

CLIMATE BUDGET 2022

Chapter 2, Oslo City Government's budget
proposal 2022 with appendix



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2 Climate Budget

In 2030, greenhouse gas (GHG) emissions in Oslo shall be reduced by 95 % compared with 2009. The City of Oslo has developed a dedicated Climate Budget, which serves as a governance tool for its climate work. The Climate Budget presents reduction targets and mitigation measures which are being implemented in Oslo to reduce emissions within the municipality, and describes important initiatives in order to achieve the targets set out in the Climate Strategy (proposition 109/20). Responsibility for implementing measures is delegated between the municipal entities and entails similar reporting requirements to the existing financial reporting arrangements. The Climate Budget also identifies the national and regional measures that directly contribute to emission reductions in Oslo. The Climate Budget covers the entire 2022-2025 economic plan period.

2.1 The City Government's initiatives for reducing GHG emissions in Oslo

In 2019, road transport, waste incineration and construction accounted for almost 90 % of all GHG emissions within Oslo's boundaries. The remaining emissions primarily originate from shipping, abandoned landfill sites and the heating of buildings. In this Climate Budget, the City Government has therefore prioritised tightening the instruments aimed at reducing the three largest sources of emissions. The City Government's initiatives in this year's Climate Budget are presented below.

2.1.1 Road transport

Public transport heading out of the pandemic

Through long-term and targeted initiatives, public transport has been developed over a period of many years into a genuine competitor to the car. The decline in the number of journeys being made by public transport during the coronavirus pandemic has resulted in an extraordinary situation for public transport and its associated funding. New travel patterns need to be established in the wake of the pandemic. The City Government is aiming to reduce car travel and encourage more people to travel by public transport. This involves efficient and attractive public transport services. Walking and cycling have become increasingly popular during the pandemic. The goal going forward is to maintain or increase the number of people walking and cycling, while at the same time ensuring that public transport at least wins back the market share lost during lockdown. Overall, the proportion of climate-friendly travel shall increase. For 2022, the City Government is proposing an appropriation of NOK 135 million with the aim of maintaining the overall level of public transport provision in the face of reduced ticket revenue. Furthermore, the City Government is proposing an annual increase of NOK 50 million to ensure zero-emission ferry and bus operations in Oslo by the end of 2023.

For 2024 and 2025, the City Government is proposing an annual increase of NOK 25 million for improvements to public transport. An annual appropriation of NOK 4 million is also proposed for study and analysis capacity to boost the systematic work being carried out to reduce traffic and

improve the accessibility of public transport. A number of major bus contracts will commence in Oslo in 2022 and 2023, and under the City Government's budget proposal, it will be possible for Ruter's operations (the dominant bus company in Oslo) to be zero-emission by the end of 2023, bringing forward the goal of zero-emission public transport by 2028.

Oslo set to become a pilot city for zero-emission heavy vehicles

By 2025, the "Pilot city for zero-emission heavy transport vehicles" initiative will cut emissions from heavy vehicles by more than 17,000 tonnes CO₂e per year. In addition, climate requirements regarding the transport of bulk materials will contribute emission reductions of approximately 2,000 tonnes CO₂e annually. In order to achieve this, the City of Oslo has developed a coordinated package of instruments for heavy vehicles, which aim to accelerate the transition from diesel to electricity, hydrogen or biogas. Key instruments are environmentally differentiated rates in the road toll payment system, climate requirements in procurements, cooperation with the business community, charging infrastructure and energy stations, in addition to a subsidy scheme for charging infrastructure. The municipality will also investigate further whether zero-emission trucks should be given access to public transport lanes on national and municipal roads. In order to rapidly meet growing demand for charging infrastructure for heavy vehicles and contribute to the establishment of a market at an early stage, the City Government is proposing an appropriation of NOK 10 million in 2022 for the establishment of charging points, totalling NOK 36 million during the economic plan period. The City Government is also proposing to set aside NOK 30.8 million from 2022 to 2025 for zero-emission construction machinery and vehicles for the Agency for Cemeteries and Burials. In addition, the City Government will set aside NOK 50 million in 2022 to cover additional costs for zero-emission heavy vehicles and machinery. In order to achieve the goal for all of the municipality's heavy vehicles and machinery to be zero-emission by 2025, all relevant entities must draw up specific plans for the replacement of vehicles and machinery.

Development of zero-emission zones

A zero-emission zone is an area that is reserved exclusively for vehicles powered by electricity, hydrogen or biogas. The City of Oslo is investigating how a zone can be established and gradually expanded. The municipality will apply to the central government to establish a pilot project for zero-emission zones, as facilitated through the Norwegian government's Climate plan for 2021-2030 (Report to the Storting No. 13 (2021-2030)). The City Government is allocating NOK 4 million in 2022 and NOK 10 million in 2023-2025 for essential investments in the establishment of a zero-emission zone.

Norconsult has estimated that a zero-emission zone limited to Oslo city centre (the car-free "city life area" outside Grønland and Tøyen) could result in emission reductions in 2023 of 8,000 tonnes CO₂ in Oslo alone, and 27,000 CO₂ tonnes including the impact outside Oslo's boundaries. With a zone within Ring 2, emissions can be reduced by an estimated 31,000 tonnes in Oslo alone, and 76,000 tonnes including the impact outside Oslo's boundaries. Zero-emission zones can thus become a powerful instrument which could bring about reductions equivalent to one third of the estimated carbon capture effect of the Klemetsrud facility. The study of zero-

emission zones will continue in 2022, with the aim of entry into force during the term of the current city government. Zero-emission zones in Oslo are also a priority area in the EU's MOVE21 innovation project. Oslo is leading MOVE21, and approximately NOK 30 million of the funding from the EU has been granted to participants from the Oslo region.

More and better charging infrastructure to be built

The widespread provision of charging infrastructure for all vehicle groups is an essential prerequisite for electrification of the transport sector. Although charging is essential for electrification, it is not possible to estimate the impact of measures relating to charging infrastructure in isolation. The City Government is proposing the appropriation of NOK 15 million in 2022, NOK 61.5 million annually during the period 2023-2024 and NOK 30.5 million in 2025 for charging infrastructure for cars, taxis, vans, trucks and buses (excluding Ruter). A total of NOK 168.5 million of new funding will be allocated for charging infrastructure during the economic plan period. This is in addition to the existing funding for charging infrastructure for 2022 of NOK 35.5 million. The establishment of charging infrastructure is a prerequisite for the introduction of other measures such as zero-emission zones and climate requirements concerning the taxi industry and procurements. In addition, NOK 2 million is being set aside annually for 2024 (a total of NOK 6 million) for the rental of containerised charging solutions for the ultra-fast charging of electric trucks and dumper trucks. See the section on building and construction for additional appropriations for containerised charging solutions.

Parking measures to reduce road traffic and GHG emissions

Parking measures are a crucial and effective means of limiting road transport, and thereby reducing GHG emissions. This view is supported by urban studies conducted by the Norwegian Public Roads Administration covering all major urban areas in Norway from 2018. It is almost impossible to calculate the precise climate impact of parking measures in isolation, as this instrument interacts with many other instruments in the transport sector.

The municipality's parking regulations, which are intended to stimulate reductions in road transport and the transition to zero-emission vehicles, remain in place. Parking charges in the yellow zone, including non-resident parking in residential zones, will rise by 25 % in 2022, in line with previous resolutions. The increase in charges will apply to both fossil fuel cars and electric cars. New parking regulations, which set out rules concerning the number and design of parking spaces for cars and bicycles linked to residential and commercial buildings, will be presented for political consideration during the first half of 2022. The municipality is also trialling a scheme for car-sharing in public car parking spaces. The aim of this trial scheme is to facilitate the greater use of car-sharing, reduce overall car use in Oslo, and reduce public road space used for parking. The trial scheme will be evaluated after 2022.

Strengthening the efforts relating to climate-friendly travel to/from work in municipal entities

Access to (free) parking at the workplace is a key factor in people opting to drive to work. The City Government is proposing to set aside NOK 10 million to continue the support scheme under

which municipal entities can apply for funding to enable their employees to travel in a more climate-friendly way when travelling on business and to and from work. The City Government will also ask all municipal entities to present a plan to enable their employees to commute to and from work in a more climate-friendly way. In addition, the entities shall present a plan which explains how business travel will take place using climate-friendly forms of transport. The entities will be asked to consider whether parking spaces can be removed completely and/or whether charging facilities can be provided where they are not already available. The City Government will continue to encourage private and public sector employers to introduce fees for the use of employee parking spaces.

Road tolls for fossil fuel cars to be increased

A supplementary agreement to the urban growth agreement has been signed which includes lower road tolls for zero-emission vehicles. This will contribute to emission reductions during the economic plan period. Oslo Package 3 will be renegotiated during 2022. Oslo will then strive to secure further cuts in emissions through increases in road tolls and time-based pricing, combined with an increase in the price differential between fossil fuel vehicles and zero-emission vehicles. For example, an increase in the price differential between fossil fuel and electric vehicles of NOK 20 through to 2025 could reduce emissions by around 22,000 tonnes CO₂ in 2025, compared with the scenario where no new measures are introduced.

Exemptions/discounts for biogas-powered heavy vehicles inside the road toll ring, which was adopted by the steering group for Oslo Package 3 two years ago, could also become an important climate measure in 2022. The City Government will work to ensure that the exemption enters into force in Oslo in January 2022, but this will require certain clarifications from the Norwegian Public Roads Administration. In May 2021, the Storting decided to ask "the Government to ensure the equal treatment of biogas vehicles and zero-emission vehicles on routes funded via road tolls with effect from 1 January 2022".

2.1.2 Building and construction

Imposition of climate requirements

In the 2021 Climate Budget, the City Government decided to introduce requirements for fossil-free construction sites in new zoning plans. This instrument will significantly reduce emissions from construction sites over the next few years, by up to an estimated 100,000 tonnes CO₂e in 2025. This estimate is uncertain, as the figures provided by the Norwegian Environment Agency are of poor quality. The City Government is also keen to ensure that municipal construction sites are fossil-free and will set aside NOK 6 million in 2022 for the establishment of sufficient electrical capacity at construction sites at Oslobygg (battery containers) and Boligbygg (power supply for charging), as well as NOK 2.5 million annually for two positions which will be responsible for developing and following up environmental and climate requirements in procurements. The City Council is also proposing to set aside NOK 44.4 million annually in the economic plan to cover additional costs relating to the Agency for Urban Environment's road operation contracts, partly as a result of climate and environmental requirements.

Environmental and climate requirements in public procurements are one of the municipality's key

instruments in the promotion of climate-friendly solutions in all sectors. In 2022, the City Government will tighten the requirements concerning the municipality's new joint procurement agreements and require zero emissions from the transport of goods and services.

Fossil-free transport and handling of bulk materials

Since 2020, the City of Oslo has required the fossil-free transport of bulk materials to and from construction sites in its own projects. All projects involving the transporting of bulk materials where the municipality is the buyer are expected to become fossil-free during the economic plan period.

The City Government will continue to strive to make the handling of bulk materials more climate-friendly. This includes a set of criteria for assessing the climate impacts of all planning and building cases. The Agency for Planning and Building Services has received funding from the Klimasats grant scheme for a two-year project with a bulk materials coordinator to ensure the climate-friendly handling of bulk materials throughout the planning process.

Emissions from construction materials

Emissions from the production and handling of construction materials are amongst the largest emission sources to which the City of Oslo's own entities contribute outside the municipality's boundaries. The City Government is working to set an ambitious target to reduce GHG emissions from material use by its own entities. Funding has been awarded by the *Klimasats* grant scheme for the realisation of a digital tool for life-cycle calculations.

