve the efficiency of transport and to move from road to rail and water. In the objective scenario, the vehicle kilometres of vans and trucks will only increase by about 12% by 2045.

Measures:

Replace fossil transport fuels (petrol, diesel and natural gas) with renewable fuels and electricity. In practice, this means measures to promote electric transport and to increase the distribution obligation (including biogas and electrofuels) up to 100%. Ensure that the renewable fuels used in transport are made only from sustainable raw materials.

Monitor the development of the distribution infrastructure of alternative transport fuels, and introduce new measures to ensure network coverage if necessary.

Ensure that the rate of modernisation of the vehicle fleet corresponds to the emission reduction targets set for traffic. If the average age of the vehicle fleet looks like it will start growing again, introduce new economic instruments to change the direction.

Prepare for increasing passenger numbers in public transport, for example by directing infra-structure investments in transport and increasing public transport appropriations.

Prepare for increasing volumes of walking and cycling, for example in land use planning and transport infrastructure investments.

Make full use of the opportunities offered by new mobility services, automation and digitalisation of transport to reduce greenhouse gas emissions from transport.

Promote the implementation of social and regional justice also in the long term

6 Impacts of the resolution on the environment and society

The results of the impact assessments of the measures of the resolution are summarised in Appendix 3 “Summary of impact assessments”. The impacts of key measures on the state, municipalities, companies and households have been identified and recorded in the impact assessments. In the assessments, attention has also been paid to the potential adverse effects of the measures and to the need to compensate for these adverse effects so that no person is disproportionately affected by emission reduction measures in transport. A decision has been made to present some measures as part of the whole specifically because of social justice, even if the impact on emissions would be smaller than other measures.

The assessment of the impacts of transport emission reduction measures involves a significant amount of uncertainties. The development of these and the related competence will continue in spring 2021 and beyond.

7 Implementation, monitoring and indicators of the resolution

The measures of the resolution will be implemented within the limits of the budget and the existing appropriations. Decisions on additional appropriations or other measures affecting the budget will be made separately within the central government spending limits and in the annual budgets.

In order to implement the resolution, the Ministry of Transport and Communications has appointed a steering group, to which the state secretaries of the minister of transport and communications, the minister of employment and the economy, the minister of finance and the minister of the environment have been invited as members. The group is chaired by the secretary of state of the minister of transport and communications. Representatives of the aforementioned ministries have also been appointed to the steering group secretariat.

The implementation of the roadmap measures is also monitored annually as part of the planning of the activities and finances of the Ministry of Transport and Communications and other ministries. In addition, climate measures in transport are reported annually to the parliament as part of the climate change report under the Climate Change Act. The environmental impacts of transport are also discussed as part of the transport system analysis included in the national transport system plan, in which information on the situation and development prospects of the transport system is collected.

The indicators of the measures are identified below.

Replace fossil fuels with alternative transport fuels

- Proportion of renewable fuels in all transport fuels (biofuels + biogas + electrofuels) (partly new indicator)
- Proportion of different driving forces (including electricity) in the energy used (partly new indicator)
- Number of alternative fuel distribution stations and charging points (partly new indicator)

Modernisation of the car fleet

- Sales volumes and transport fuels of new cars; proportion of alternative transport fuels in new cars (existing indicator)
- Emissions of new cars as g/km (existing indicator)
- Average age of the entire vehicle fleet and average g/km emissions (existing indicator)
- Number and share of vehicles using alternative fuels in the entire fleet (existing indicator)

Improving the efficiency of the transport system

- Development of vehicle-kilometres (passenger/freight) (existing indicator)
- Proportions by means of moving and transportation (partly new indicator)
- Energy efficiency of transport (freight/passenger) (partly new indicator)

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