2.1.3 Waste incineration

Establish carbon capture and storage at Klemetsrud

The City Government will continue to work to achieve carbon capture and storage (CCS) at the Klemetsrud waste-to-energy facility. This will be crucial in achieving Oslo's climate targets. In Report to the Storting 33 (2019-2020) *Longship – Carbon capture and storage*, the Government proposed the awarding of NOK 3 billion to Fortum Oslo Varme's carbon capture project, subject to the condition that Fortum Oslo Varme AS obtains sufficient self-funding and funding from the EU or other sources. Fortum Oslo Varme AS has applied for funding from the EU's Innovation Fund. The project is currently in the second round of the application process. A final response is anticipated during the last quarter of 2021. Subject to these assumptions and in light of the application process for the EU's Innovation Fund, the project may not become operational until 2026 at the earliest.

Household waste in Oslo is incinerated at Haraldrud. The municipality is currently investigating the possibility of incinerating household waste with carbon capture. This includes entering into a dialogue with Oslo Fortum Varme AS and other potential suppliers of carbon capture incineration services. Assuming that the dialogue with the market is productive, or that it is decided that the municipality will continue to process household waste inhouse with carbon capture, this will eliminate the second largest point emission source in the municipality. In addition, it will be important in 2022 to clarify the instruments that will be required to achieve

the target plastic recycling rate of 65 % by 2030. This will be determined on the basis of an ongoing investigation. Ensuring that more waste plastic is sorted upon disposal will be an important step in achieving the climate targets.

2.1.4 Spatial planning

Climate considerations in the land-use section of the municipal master plan

Oslo is revising its land-use section for the municipal master plan, with the aim of ensuring that this section can be adopted in 2023. The key instrument in the land-use section for contributing to the 2030 target lies in the coordination of land use and transport. To ensure that the land-use section actually underpins the 2030 target, the climate impacts of the plan must be analysed. In particular, the analysis will address the consequences of the overarching measures in the land-use section as regards GHG emissions from road transport and land-use reallocation.

Further development of climate criteria in the processing of planning and building matters

In order to highlight and assess how the consideration of planning and building cases contributes to attainment of the climate targets, the Agency for Planning and Building Services has developed climate criteria for use in case processing. In cooperation with Bergen, Oslo is now working to further develop the climate criteria in order to also assess GHG emissions which occur outside the municipality's boundaries when considering planning and building cases. The methodology can be used in projects in both the private and public sectors.

The Climate and Energy Fund

Through subsidies for climate and energy measures, the City Government is facilitating the implementation of measures by residents and businesses in Oslo to reduce GHG emissions and improve energy efficiency. The City Government is proposing to continue the commitment of NOK 120 million. Relevant subsidy schemes in 2022 that can help to cut GHG emissions include:

Road transport:

- Subsidies for charging facilities at housing cooperatives and jointly owned properties
- Subsidies for charging facilities for electric vans for companies
- Subsidies for rapid chargers for vans
- Subsidies for charging stations for electric taxis
- Subsidies to purchase electric cargo bikes for companies
- Subsidies for climate-smart travel to/from work
- Subsidies to provide secure bike parking for housing cooperatives and jointly owned properties
- Subsidies for the charging of heavy vehicles
- Subsidies for depot charging facilities for buses (excluding Ruter's buses)

Building and construction:

- Subsidies for mapping how a construction site can become a zero-emissions site
- Subsidies for electric motorised equipment

Energy improvements:

- Subsidies for the installation of solar panels in housing cooperatives, jointly owned properties and commercial buildings
- Subsidies for insulation and the replacement of windows and doors in housing cooperatives and jointly owned properties
- Subsidies for energy improvements in private housing

All sectors:

- Subsidies for pilot and development projects for climate cuts and energy savings

2.2 Oslo's climate targets

Oslo shall become a city virtually free from GHG emissions and a city that is better equipped to cope with climate change. In 2030, greenhouse gas (GHG) emissions in Oslo shall be reduced by 95 % compared with 2009. In proposition 109/20 Climate Strategy towards 2030, Oslo City Council adopted five main targets for its climate work. The Climate Strategy also includes a description of how these targets will be achieved. The five targets are presented in the box below. Sections 2.5-2.7 of this Climate Budget consider measures to reduce emissions within Oslo's boundaries (target no. 1 in the strategy). The climate work to achieve the remaining targets is discussed in section 2.8.

The five targets of Oslo's Climate Strategy towards 2030:

1. Oslo's greenhouse gas emissions in 2030 shall be reduced by 95 % compared with 2009, and by 52 % in 2023
2. Oslo's natural environment shall be managed in such a way that natural carbon storage in vegetation and soil is protected and the greenhouse gas removal in forests and other vegetation increase by 2030
3. Oslo's total energy consumption in 2030 shall be reduced by 10 % compared with 2009
4. Oslo's capacity to withstand climate change shall be strengthened towards 2030, and the city will be developed so that it is prepared for the changes projected by 2100
5. Oslo's contribution to greenhouse gas emissions generated outside the municipality shall be substantially lower in 2030 than in 2020

If Oslo achieves its climate targets, the city will make a significant contribution to Norway's climate commitments. This will become even more important given the EU's decision to raise its ambition level to an emission reduction of 55 % by 2030. Because Norway has an agreement to implement the climate target in partnership with the EU, the country's target for emission reductions outside the ETS must also be raised. This essentially means that the climate plan presented by the Norwegian government this winter will not be sufficiently ambitious – stronger measures will be needed. Oslo and other major cities must deliver on this.

However, Oslo is also dependent on strengthened regional and central government instruments to achieve its climate targets. The most recent available emission inventory for Oslo dates from 2019, and shows a reduction of 16 % during the period from 2009 to 2019. However, there is reason to believe that the emission reductions have been greater than the figures suggest, as the Norwegian Environment Agency's emission inventory only partially reflects the impacts of most of the measures in Oslo's Climate Budget (see Chapter 2.4).

Main target 1 in the box above includes a secondary target for Oslo's GHG emissions in 2023 to be reduced by 52 % compared with 2009. The target for 2023 is challenging, but the City Government is working purposefully to implement more measures or raise the level of ambition for existing measures, in order to bring us closer to achieving the target. With regard to this, the City Government notes that the Norwegian Environment Agency's emission inventory should not be used in isolation as a way of assessing the attainment of targets, as the impacts of many climate measures are not reflected in the figures. As a result, it is very likely that the GHG emissions in Oslo indicated by the Norwegian Environment Agency's emission inventory are overestimates. Measures which are implemented could also have a greater or earlier impact than expected.

2.3 Climate transformation

2.3.1 Climate transformation in the City of Oslo

The fight against climate change is one of the City Government's highest priorities. Oslo shall become a zero-emission city which is better to live in and has cleaner air, better public transport and safer routes to school. Oslo is a small city on a global scale, but by working closely with other cities, we can develop solutions which can quickly be adopted by others. The major transformation that will be necessary to become a zero-emission city has been continuing since the current City Government took office in 2015, and many major changes have taken place:

- Road transport in Oslo has declined in recent years, and the remaining road transport is rapidly becoming electrified. This is partly the result of higher parking fees, the removal of several thousand parking spaces, changes to the road toll scheme with more toll stations, two-way toll collection and greater environmentally differentiated rates. One in four vehicles passing the toll ring is now electric.
- By facilitating energy stations which offer charging/refuelling with renewable fuels such as biogas, hydrogen and rapid charging, the City of Oslo can drive the transition to zero emissions amongst the business community, as well as within our own operations. The

production of biogas for fuel from food waste and wastewater sludge is part of the transition to a circular economy.

- By using climate criteria in spatial planning, the City of Oslo is laying the foundations for the long-term restructuring of the city, where future housing, transport solutions and businesses are based on low-emission solutions and reduced demand for transport.
- By setting strict climate requirements regarding the transport of goods and services, the City of Oslo is driving the development of zero-emission transport. Furthermore, Oslo's own construction sites are fossil-free as a result of the imposition of procurement requirements. This means that the construction machinery that is used in Oslo's construction projects is powered by biodiesel, biogas, electricity or hydrogen. We are also imposing such requirements on both private and public sector developers. By introducing climate requirements concerning the procurement of construction services and bringing electric wheel loaders and excavators etc. to the market, Oslo is helping to transform an entire industry, first across Norway and subsequently worldwide.
- Until the coronavirus pandemic, public transport's share of motorised transport had been increasing every year, and more journeys in Oslo have been made by public transport than by car every year since 2016. This is the result of the City Government's efforts to make public transport services more attractive and efficient. However, inhabitants are also cycling more and more, as a result of the greatly improved cycling facilities, including a much more extensive interlinked cycle path network.
- During the past year, electrification of the van fleet has also increased, with this fleet accounting for 35 % of new car sales in 2021 (as of July). This is a result of measures such as requirements concerning procurements, reserved parking for electric vans, exemption from road tolls, etc. Government support for the purchase of electric vans (Enova) has also been a contributory factor behind this.
- Public transport will be converted to zero-emission operation with the aim of achieving zero-emission ferry and bus operations in Oslo by the end of 2023. During the 2021-2022 winter season, the existing island ferries will be replaced by new electric ferries with greater passenger-carrying capacity. In 2022, a new bus contract began in Oslo South based on 95 % zero-emission operation. Today, all minibuses used by TT-transport in Oslo are powered by either biogas or electric (total of 64 minibuses). Other specialist vehicles (age-friendly transport) are currently powered by fossil diesel (16 buses).
- All international ferries arriving in Oslo now use electricity rather than diesel when docked. The installation of shore supply facilities is planned for container ships, tankers, bulk carriers, car carriers, etc. calling at Sydhavna.
- Fifteen per cent of taxis operated by Oslo Taxis and Norgestaxis (the largest taxi companies in Oslo) are zero-emission, and all taxis in Oslo must be zero-emission by 1 November 2024, as a result of requirements imposed by the municipality. The municipality is providing charging points specifically reserved for taxis, various pilot projects (e.g. wireless charging), and subsidies through the Climate and Energy Fund for home charging for taxi drivers.
- 87 % of the municipality's own vehicle fleet is zero-emission or runs on sustainable renewable fuel. Few other municipalities or government agencies even come close to having such a high proportion.

- Oslo is working to develop a completely new and innovative approach to waste management involving carbon capture during waste incineration. This could be the start of a new industrial chapter, bring new green jobs to Oslo, and help solve a major environmental problem facing the world. There are 500 waste incineration plants across Europe alone to which the technology could be exported.
- The 2021 climate survey shows that there is broad support amongst the population for the city's climate strategy and targets. 68 % of Oslo's inhabitants support the overall target of a 95 % reduction in GHG emissions by 2030, and 57 % believe that the efforts being made to achieve the climate targets are making the city a better place to live in.

2.3.2 The role of the business community in achieving Oslo's climate targets

The business community in Oslo must adapt if Oslo is to achieve the climate targets, but it can also help to accelerate the transition to zero-emission solutions. In particular, Oslo's business community can influence emissions by investing in zero-emission transport, developing solutions based on a circular economy, and establishing requirements for suppliers. The finance industry can contribute to the climate transformation through investment strategies based on sound climate risk assessments.

According to the 2021 climate survey, 82 % of businesses believe it is important for them to be seen as climate and environmentally friendly by their customers, an increase of eight percentage points over the previous year. This trend is also reflected in the proportion of businesses preparing an emission inventory, with the proportion preparing such an inventory rising from 12 % to 18 % in two years, according to the same survey.

A number of major companies have taken on the role of leader in the Green Shift and demanded stronger climate action from the national authorities through the *Skift – Næringslivets klimaledere* (Skift – Business Climate Leaders) climate network. The City of Oslo has a productive dialogue with pioneer businesses through its own *Næring for klima* (Business for climate) network, with 130 member businesses from across a wide range of sectors. In this network, specialists from member companies and the municipality discuss measures and solutions in four areas: Goods and service transport vehicles, construction and real property, waste and circular solutions and climate adaptation.

Leading players are also visible at the forefront of the cityscape in Oslo. Adjacent to the European route E18 at Filipstad, the Norwegian postal service (*Posten*) and DHL have established their own City Hubs next to DB Schenker's hub which dates from 2019, and are now able to distribute goods from there using cargo bikes and electric vans. The transport industry is also starting to use trucks powered by electricity or biogas. As of July 2021, 7 % of new trucks in Oslo were electric. Alongside their low operating costs, climate requirements concerning the municipality's procurements and the road toll payment system are a key reason why businesses are purchasing such vehicles.

Many businesses have also announced tighter climate requirements for procurements, and a small number are also demanding climate neutrality from their suppliers. However, the 2021 climate survey shows that the proportion of companies imposing climate requirements on their suppliers is not increasing overall, but has remained stable at 53 % for several years. An increase in the proportion of businesses imposing stricter climate requirements on their suppliers will be an important contribution from the business community to the attainment of Oslo's climate targets through to 2030.

The transition to a more circular economy will help to reduce both direct emissions from waste incineration and indirect emissions in Oslo. An increase in demand for reused and recycled materials is a prerequisite. For example, in the business community, soft drinks producers such as Coca Cola and Ringnes have switched to manufacturing soft drinks bottles from recycled plastic. In the construction industry, the recycling of construction materials has increasingly come into focus. In 2021, Entra completed an office building at Kristian Augusts gate 13 made from 80 % recycled materials, reducing GHG emissions generated by material use by 70 %. Many start-up enterprises are demonstrating that transformation is possible through the adoption of green business models and circular solutions.

The transformation necessary to achieve Oslo's climate targets is comprehensive. Despite many good climate measures and examples of future-oriented solutions and businesses amongst Oslo's business community, the solutions still need to be disseminated on a large scale, and even more businesses must take the steps that are needed. The operators who have progressed furthest in re-aligning their strategy and taken the lead in introducing new solutions will be best equipped to retain access to markets and capital as climate regulations imposed by the EU, greater weighting of climate risk in the finance sector and stricter climate requirements for procurements are escalated over the coming years.

2.3.3 The role of the central government in achieving Oslo's climate targets

In January 2021, the Norwegian government presented the Climate plan for 2021-2030 (Report to the Storting No. 13 (2020-2021)). The two key points as far as Oslo is concerned are that provision is being made for a pilot project with zero-emission zones in two major Norwegian cities (Oslo and Bergen), and that the Norwegian government is intending to increase the carbon tax to NOK 2,000 per tonne in 2030. According to Norway's report to the UN Framework Convention on Climate Change, carbon tax is the single instrument that has resulted in the largest national emission reductions since 1990. However, it is unclear what reductions the increase in the tax in 2030 will lead to, if the increase in the tax is compensated by reductions in other taxes. For example, if compensation is given in the form of a reduction in road use tax, the impact of the carbon tax will be eliminated as regards road transport. The Storting has also not adopted an escalation plan for carbon tax, so it is unclear when any increase will actually be introduced.

Proposals that could have a positive impact for Oslo include the development of integrated infrastructure for zero- and low-emission vehicles, the facilitation of support schemes for the establishment of essential infrastructure for realising technologies within passenger and freight transport, the scope to carry out pilot trials with zero-emission zones, and the introduction of carbon tax on waste incineration.

The Norwegian government has also introduced a scheme which means that biofuels which are used over and above the sales requirement will not have a climate impact. When a customer buys 100 % biofuel, the seller will then be able to sell correspondingly more fossil fuels to another customer, so that the climate impact is offset on a litre-for-litre basis. Oslo will continue to work towards a national, government agency-run system which will ensure a climate impact from biofuels which are used over and above the minimum level in the sales requirement. If such a system is not put in place, the City Government will be forced to consider moving away from requirements concerning biofuels in procurements. If this becomes a reality, the City Government's target for emission reductions in 2023 will become even more challenging to achieve.

In June 2021, the Storting adopted a new National Transport Plan 2022-2033 (NTP). In a densely populated metropolitan area like Oslo, a high-capacity, efficient public transport network is essential in order for the population to get about and thrive in their everyday lives. The key measures for Oslo are the Fornebu Line, a new signalling system for Oslo Metro, a new city centre tunnel, and a new high-capacity station at Majorstua. Through the urban growth agreement, the central government has committed to co-financing the Fornebu Line and a new city centre tunnel for Oslo Metro. In the 2022-2025 action programme for the urban growth partnership and Oslo Package 3, funding was allocated for the planning of Majorstua Station, but not the actual construction. In the NTP, NOK 500 million has been set aside for a new Majorstuen station during the first period. The key public transport projects for Oslo are underfunded. In order to achieve the various targets regarding the climate and traffic reductions, it will be necessary to prioritise investments and the operation of public transport, and to deprioritise investments in roads which generate traffic growth. Parallel to this, it will also be necessary to work to ensure that revenues from the road toll ring and central government funding for major public transport projects both increase.

2.3.4 Oslo's international climate engagement

Global climate and environmental targets require efforts to be made at local, national and international level. Cities are pivotal to the climate transformation that will be necessary if the world is to achieve the goals agreed in the Paris Agreement.

By participating in international climate networks for cities, Oslo is contributing to the sharing of experiences and the exporting of climate solutions. By participating as an innovator city in the C40 network, through Eurocities, Carbon neutral Cities Alliance (CNCA) and Local Governments for Sustainability (ICLEI), Oslo is helping to grow markets for new climate solutions and drive

better national and international framework conditions for the implementation of climate initiatives.

Given that Norway has an agreement to implement the climate target for 2030 in cooperation with the EU, the EU's climate policy becomes even more important as a framework than was previously the case. Oslo is therefore actively working to influence the EU's major climate package "Fit for 55", which was presented in July 2021, both through Eurocities and through input to the Norwegian government.

Oslo's experiences and results are in great demand internationally. In autumn 2020, an Oslo office was established under the C40 climate network to further develop climate solutions in areas where Oslo is a leading player. The key focus areas for the office are zero-emission buildings and construction sites, climate leadership and climate budgets.

2.4 Development in GHG emissions in Oslo from 2009 to 2019

The Norwegian Environment Agency's municipal emission inventory is used as a basis in the Climate Budget. The most recent figures in the emission inventory concern 2019. The inventory has been updated back to 2009 as regards the years for which figures are available. The Norwegian Environment Agency has not prepared an emission inventory for 2010, 2012 or 2014. Although the Norwegian Environment Agency's emission inventory remains subject to considerable uncertainty, it is continually being improved.

The municipal emission inventory only partially reflects the impact of most of the measures in Oslo's Climate Budget. This emission inventory should therefore not be used in isolation as a basis for the attainment of targets. This is also an important reason why the City of Oslo's Climate Agency has prepared the "Climate Barometer", which monitors developments in a number of key parameters which provide information on developments in GHG emissions. As the impact of many of the municipality's climate measures is not reflected in the Norwegian Environment Agency's emission inventory, it is highly likely that the GHG emissions in Oslo indicated by the Norwegian Environment Agency's emission inventory are overestimates.

The Norwegian Environment Agency is working to improve the figures before the emission inventory for 2020 is published, which is expected to take place around the turn of the year 2021/2022. Priority areas for improvement include calculating emissions from construction machinery and motorised equipment, as well as methodological improvements concerning emissions from road transport. The scope of these improvements is not known. The City of Oslo's Climate Agency will continue its dialogue with the directorate in 2022 (see section 5.2 of the Appendix to the 2022 Climate Budget for more information). Adjustments resulting from a change of method will affect emissions throughout the time series, from 2009 through to the most recent emission year.

2.4.1 Emission inventory for Oslo broken down by emission sector

The emission inventory shows that GHG emissions in Oslo totalled around 1.27 million tonnes CO₂e in 2019. This represents a decrease of 6.7 % from 2018. The rise in emissions in 2017-18 was caused by an increase in emissions from diesel-powered motorised equipment and a reduction in the use of biofuels in road transport. During the period 2009 to 2019, GHG emissions reached a minimum in 2019, and emissions have declined by 16 % compared with the 2009 level (Figure 1). Emissions have been declining in almost all sectors since 2009.

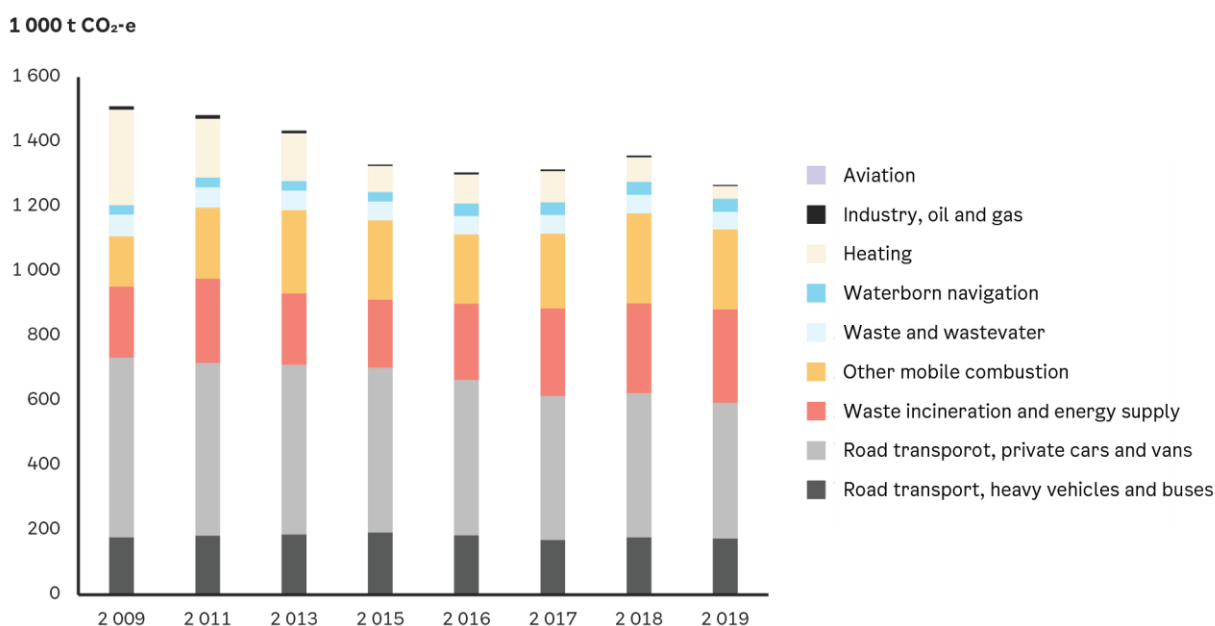


Figure 1: Greenhouse gas emissions in Oslo by emission sector, 2009-2019

All sectors, except for waste incineration, energy supply and shipping, saw reductions in emissions from 2018 to 2019. Emissions from road transport fell by 4.8 % from 2018 to 2019, equivalent to 30,000 tonnes CO₂e, as a result of an increase in the proportion of electric cars and the blending of biofuel in petrol and diesel.

Emissions from construction machinery (other mobile combustion) fell by 11 % and just under 31,000 tonnes CO₂e. However, the underlying data and the method used to calculate these emissions are uncertain. Emissions from heating declined by 48 %, equivalent to just over 36,000 tonnes CO₂e, as a result of a sharp decrease in the use of fossil heating sources. The decrease is the result of adaptation to the ban on oil-fired heating, which entered into force on 1 January 2020.

As Figure 2 shows, the largest sources of emissions are road transport (47 %), waste incineration and energy supply (23 %, mainly the incineration of fossil waste) and other mobile combustion, i.e. construction machinery and motorised equipment (20 %). The Norwegian Environment Agency's publication of the emission inventory for 2019 again included emissions

from landfill sites, which are now included under emissions from the waste and wastewater sector.

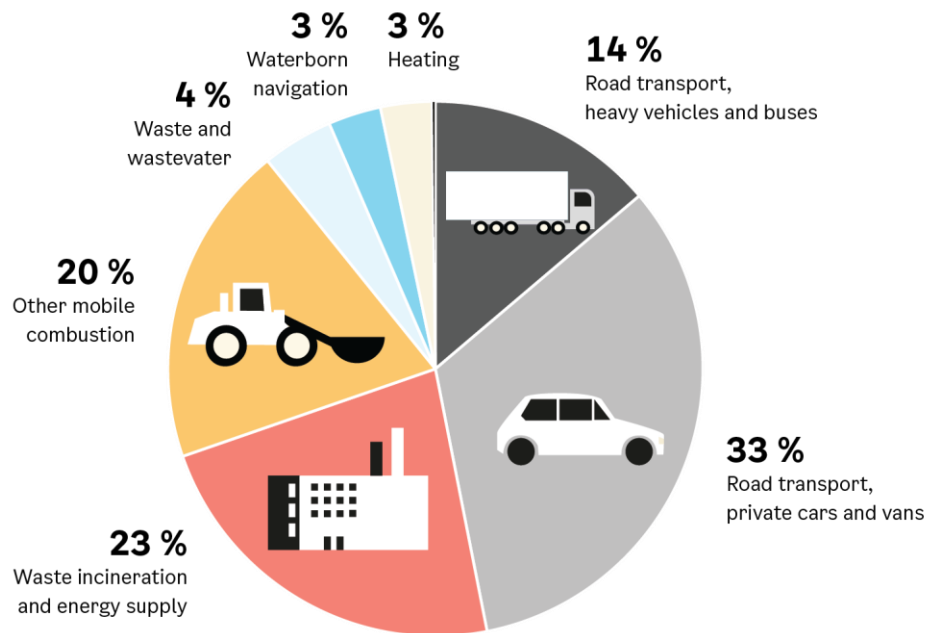


Figure 2: GHG emissions in Oslo by emission sector, 2019

2.5 Calculation of the impacts of measures 2022-2025

The Climate Agency has estimated the impacts of the measures in the Climate budget (Table 2.2.a). Impact calculations for measures in the Climate budget are based on a projection of Oslo's emissions through to 2030 without any additional measures (the baseline scenario). This projection was prepared by the Centre for Climate Research (CICERO) and is based on the best available knowledge regarding the drivers that will impact on GHG emissions through to 2030.

The projection is subject to considerable uncertainty, partly because of the difficulty of making accurate predictions regarding technological advances which will impact on emissions. Further information regarding methodology and the basis for the calculations can be found in Chapter 2 of the Appendix to the 2022 Climate Budget.

The coronavirus pandemic has so far had major consequences for Oslo. The pandemic has influenced the behaviour of both inhabitants and businesses in Oslo and Norway generally. This behavioural change could impact on emission levels in both the short and the longer term. However, we do not know enough about the restructuring impacts of the coronavirus pandemic, or what will become the "new normal", to include such impacts in the Climate budget's analyses this year.

2.5.1 Overall impact of measures

The analyses underlying this budget proposal show that the projected emission trends in Oslo, including the impact-assessed measures in the Climate budget, could cut GHG emissions by 26 % in 2022 and by 31 % in 2025, compared with 2009 levels (the dotted green line in the figure below).

A new feature in the 2022 Climate Budget is that emissions reductions are also estimated for measures politically adopted at either central government or municipal level which have not been quantified in Table 2.2a, because the basis for the figures is more uncertain or because of uncertainty regarding when the measure will be implemented (e.g. carbon capture at Klemetsrud).

Measures in this category are:

- Requirements regarding fossil-free construction sites in all new zoning plans (measure 24, Table 2.2b)
- Measure to reduce emissions from road transport (measures 17, 18, 20, 21 and 23, Table 2.2b)
- Zero-emission motorised equipment (measure 26, Table 2.2b)
- Ban on the use of mineral oil for temporary heating (central government) (measure 27, Table 2.2b)
- Carbon capture and storage at Klemetsrud from 2026 (from Table 2.3)

Of these, carbon capture at Klemetsrud will have the greatest impact and will contribute to the decrease in emissions from 2025 to 2026. The requirement for fossil-free and zero-emission construction sites will also have a significant impact towards 2026, and will result in a reduction in emissions almost as large as that from carbon capture in 2030. In the figure, these measures are referred to as “Adopted measures with uncertain calculations” (hatched darker green area in the figure below). If the impact of these measures is included, the total reductions in emissions are estimated to be 28 % in 2022, 39 % in 2025 and 62 % in 2030.

There is considerable uncertainty associated with the Norwegian Environment Agency's emission inventory for 2009-2019, the emission projections and the projections concerning the impact of measures.

2.5.2 More about measures in the palest hatched green area

The measures referred to as “New measures under consideration”, are measures which have either been adopted or are the subject of a declaration of intent in the Climate strategy and elsewhere, but where the scope has not been clarified locally and/or nationally. These are measures that are being studied/planned at either local or national level. The final form of the measures could change the emission cuts specified below. The measures have been included to illustrate that a number of climate measures which could contribute to attainment of the climate target for 2030 are currently under development.

These measures include an extended zero-emission zone within Ring 2 from 2026, a gradual increase in prices in the road toll payment system for fossil fuel vehicles (Norconsult concluded that the largest reduction in emissions will be achieved with a price increase of NOK 100 for fossil fuel vehicles per passage compared with zero-emission vehicles in 2030), a carbon tax equivalent to NOK 2,000 in 2030 (without any compensation in the form of reductions in road use tax, etc.), according to the Norwegian government's Climate Plan, and an increase in the biofuel sales requirement to 40 % in road transport in 2030, also according to the Norwegian government's Climate Plan. In addition, there is a reduction in emissions linked to the municipality's incineration of household waste through to 2030, although we have not yet adopted specific measures to eliminate these emissions.

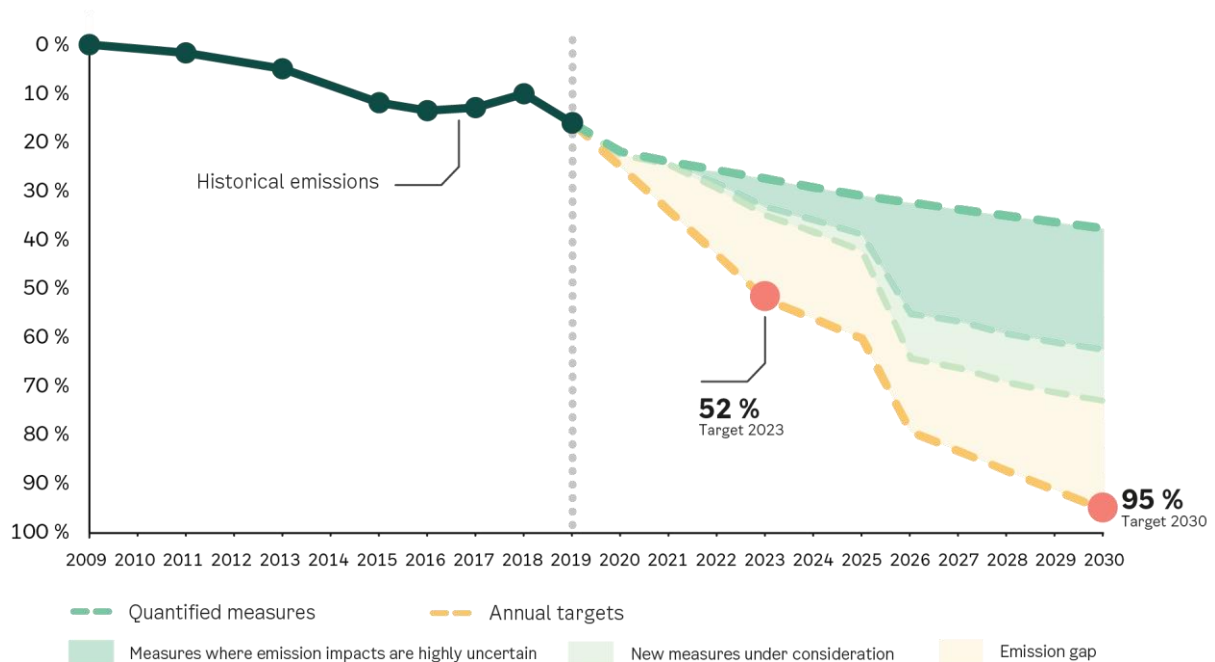


Figure 3: The figure shows emission projections towards 2030 based on adopted, quantified measures and instruments (dotted green line) and adopted measures and instruments with uncertain calculations (hatched green area). The pale green hatched area shows measures under considerations. The figure also shows necessary emission reductions to achieve the climate target in 2030 (annual targets), and the need to strengthen existing and develop new instruments (pale yellow hatched area)

As the figure above shows, the adopted and ongoing climate work could result in a 72 % reduction in emissions in 2030. In order to achieve the 2030 target, it will be necessary to work purposefully in order to reinforce existing measures and implement new ones. This also assumes that additional national measures will be implemented. There is a difference of 23 percentage points between adopted measures and declarations of intent, and the emissions limit in 2030. If the City Council does not support the identified measures, other measures which are at least as

vigorous must be implemented to compensate for this. Despite the very high level of ambition in Oslo's target for 2030, the city can achieve this target given these prerequisites.

No emission inventory is available for 2020, but the City Government's 2020 annual report included a warning that the 2020 target was unlikely to be achieved. In the 2022 Climate budget, the City Government is proposing an emissions limit which starts from the last known emission inventory and then proceeds linearly to the target 52 % emission reduction in 2023 and on down to the target of a 95 % reduction in emissions in 2030.

As the figure above shows, it will be very challenging to achieve the target for 2023. Nevertheless, it is still possible to implement additional measures or raise the level of ambition for existing measures. The measures that are implemented may also have a greater or earlier impact than expected, and any improvement in the Norwegian Environment Agency's emission inventory could more accurately reflect the impact of many key measures in Oslo. These factors could have a major impact on both the calculation of goal attainment and when the goal is attained.

In order to close the emission gap towards both 2023 and 2030, we will be dependent on the climate impacts of a strengthened national policy and the further climate-related efforts of the business community. The Norwegian government must eliminate barriers which prevent emission cuts in the major cities and reinforce the use of instruments in addition to what is set out in the government's Climate Plan, such as:

- Ensure a national system that creates a climate impact for sustainably produced biofuels over and above the sales requirement, so that Norway achieves 1-2 million tonnes of additional emission reductions through to 2030.
- Introduce an exemption in the road toll ring for trucks powered by biogas. This was adopted by the Oslo Package 3 partnership 2.5 years ago, but the government has still not ensured its introduction. The exemption is likely to lead to a significant increase in the number of biogas-powered cars and more secure sales for the gas for biogas producers.
- Increase purchase taxes for fossil fuel cars, including rechargeable hybrid cars, to ensure that the target of selling 100 % zero-emission cars in 2025 is achieved.
- Ensure that the tax rules for the leasing of cars stimulate the leasing of electric cars rather than fossil fuel cars.
- Continue the Klimasats grant scheme and increase the subsidy to NOK 1 billion, in order to continue to stimulate innovative climate measures around the Norwegian municipalities.
- Secure regulations which permit municipalities to require charging for private parking, e.g. at workplaces, in order to encourage a modal shift to public transport, walking and cycling for travel to/from work.

All these central government instruments will help to close the gap in the pale-yellow hatched area.

2.5.3 Proposed resolution

The City Council shall strive to achieve the emissions limit year by year in order to achieve the 2030 target, and must therefore actively work to ensure the implementation of both the measures that cannot be quantified with sufficient certainty and the measures that are in process, and develop new and strengthen existing instruments. The 2022 Climate Budget concerns the economic plan period 2022-2025 and is intended to help to steer towards the climate target for 2030.

Based on the above, the City Council proposes the following resolution for the Climate budget under Proposition 1:

The City Council calls on the City Government to work to reduce GHG emissions which follow the emissions limit towards a 95 % reduction in 2030. This entails an emission reduction of 43 % in 2022 and 60 % in 2025, compared with the emission level in 2009. The City Government notes

Table 2.1: Limits for GHG emissions in the City of Oslo 2022-2025

	2009 (year of baseline)	2019 (inventory)	2022	2025
Historical emission reduction	0 %	16 %	-	-
Quantified measures	-	-	- 26 %	- 31 %
Emission level [tonnes CO2 equivalents]	1,509,800	1,267,100	1,120,100	1,040,900
Adopted measures with uncertain calculations			- 28 %	- 39 %
Emissions limit			- 43 %	- 60 %
Difference between quantified measures and emissions limit			17 pp.	29 pp.

Note: All percentages are relative to the baseline year 2009. All figures are given in tonnes CO2 equivalents and rounded to the nearest 100 tonnes. The figures are based on the latest available emission inventory from the Norwegian Environment Agency, published on 22 February 2021. These figures may change over time as a result of the Norwegian Environment Agency's method development and data access.

that the impact of most measures in the Climate budget is not fully or even partially reflected in the emission inventory, and that the distance to target attainment is therefore probably less than what it has been possible to quantify.

The City Council agrees to the measures in Table 2.2a and Table 2.2b in Chapter 2 Climate Budget in Proposition 1. As part of its ordinary reporting to the City Council, the City Government reports on the status of the follow-up of the measures and estimates for the emissions limit in 2022 and 2025. The reporting is based on the status of the implementation of the measures, which are presented in Table 2.2a and Table 2.2b in Chapter 2 Climate Budget in Proposition 1, as well as the indicators for GHG emissions in Oslo, the "Climate Barometer".

2.5.4 Distributional effects

The City Council wishes to ensure that climate measures do not contribute to social inequality. Thus, both climate and distributional effects must be assessed in all relevant decisions. At an overarching level, the Climate Agency has assessed the distributional effects of climate measures in transport and construction, as measures and instruments within these emission sectors can have the greatest impact on citizens and businesses.

The transport measures largely entail the redistribution of resources from those who have and use a car, to those who walk, cycle or travel by public transport. A third of the population of Oslo lives in a household which has no access to a car, and two in every three journeys are made on foot, by bicycle or on public transport. Investment in public transport, road toll payments and the use of space for pedestrian and cycling infrastructure instead of car parking contribute to the redistribution of resources from those who have access to a car to those who do not. Women tend to walk more than men, travel on public transport more and use a car less. People on low incomes tend to walk more and travel on public transport more. Overall, these groups will therefore benefit from this redistribution.

The measures that promote the use of electric cars also help to create a used car market for electric cars, ensuring that this does not become an opportunity exclusively reserved for those on higher incomes. The used car market for electric cars is growing rapidly and helping to ensure that low-income groups are increasingly able to buy electric cars. Measures aimed at the business community, such as environmental requirements for taxi permits and measures relating to goods and service transport vehicles, will have different consequences for different stakeholders. The requirements may entail an economic risk during the transitional phase to zero-emission solutions, and could have different consequences for large and small enterprises. Subsidies are used strategically to reduce the costs associated with restructuring and increase innovation capacity. See section 2.2 of the Appendix to the 2022 Climate Budget for more detailed information.

In autumn 2020, the Department for Urban Development in Oslo pursued a dialogue with the major industry players regarding requirements for fossil-free construction sites. During these meetings, it was stated that the industry can meet the requirement, but at an additional cost. Requirements regarding fossil-free construction sites mean that biofuel must be used, which is more expensive than fossil fuels. Biofuels cost between 50 and 100 % more than traditional fuels. In addition, there are administrative costs associated with obtaining access to biofuels. These costs impact equally on all players, but they can be more challenging to meet for smaller players. The municipality may therefore grant exemptions in individual cases in order to avoid imposing requirements that are either impossible or disproportionately demanding to meet, provided that the applicant can implement other measures which compensate for the lack of emission reductions.

2.5.5 Uncertainty

As mentioned above, the emission inventory is very uncertain, and the Norwegian Environment Agency is working to improve the statistics. This could lead to significant changes in future publications. Measure calculations, which are often based on this emission inventory, also entail numerous assumptions concerning future developments, and will therefore always be subject to uncertainty. There is also uncertainty associated with the projections of GHG emissions.

The City Government's approach to these challenges is to use the best available knowledge and be transparent regarding the data and methods that are used in the analyses. The City of Oslo's Climate Agency is working closely with the Norwegian Environment Agency to improve the municipal statistics concerning GHG emissions.

The impacts of the various measures in the Climate Budget are calculated conservatively. More information on assessments of uncertainty can be found in the Appendix to the 2022 Climate Budget, section 2.3.

2.6 Measures in the 2022–2025 Climate Budget

The Norwegian Climate Agency has sought to determine the magnitude of emission reductions which could result from the measures in the Climate Budget. The method and assumptions used to calculate the impact of the measures is described in more detail in the Appendix to the Climate Budget Proposition 1/2021. All measures and activities have been placed in Table 2.2a, 2.2b or 2.3. Brief descriptions of the measures are provided under Tables 2.2a and 2.2b.

2.6.1 Measures with quantified emission reductions

Table 2.2a shows the measures for which it has been possible to estimate quantified emission reductions in 2022 and 2025 (the economic plan period). The GHG reduction stated for the measures is measured against a projection (a baseline trajectory) of emissions, which shows what the development in emissions would have been without the measures in the Climate Budget. As Table 2.2a shows, there are a number of important measures in the Climate Budget for which the impact is already included in the projection. For more information on the projection, see Chapter 2 of the Appendix to the 2022 Climate Budget.

Table 2.2a: Measures in the Climate Budget with quantified emission reductions

Emissions sector and source	No.	Measures and instruments	Responsible	Measure impact 2022	Measure impact 2025
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				[tonnes CO ₂ e]	[tonnes CO ₂ e]
Heating					
Fossil fuel heating	1	Phasing out of oil-fired heating of buildings	BYM*	<i>Included in projection</i>	
		Follow-up of governmental ban from 1 January 2020			
Waste incineration and energy supply					
District heating excluding waste incineration	2	Phasing out of fossil oil and gas in district heating (peak load) Fortum Varme	NOE*	2,700	2,600
Waste and wastewater					
Landfill gas	3	Extraction of landfill gas	EBY*	<i>Included in projection</i>	
		Rommen landfill site - increased extraction of landfill gas	EBY*		
		Grønmo - minimise downtime at the gas facility	EBY, REG		
Road transport					
Light and heavy vehicles	4	National requirement for sale of 24.5 % biofuel		<i>Included in projection</i>	
	5	Road toll payment system			
		Establish sufficient charging infrastructure for cars	BYM*		
		Continuation of local and regional instruments in order to promote zero-emission cars	MOS		
	Exemption from payment for electric vans inside the toll ring	MOS			
6	Zero emissions/sustainable biofuels in the municipality's vehicle fleet	All*, UKE*	1,900	1,900	
Cars	7	Better cycling facilities	MOS, BYM*	2,200	2,900
		Follow up the cycling strategy			
	8	Legislation for taxis: zero emissions by 2025		4,400	15,300
		Contribute to the establishment of adequate charging infrastructure for taxis	BYM*		
Subsidy scheme for charging infrastructure for taxis		KLI*			
Reserve some taxi stands for zero-emission taxis	BYM*				
Vans	9	Zero-emission goods and service transport vehicles		1,100	6,300

		Parking spaces, loading and unloading stations reserved for zero-emission vans	BYM*		
		Establishment of publicly available charging	BYM*		
		Procurement requirements in the City of Oslo	All*, UKE		
		Municipal subsidy scheme for charging infrastructure for electric vans	KLI*		
		National subsidy schemes for electric vans			
Buses	10	Zero-emission buses in public transport	Ruter*, MOS	11,900	20,500
Heavy vehicles	11	Zero emissions/ sustainable biofuels in transport of bulk materials and waste from building and construction sites		2,000	2,000
		Procurement requirements in the City of Oslo	All*, UKE		
		Dialogue with developers on measures for climate-friendly transport and handling of bulk materials in planning matters	PBE*		
		Municipal cooperation to reduce emissions from transport of bulk materials	KLI*, PBE, EBY, BYM, FOB, UKE, Oslobygg, Boligbygg, Port of Oslo		
		Pilot projects in Hovinbyen	KLI*, PBE, EBY, BYM, VAV, Oslobygg, Port of Oslo.		
	12	Pilot city for zero-emission heavy vehicles	KLI*	3,800	17,400
		Exemption from payment for biogas-powered heavy vehicles inside the road toll ring	MOS*		
		Procurement requirements in the City of Oslo	All*, UKE		
		Establishment of energy stations	KLI*		

		Establishment of charging infrastructure	BYM*		
		Assessment of access for trucks to public transport lanes	BYM*		
		Municipal subsidy scheme for charging infrastructure	KLI*		
		National subsidy scheme for vehicles			
		Campaign for fossil-free heavy vehicles	KLI*		
		Provide areas for municipal climate measures (energy stations, bulk material handling and freight consolidation centre)	EBY*		
Other mobile combustion					
Diesel-powered motorised equipment	13	Zero emissions/sustainable biofuel in municipal machinery	All*, UKE*	1,100	1,600
Waterborne navigation					
	14	Fossil-free public transport - ferries	Ruter*, MOS	6,600	9,000
	15	Establishment of shore power	HAV*, NOE	3,800	3,800
		Shore power, international ferries			
		Shore power, Sydhavna port			
Total impact of measures in the Climate Budget				41,500	83,500
Historical emission reductions and emission reductions in the projection (produced by Cicero)				348,300	385,400
Total impact of historical emission reductions, emission reductions in the projection and measures in the 2022 Climate Budget 1)				389,700	468,900

* indicates reporting responsibility.

1) The impact of the projection is assessed in relation to the 2009 emissions level. The impacts of the measures are calculated using the projection in the same year. This means that the overall impact of the measures cannot be aggregated between columns 2022 and 2025, as they indicate the impact in the year in question compared with 2009. The impacts are calculated based on assumptions concerning the timing of implementation of the measures. The impact per measure is rounded to the nearest 100 tonnes CO₂e, and the sum in the table above is therefore 389,700, rather than 389,800.

2.6.2 Description of measures in Table 2.2a:

Measure 1. Phasing out of oil-fired heating of buildings

The use of heating oil and kerosene for the heating of buildings was prohibited on 1 January 2020. The Agency for Urban Environment follows up the ban as regards private buildings and commercial buildings, and has authority to grant dispensations from the ban. The Agency for

Urban Environment is monitoring the intentions behind the regulations and associated guide, and has adopted a restrictive approach to the granting of dispensations from the ban.

Measure 2. Phasing out of fossil oil and gas in district heating (peak load)

Fortum Oslo Varme AS aims to phase out the remaining use of fossil heating oil and LNG as a peak load in the production of district heating under normal operating conditions. The company is actively working to identify suitable alternatives, such as electricity, bio-oils, pellets and liquid biogas. The average proportion of LNG over the past three years has been 1.5 %.

Measure 3. Extraction of landfill gas

The aim of this measure is to increase extraction of landfill gas (methane) from the landfill sites at Grønmo and Rommen. In 2022, various operational measures are planned to ensure efficient collection of landfill gas.

Measure 4. National requirement for sale of 24.5 % biofuel

The Product Regulations set out requirements regarding the blending of biofuels in petrol and diesel sold for road transport purposes in Norway (the sales requirement). As of 1 January 2021, the national sales requirement for biofuels is 24.5 %, with a secondary requirement for 9 % advanced biofuel¹ (including double-counting of advanced biofuel). The Norwegian government has announced that there will be a further increase in the sales requirement in the coming years.

Measure 5. Road toll payment system

The road toll payment system helps to reduce road transport, promote more climate- and environmentally friendly transport and contribute to the funding of infrastructure, especially for public transport and cycling. Changes in the road toll ring that could give rise to reductions in GHG emissions from 2022 include a reduction in the price charged for electric cars in 2021. Biogas vehicles will be exempt provided that the Norwegian Public Roads Administration has established the necessary practical arrangements. The road toll payment system will be renegotiated during 2022.

Measure 6. Zero emissions/sustainable biofuels in the municipality's vehicle fleet

The plan was for all vehicles in the City of Oslo's vehicle fleet (cars, vans and heavy vehicles) to be either zero-emission or powered by sustainable biofuel (ideally biogas, but biodiesel is also permissible) during 2020. As of the first quarter of 2021, the total renewable proportion within the light and heavy vehicle fleet was estimated to be 87 %. The transition away from fossil to zero-emission and biogas-powered municipal vehicles will continue in 2022. Biodiesel will gradually be phased out where suitable, competitive alternatives are available. There is a proposal to set aside NOK 124 million, in addition to the NOK 50 million that was previously allocated during the term of the economic plan, to replace and acquire more refuse collection

¹ Biofuels which are primarily produced from waste and residues, defined in the list in Appendix V of the Product Regulations

vehicles to ensure the efficient stable collection of waste. The refuse collection vehicles that are acquired will be powered by biogas, which entails an additional cost. It is proposed that NOK 50 million be set aside in 2022 for further replacements of municipal heavy vehicles and machinery. It is also proposed that the loan scheme for the districts be continued in an annual amount of NOK 20 million in 2024 and 2025 for the ongoing replacement of the vehicle fleet in the districts.

Measure 7. Better cycling facilities

Amongst the most important instruments for making Oslo a cycling city for all is an interlinked cycle path network. In addition to the new-build and upgrading of cycling infrastructure, the municipality will prioritise operation and maintenance, research and development, along with communication and campaigns. The City Government will set aside NOK 13 million in 2022 and NOK 16 million annually for the remainder of the economic plan period to boost capacity in the work on new and upgraded cycling infrastructure.

Measure 8. Zero-emission taxis by 2025

The measure is based on regulations concerning environmental requirements for taxis in Oslo, which require the taxi industry to use zero-emission vehicles (City Council Proposition 255/20). The municipality is facilitating the transition by establishing ordinary charging infrastructure, various pilot schemes for fast charging, facilitating priority for zero-emission vehicles at taxi stands, dedicated charging infrastructure for zero-emission taxis at stands, and subsidies through the Climate and Energy Fund for home charging for taxi drivers. The City Government is proposing the allocation of NOK 5 million for the establishment of six new charging points for electric taxis in 2022.

Measure 9. Zero-emission goods and service transport vehicles

This measure aims to reduce emissions from vans in Oslo by accelerating the transition to electric vans. The reduction in emissions shown in Table 2.2a concerns impacts over and above what is already included in the projection. This is a package of measures which comprises a range of instruments. At the end of March 2021, electric vans accounted for just under 8 % of the total number of vans registered in Oslo. The City of Oslo is working to reserve business parking spaces within Ring 1 for electric vans. In 2022, an additional 25 business parking spaces will be reserved for electric goods and service transport vehicles. A total of 109 out of 123 business parking spaces within Ring 1 will then be reserved for zero-emission goods and service vehicles. Two zones have been established with loading and unloading stations reserved for zero-emission goods transport, which will be evaluated during 2021. Based on the evaluation, an escalation plan will be drawn up for the re-prioritisation of loading and unloading areas within Ring 1. In 2022, 14 charging points for goods and service transport will be established; see more about appropriations for charging in the introduction.

All entities are responsible for applying the City of Oslo's standard climate and environmental requirements in the procurement of transport or construction. This will help to accelerate the transition to electric vans. The municipality has two subsidy schemes for charging electric vans

through the Climate and Energy Fund, charging infrastructure for businesses and fast chargers for electric vans respectively. Electric vans can also be parked free of charge in resident parking areas. The municipality is working to communicate the benefits of electric vans and other subsidy schemes. Through the Zero Emissions Fund, Enova has established a subsidy scheme for purchases of electric vans and associated normal charging.

Measure 10. Zero-emission buses in public transport

The City Government failed to achieve its target for fossil-free public transport in 2020, largely as a result of the uncertainty created by the government over whether biodiesel over and above the sales requirement would have a climate effect. Ruter is aiming for zero-emission public transport by the end of 2028. As regards Oslo, Ruter is proposing virtually zero-emission operation at the start of new bus contracts, so that all city buses in Oslo are electric by the end of 2023. As Oslo Metro trains and trams are already electric, the replacement of buses will be key to the measure's effectiveness.

Measure 11. Zero emissions/sustainable biofuel in the transport of bulk materials and waste from construction sites

Since 2020, the City of Oslo has required the fossil-free transport of bulk materials to and from construction sites in its own projects. In addition, there are rewards for using electricity, hydrogen and biogas, as well as minimising the distances travelled. All relevant agencies stipulate requirements in new contracts where applicable. The municipality is also working to reduce the quantities of bulk materials that are transported around Oslo. This is partly being achieved by:

Raising awareness amongst the City of Oslo's buyers of bulk transport services concerning how bulk materials can be reused and exploring new solutions and/or logistics through a municipal working group and Pådriv in Hovinbyen:

- In all new planning matters where it is relevant, the Agency for Planning and Building Services asks proposers to present an account of issues relating to the handling of bulk materials
- Breaking down barriers in regulations and acquiring land for local bulk material handling through planning processes
- Exploring the scope to ensure that land is set aside for bulk material handling

Measure 12. Pilot city for zero-emission heavy vehicles

The measure "Pilot city for zero-emissions heavy transport" aims to reduce emissions from trucks in Oslo by accelerating the transition from diesel to electricity, hydrogen or biogas. This is a package of measures which comprises a range of instruments. From 2021, a subsidy scheme for charging infrastructure for electric trucks will be established under the Climate and Energy Fund, as a supplement to Enova's support schemes. The City of Oslo is working to ensure

predictability and appropriate framework conditions for the transport industry inside the road toll ring. The joint imposition of requirements will help to ensure that all vehicles used to deliver goods or services to the City of Oslo will use climate-friendly fuel technologies. The City of Oslo will pursue a dialogue with the business community regarding the imposition of environmental requirements for transport in procurements through the *Næring for klima* (Business for climate) network.

Furthermore, the municipality will establish charging infrastructure for heavy vehicles; see the introduction for more information on grants for charging infrastructure. The City of Oslo will also facilitate energy stations that offer charging and refuelling with renewable fuels, such as biogas, hydrogen and fast charging. It will also continue the measure to exclusively reserve loading and unloading areas for zero-emission goods vehicles. During 2022, energy stations will be established at Ryen and Kjelsrud, which will supply biogas and hydrogen respectively. In addition, both stations will offer fast charging. In 2021 and 2022, the City of Oslo will conduct an information campaign in cooperation with Viken County Council aimed at heavy transport operators, with a particular focus on small businesses. The Agency for Real Estate and Urban Renewal is currently tasked with acquiring land for climate infrastructure, such as energy stations, bulk material management and freight consolidation centres. The Port of Oslo is planning to install fast charging infrastructure for heavy vehicles at Grønli in 2021/2022.

Measure 13. Zero emissions/sustainable biofuel in municipal machinery

All the City of Oslo's own construction machinery will switch to fossil-free fuel and eventually zero-emission solutions. In the revised budget for 2021, NOK 50 million has been allocated to accelerate this transition. The City Government is proposing that the provision be continued in 2022 and is setting aside NOK 50 million. In addition, NOK 8 million will be allocated annually from 2022 to 2024, along with NOK 6.8 million in 2025 for the replacement of the machinery and vehicle fleet of the Agency for Cemeteries and Burials.

Measure 14. Zero-emission public transport – ferries

Ruter's electrification of ferry traffic began in 2019 with the Oslo-Nesodden route, and the Nesodden ferries have been electrically operated since April 2020. The existing island ferries will be replaced by new electric ferries in the winter of 2021/2022.

Measure 15. Establishment of shore power

Shore power facilities provide an opportunity to supply the power required by ships when docked using zero-emission solutions rather than fossil diesel. All international ferries serving Oslo have used shore power since the first quarter of 2020. The establishment of shore power for cement ships docked at the northern Sjørsøy pier has entered the final phase and is scheduled to become operational during autumn 2021. The Port of Oslo has applied to Enova for investment support for shore power for container ships in Sydhavna port.

2.6.3 Unquantified measures expected to provide emission reductions

Table 2.2b shows measures that are considered to have an emission-reducing effect, but where the level of uncertainty is considered to be too great to quantify the impact and place the measure in Table 2.2a. This could for example be due to uncertainty in the scope of the measure and the timing of the expected impact.

Even though the emission reductions resulting from the measures have not been quantified, this does not mean that the measures will necessarily have less impact on GHG emissions in Oslo than the quantified measures. For example, requirements regarding zero emissions/sustainable biofuels in machinery used in construction projects will have a major impact, but the underlying data used in the impact calculation must be developed further before the impact can be included in Table 2.2a.

Table 2.2b: Unquantified measures expected to result in emission reductions in 2022 and 2025

Emissions sector and source	No.	Measures and instruments	Responsible organisation within the City of Oslo
Waste incineration and energy supply			
Waste incineration	16	Increased materials recycling and reduced quantity of plastic waste for incineration Information campaigns to increase the household sorting of recyclable waste Facilitate sorting of recyclable commercial waste with gradual roll-out to REG's business customers	REG*
Road transport			
Light and heavy vehicles	17	Increased investment in public transport Increased public transport capacity Vigorous measures to reduce delays	MOS* BYM*
	18	Zero emissions/sustainable biofuel in transport when purchasing goods and services Common environmental criteria for vehicles and machinery used in transport. Tighter emission requirements in the municipality's joint purchase agreements from 2022 Digital system for the follow-up of requirements in procurements	All*, UKE UKE*, KLI
	19	More efficient goods and service transport Coordinator for climate-smart urban logistics (the <i>Klimasats</i> grant scheme) Contribute to the establishment of urban terminals for transshipment and freight consolidation Collaborative projects aimed at improving efficiency (Goods delivery in the Western Corridor, MOVE21)	BYM*, KLI

	20	Zero-emission zone within the car-free “city life area” (excluding Grønland and Tøyen)	BYM*, KLI
Cars	21	Climate-friendly travel to/from work Support scheme and certification in the municipality Subsidy scheme aimed at private individuals	All, KLI*
	22	Street and parking measures Resident parking and increased tariffs Removal of parking spaces New parking regulations (assumes political consideration during the first half of 2022) Parking measures concerning municipal entities	BYM* BYM* PBE*, BYU
Buses	23	Zero emissions/biogas as a fuel for non-Ruter buses Charging infrastructure for coaches Subsidy scheme for depot charging Procurement of transport services, e.g. school transport, with zero-emission and biogas buses within the municipality (see also measure 18). Industry dialogue Work to introduce requirements in route licences for bus routes in Oslo	KLI* BYM* KLI* KLI*, UDE, UKE KLI* KLI*, BYM
Other mobile combustion			
Diesel-powered motorised equipment	24	Zero emissions/sustainable biofuel for machinery used in construction projects carried out on behalf of private sector and state developers Requirements regarding private sector and state developers through zoning plans Subsidy scheme	PBE* KLI*
	25	Zero emissions/sustainable biofuel for machinery used in construction projects carried out on behalf of the City of Oslo Procurement requirements in the City of Oslo	All*, UKE
	26	Zero-emission motorised equipment National subsidy scheme for zero-emission motorised equipment vehicles Subsidy scheme: electric motorised equipment Zero-emission electrical power supplies for events	KLI* BYM*
	27	Central government ban on the use of fossil oil for temporary heating and drying of buildings	BYM*

* Asterisk indicates reporting responsibility

2.6.4 Description of measures in Table 2.2b

Measure 16. Increased materials recycling and reduced quantity of plastic waste for incineration

The aim of this measure is to reduce GHG emissions through the increased material recycling of plastic waste from Oslo's households. The goal is for the Agency for Real Estate and Urban Renewal (EBY) to increase the degree of sorting of plastic from 2,453 tonnes in 2020 to 2,900 tonnes in 2022. To achieve the sorting target in 2022, EBY will both continue and strengthen its communication work. In 2025, 50 % of the plastic in household waste will be separated through sorting (if the Norwegian Environment Agency's proposed regulations, which are currently out for consultation, are introduced). In 2020, the sorting rate was 30 %. Going forward, the municipality must identify long-term measures to increase the sorting of plastic.

Measure 17. Increased investment in public transport

Public transport services have been developed over many years through long-term targeted investment, and are a genuinely competitive transport alternative to the car. Public transport services normally hold a very strong position in the Oslo region, but the coronavirus pandemic has resulted in a significant reduction in market share, traffic volumes and ticket revenues. The City Government anticipates a transitional phase of around six months from the abolition of the current travel rules and recommendations before a new normal level of demand for public transport service and ticket revenues is established. People will need attractive public transport services while travel habits are re-established. If public transport services are scaled down in line with forecasts of reduced demand and ticket revenues, there is a risk that any downward trend will be amplified and that the competitiveness of public transport with respect to the car will be significantly impaired. Going forward, the City Government will work to increase the overall share of climate-friendly travel by ensuring that pedestrians and cyclists can continue to use these modes of transport, while at the same time encouraging car users back to public transport. The City Government will step up the efforts being made to reduce car use and improve accessibility to public transport. NOK 4 million per year is being set aside during the economic plan period for study and analysis capacity to boost the systematic work being carried out to improve public transport access.

Good access to public transport will be vital in enhancing the competitiveness of public transport with respect to the car. Improved accessibility will also enable better utilisation of the vehicle fleet. The "Vigorous accessibility measures" project began in 2013. In 2021, work began on the seventh package of measures in this project. This work will continue in 2022. On behalf of Oslo Package 3's steering group, Ruter is coordinating the work relating to an action plan for accessibility in the key corridors of the urban belt. Follow-up of the action plan is expected to commence in 2022.

New trams will be introduced into service through to 2024. The new trams will accommodate more passengers than the existing trams and will be designed according to the principle of

universal design. Construction of the Fornebu Line was scheduled to commence in December 2020, with the line expected to be completed in 2027. A number of major public transport measures are currently at the planning stage: a new signalling and interlocking system for the Oslo Metro which will boost capacity in the joint tunnel and improve reliability and punctuality, a new metro hub station at Majorstuen, and a new metro tunnel from Majorstuen to Tøyen via Bislett, Stortinget and Nybrua. The tunnel will enable a five-minute frequency where the traffic base is highest.

Measure 18. Zero emissions/sustainable biofuel in transport when purchasing goods and services

The joint imposition of requirements will help to ensure that all vehicles used to deliver goods or services to the City of Oslo will use climate-friendly fuel technologies. The imposition of requirements also applies to operating contracts. During the procurement process, emphasis is placed on the suppliers' proportion of zero-emission vehicles and/or biofuel vehicles (preferably biogas). Requirements regarding vehicles and fuels must either be imposed as a minimum requirement or used as an award criterion in procurements. The climate impact of the use of zero emissions as a result of requirements imposed during the procurement of goods and services is included under measure 9 *Zero-emission goods and service transport vehicles* and measure 11 *Zero-emissions/sustainable biofuels in the transport of bulk material and waste from construction projects*. The climate impact of the transition from diesel to sustainable biodiesel as a result of the imposition of requirements in the procurement of goods and services has not been quantified. In 2022, the City Government will continue to work actively to follow up and tighten the requirements so that all transport of goods and services under joint procurement agreements (procurements which are carried out for the entire municipality, rather than just one entity) must take place with zero emissions/biogas from 2022.

Measure 19. More efficient goods and service transport

In cooperation with the business community, the City of Oslo will contribute to the establishment of urban terminals for transshipment and freight consolidation and other streamlining measures. The Agency for Urban Environment will appoint a dedicated coordinator who will work on climate-smart urban logistics. Through the innovation project "Goods delivery in the Western Corridor", the City of Oslo is working closely with the municipalities of Bærum, Asker and Drammen, Viken county council and the Norwegian Public Roads Administration to develop concepts for the sustainable and efficient delivery of goods. Under the MOVE 21 project, the municipality will also work to streamline goods and service transport.

Measure 20. Zero-emission zone

A zero-emission zone is an area that is reserved exclusively for vehicles powered by electricity, hydrogen or biogas. The City of Oslo is investigating how a zone can be established and gradually expanded. The municipality will apply to the central government to establish a pilot project for zero-emission zones, as facilitated through the Norwegian government's Climate plan for 2021-2030 (Report to the Storting No. 13 (2021-2030)). The study of zero-emission zones will

continue in 2022, with the aim of entry into force during the term of the current city government. The City Government is allocating NOK 4 million in 2022 and NOK 10 million annually in 2023-2025 for essential investments in the establishment of a zero-emission zone. A zone is initially being established in Oslo city centre (the car-free “city life area” outside Grønland and Tøyen). Zero-emission zones in Oslo are also a priority area in the EU's MOVE21 innovation project, which Oslo is leading.

Measure 21. Climate-friendly travel to/from work

Climate-smart travel to/from work is a municipal subsidy scheme. Private companies can receive support for converting parking spaces to other uses (Scrappage for parking), the provision of facilities at the workplace (Active for work), secure bicycle parking, and for smart and innovative solutions (“Oslo's smartest travel to/from work”). Municipal employers can apply for support for measures which promote climate-friendly travel to/from work, including both physical and other measures, and the City Government is proposing to continue the scheme in 2022 with funding of NOK 10. A service has also been acquired for mapping and consultancy regarding active and climate-friendly travel to/from the municipality's workplaces. The municipality has also had an outreach bicycle service at municipal workplaces.

Measure 22. Street and parking measures

The City of Oslo is prioritising accessibility for bicycles and public transport over parking spaces, and re-prioritising parking for other purposes as and where needed. The municipality's parking regulations, which are intended to stimulate reductions in road transport and the transition to zero-emission vehicles, remain in place, and parking fees in the yellow zone and non-resident parking in residential zones will rise by 25 %, in line with previous resolutions. New parking regulations, which set out rules concerning the number and design of parking spaces for cars and bicycles linked to residential and commercial buildings, are expected to be considered at political level during the first half of 2022. The municipality is also trialling a scheme for car-sharing in public car parking spaces. The aim of this trial scheme is to facilitate the greater use of car-sharing, reduce overall car use in Oslo, and reduce public road space used for parking. The trial scheme will be evaluated after 2022.

Measure 23. Zero-emission and/biogas buses not used on local public transport services

The City of Oslo is in the process of developing a package of measures which will contribute to emission cuts from buses not used on Ruter services around Oslo. This primarily applies to express, airport and tourist buses. The work includes a dialogue with bus companies, an assessment of the utility benefits, the establishment of charging infrastructure and the imposition of requirements and award criteria in connection with the municipality's procurement of bus services. The municipality is working to impose requirements on route permits for bus routes in Oslo and has asked the Ministry of Transport for a reassessment of the legal basis for stipulating climate-related requirements in route permits

Measure 24. Zero emissions/sustainable biofuel for machinery used in construction projects carried out on behalf of private sector and state developers

In 2020, the City Government introduced requirements for fossil-free construction sites in new zoning plans. Preliminary, rough estimates indicate that the requirements proposed by the City Government could cover around 40 % of construction activity in Oslo by as early as 2024, increasing to 80 % by 2030. This instrument will thus considerably reduce emissions from construction sites over the coming years. It represents a vigorous response to new knowledge regarding emissions from this sector.

The City of Oslo will also continue to facilitate the supply of renewable energy to construction sites, partly through the establishment of a new grant scheme under the Climate and Energy Fund.

Measure 25. Zero emissions/sustainable biofuel for machinery used in construction projects carried out on behalf of the City of Oslo

The joint imposition of requirements will help to ensure that all machinery used at municipal construction sites in Oslo will use fossil-free fuel from 2020. During the procurement process, suppliers are rewarded for using machinery which is either zero-emission or uses biogas technology.

Measure 26. Zero-emission motorised equipment

The Climate and Energy Fund provides subsidies to companies which purchase electric motorised equipment. This scheme complements Enova's nationwide *Energy and climate measures in land transport* scheme, enabling businesses in Oslo to receive subsidies for purchases of electric motorised equipment of any size.

Measure 27. Central government ban on the use of fossil oil for temporary heating and drying of buildings

A national ban on the use of mineral oil (fossil oil) for the temporary heating and drying of buildings will take effect from 1 January 2022. This ban represents an extension of the ban on the use of mineral oil for the permanent heating of buildings, which was introduced in 2020. Other fossil energy use is not covered by the ban, and it is therefore permissible to use gas of fossil origin, for example. This means that the ban will not necessarily lead to all building drying and heating being fossil-free from 2022. The City of Oslo already requires the zero-emission heating of construction sites in its projects, so the new ban will only have an impact and potential emission reductions in private sector and state construction projects within the boundaries of the City of Oslo.

2.6.5 Activities that provide a basis for further emission reductions

Table 2.3 shows activities which reinforce the climate work being carried out in the City of Oslo and which could provide a basis for future emission reductions. These activities are included in the Climate budget to highlight the wide range of instruments being used to promote emission

reductions in Oslo, and indicate where responsibility for the various activities lies. The activities are divided into the following categories: "communication/mobilisation", "facilitating measures" and "studies/plans/pilots".

Table 2.3 – Activities which provide a basis for further emission reductions

	Activity	Responsible organisation within the City of Oslo
	Communication and mobilisation	
A	Promote the Climate and Energy Fund's subsidy schemes in Oslo, as well as central government subsidy schemes (incl. Enova)	KLI
	Contribute to increased knowledge concerning support and subsidy schemes, and faster implementation of climate measures. Priority shall be given to Outer Oslo.	
B	Communication concerning climate solutions to change behaviour	KLI
	Disseminate information concerning practical climate measures/solutions to the population and businesses, encourage a change in behaviour and provide information on the City of Oslo's climate work	
	Further develop the KlimaOslo.no communications platform and communication in social media	
C	<i>Næring for klima</i> (Business for climate) network	KLI
	Continue and further develop cooperation on climate action between businesses and public authorities in the City of Oslo in order to bring about further emission reductions from the business community.	
D	Climate communication targeting children and adolescents	KLI
	"Climate school" teaching portal for teachers and pupils in Oslo schools	
	Lecture tour of Oslo schools by "climate pilots"	
	Cooperation with <i>Klimahuset</i> (The Climate House) on communicating the role of cities in climate work	
E	ByKuben – Oslo's centre for urban ecology	PBE
	Further develop offers for all those wanting to learn about and participate in the work on urban ecology	
	Help the people of Oslo gain a sense of ownership of and recognise the opportunities on the way to a zero-emissions society	
	Guide Oslo's districts in developing and promoting local environmental and climate measures	
	Facilitating measures	
F	Measures to increase city life and improve the urban environment in Oslo city centre, Grønland and Tøyen	BYU
G	Better facilities for pedestrians	BYM

	Activity	Responsible organisation within the City of Oslo
	The shortcut project	
H	Climate-friendly urban development with densification around transport hubs	PBE, BYM, EBY
	Use of climate criteria to assess climate consequences in planning matters.	
	Climate evaluations in the work on the new land-use element of the municipal master plan.	
I	Reduced use of unnecessary plastic and single-use plastic articles in municipal entities and in the city; see the Action plan to combat plastic pollution in the Oslofjord 2021–2024	BYM
J	Production of biogas for fuel	
	Production of liquid biogas from food waste at Romerike biogas plant	REG
	Production of compressed biogas from wastewater sludge at Bekkelaget purification plant	VAV
	Production of liquid biogas from wastewater sludge at VEAS	MOS, VEAS
	Studies for future measures	
K	Further development and expansion of the zero-emission zone in Oslo	BYM, KLI
L	Study of zero-emission waste system and 65 % material recycling in Oslo	REG, BRAN, BYM
	Measures through to 2030	
M	Carbon capture at the Klemetsrud plant (Fortum Varme AS)	NOE
N	The Fornebu Line	MOS, FOB
	Reduce transport of bulk materials, more zero-emission transport	
	Zero-emission and fossil-free construction sites	
	Material optimisation - innovative low-carbon solutions	
	Reduction of plastic outside the plastic cycle	
O	New city centre tunnel for the Oslo Metro	MOS
P	The tram programme	MOS
Q	New signalling and interlocking system for the Oslo Metro	MOS

2.7 New appropriations for climate action 2022–2025

An overview is presented below of the proposed additional appropriations to previous and new measures in the 2022 Climate Budget.

Table 2.4 Operations

Amounts in thousands

Chapter	Operation	2022	2023	2024	2025
125	Digital follow-up of climate and environmental requirements	2,500	2,500	2,500	2,500

125	Mobility manager	500	1,000	1,000	1,000
400	Monitoring and post-operation of closed municipal landfill sites 1)	6,000	5,700	5,700	5,700
542	Strengthen the work relating to road transport reduction and public transport accessibility	4,000	4,000	4,000	4,000
543	Rental of containerised charging solutions for heavy vehicles and rental of temporary space	2,000	2,000	2,000	
542	Operational consequences and higher prices in new operating contracts, partly to follow up on climate requirements 2)	44,400	44,400	44,400	44,400
542	The cycling project - increased capacity	1,500	3,000	3,000	3,000
761	The cycling project - increased capacity	1,500	3,000	3,000	3,000
771	Support scheme for climate-friendly travel to/from work amongst municipal entities	10,000			
711	Compensate for loss of ticket revenues	135,000		25,000	25,000
711	Electrification of public transport services		51,000	50,000	50,000
	Total	207,400	116,600	140,600	138,600

- 1) The measure concerns the Grønmo and Rommen landfill sites and includes the implementation of measures to reduce and manage sewage and runoff. At Grønmo, the upgrading of facilities for the extraction of landfill gas is also planned.
- 2) The increase in the Agency for Urban Environment's framework of NOK 44.4 million annually in the economic plan will cover higher contract prices for road and winter operations, the operation of new road and lighting facilities and parks and urban spaces. Some of the price rises are due to the imposition of climate and environmental requirements.

Table 2.5 Investments*Amounts in thousands*

Chapter	Investment	2022	2023	2024	2025
542	Establishment of zero-emission zone	4,000	10,000	10,000	10,000
543	Electric vehicle charging - package	15,000	61,500	61,500	30,500
308	Continue loan scheme for replacing electric cars in Oslo's districts			20,000	20,000
590	Replacement of zero-emission machinery and vehicles	10,000	10,000	10,000	8,500
172	Battery containers on zero-emission construction sites	2,000			
179	Power supplies for charging at construction sites	4,000			
192	Provision to cover additional costs for zero-emission vans, heavy vehicles and machinery	50,000			
	Total	85,000	81,500	101,500	69,000

2.8 The City of Oslo's follow-up of the climate strategy

Under proposition 109/20, the City Council adopted the Oslo's Climate Strategy towards 2030.

The strategy has five overarching objectives, along with 16 associated priority areas.

Implementation of the strategy is a prerequisite for achieving Oslo's ambitious climate targets,

contributing to emission reductions outside the boundaries of the City of Oslo, and ensuring that Oslo is equipped to meet climate change. As part of the resolution, the City Government will show how the Climate Strategy is being followed up through the annual budgets. A brief description is given below of the key initiatives in 2022 and the work that will be done during the economic plan period under the five main targets (main target 1 is discussed in the previous chapters, as it is part of the Climate Budget).

In addition to the review below, there are also a number of cross-cutting initiatives under the auspices of the municipality which will help to meet several of the targets in the Climate Strategy. One particularly important task will be the revision of the City of Oslo's land-use section in the municipal master plan in accordance with the visions set out in the societal section for a greener, warmer and more creative city with room for everyone. One of the main aims behind the revision will be to contribute to attainment of the target of a 95 % reduction in GHG emissions in the municipality through urban development along the subway network and the prioritisation of development from the “inside out”, along with the facilitation of a robust city in the face of climate change. Land-use priorities, land for climate measures and provisions in the land-use section of the municipal master plan also represent important prerequisites if Oslo is to achieve its climate targets.

2.8.1 Oslo's natural environment shall be managed in such a way that natural carbon storage in vegetation and soil is protected and the greenhouse gas removal in forests and other vegetation increase by 2030

The Norwegian Environment Agency has published a beta version of an emission inventory for land use in Norwegian municipalities. This inventory shows that total carbon absorption in the forestry and land-use sector fell by around 16,000 tonnes CO_{2e} from 2010 to 2015 (from around -110,000 to -96,000 tonnes CO_{2e}). Although absorption in forest areas rose during the period, there was an overall decrease due to a rise in emissions from land-use changes (development). The statistics for forestry and land use are published every five years. The next publication is expected in spring 2022. The figures are subject to considerable uncertainty.

In partnership with the Agency for Urban Environment, the Climate Agency has recommended a raft of measures aimed at incorporating climate considerations into the City of Oslo's forests, in line with the guidance that measures with a positive impact on climate adaptation (both carbon storage and climate adaptation), biodiversity and outdoor recreation are to be given priority. The recommendations only include forests owned by the City of Oslo. Amongst other things, the agencies have recommended further work on underlying data and indicators that can enable developments to be measured more accurately.

Within the building zone, a number of strategic initiatives and projects have been initiated which will bring us closer to achieving our targets. The Oslo Trees project is aiming to plant 100,000 more trees around the city and to take better care of our existing trees. The Agency for Planning

and Building Services (PBE) is developing the Green Portal, a database which will provide an overview of the city's trees and the ecosystem services provided by the urban forest, as a basis for planning and management. PBE is also responsible for the Green Inventory, a land-use inventory which quantifies the extent of green structure in Oslo's building zone and changes in it. A project has also been initiated to strengthen our knowledge of carbon storage in areas of the building zone.

2.8.2 Oslo's total energy consumption in 2030 shall be reduced by 10 % compared with 2009

Total energy consumption in Oslo has fallen compared with 2009. Total energy consumption includes the consumption of electricity, district heating, wood-firing, heating oil/kerosene and petroleum products in the transport sector. No official combined energy inventory is currently compiled for Norwegian municipalities. The figures referred to here are uncertain and compiled on the basis of statistics from Statistics Norway, the Norwegian Environment Agency's municipal greenhouse gas inventory and the Norwegian District Heating Association. Together with Stavanger, Bergen and Trondheim, the City of Oslo has asked the national authorities to establish a national energy inventory for Norwegian municipalities.

Notwithstanding the uncertainty linked to the underlying data, total energy consumption in Oslo fell during the period 2009-2019. Between 2014 and 2019, the decline was less than in the preceding years. Over the same period, the city saw population growth of around 18 %, which means that the energy savings per capita are actually greater.

The target of a 10 % reduction can probably be achieved by 2030, but this will require a continuing targeted commitment to energy efficiency in all sectors, partly through electrification. The City of Oslo owns both direct and indirect stakes in the energy companies Hafslund E-CO, Fortum Oslo Varme and Elvia. These companies are essential in the electrification of society. Municipal entities are working to reduce energy consumption in their own buildings and to ensure that new buildings are constructed in an energy-efficient manner (based on passive house standards). The City Government is proposing to set aside NOK 9.1 million annually in 2022 and 2023 for the installation of solar panels on many of Oslobygg's buildings.

2.8.3 Oslo's capacity to withstand climate change shall be strengthened towards 2030, and the city will be developed so that it is prepared for the changes projected by 2100

Stormwater Management Action Plan

The City of Oslo's work on stormwater management is the single most important initiative in order to become climate-robust. A targeted effort to develop a climate-robust Oslo is underway, and sustainable management of stormwater and urban flooding are key elements in this process. Numerous measures have been implemented since the Stormwater Management Action Plan was considered at political level in 2019 (proposition 291/19). Thematic maps for stormwater and urban flooding, which are expected to be completed in 2023, and the

development of the Stormwater Management Guide, are important prerequisites for implementing many of the other measures in the plan.

The City Government is proposing to increase Chapter 542, Agency for Urban Environment by NOK 2 million in 2022 in order to follow up the municipality's Stormwater Management Act Plan, a total increase of NOK 27 million during the term of the economic plan. The City of Oslo's property enterprise is working continuously to delay stormwater on municipal land. The enterprise currently has 15 construction projects in which stormwater management has been integrated. These are expected to be implemented or completed during the term of the economic plan. Common to all is that they have green roofs and other naturally based solutions. Work is underway on the development of a stormwater management communication strategy with the aim of strengthening the communication work relating to stormwater management from 2022.

Other initiatives

From 2022, a number of new or revised instruments will be introduced which will strengthen the efforts being made to ensure that Oslo becomes a climate-robust city. Through the work to revise the land-use section of the municipal master plan, the aim is to take greater account of current and future climate, including not only stormwater, but also other natural events which are being exacerbated by climate change. This will include taking greater account of the preservation and development of blue-green structures, further development of the Green Inventory (see the discussion under the carbon storage target), and the strengthening of risk and vulnerability analyses in planning processes, with a particular focus on ground conditions.

The Agency for Planning and Building Services has developed a set of criteria for climate assessments which are used in the processing of detailed regulations. The criteria for stormwater management and blue-green structures are of particular importance as regards climate adaptation. From 2021, these criteria will also be used in area regulations, which will contribute to more holistic and sustainable solutions for managing both current and future climate.

The regulations concerning the blue-green factor set out minimum requirements for nature-based solutions in housing projects, in other buildings and in connection with land use. The strategy for green roofs and façades is another tool which will strengthen nature-based solutions in the city. Both of these documents will be finalised in 2021 and will help to ensure that climate considerations are given greater priority in connection with construction projects and land use.

One important task which will enhance the city's climate resilience in 2022 and during the term of the economic plan is the re-establishment and restoration of the natural environment in Marka and the city. The Agency for Urban Environment is responsible for this task and is planning to restore one or two wetland areas a year during the term of the economic plan. Stream reinstatement in Klosterenga will commence in 2021, and the reinstatement of Hovinbekken in

Østre parkdrag will be completed by late autumn 2023. Flower meadows will be established as part of these projects. The Oslo Trees project is another important initiative which will enable the city to withstand both higher rainfall and higher temperatures.

2.8.4 Oslo's contribution to greenhouse gas emissions generated outside the municipality shall be substantially lower in 2030 than in 2020

A number of processes are underway to reduce Oslo's contribution to GHG emissions outside the city's boundaries (indirect, consumption-based GHG emissions). Central to these is the municipality's consumption strategy "Future consumption - strategy for sustainable and reduced consumption 2019-2030", which was adopted in 2019. The strategy sets out how the city's inhabitants, the municipality's entities and the business community can use more sustainable alternatives. Material consumption will be reduced by sharing, renting, borrowing, repairing, reusing, recycling and buying second hand.

The Agency for Urban Environment has drawn up a list of measures to promote sustainable and reduced consumption which have been incorporated into the City Government's proposed budget for 2022. Funding schemes for projects and pilots have already been initiated to promote reuse amongst the municipal entities. The City of Oslo's work relating to environmental management and certification is also an important tool in the efforts being made to reduce indirect emissions.

Indicators for consumption-based GHG emissions

During 2021, a set of indicators will be developed for sustainable and reduced consumption for the City of Oslo's own operations and the Oslo community. Several of the municipal entities are involved in this project, which is an R&D partnership with three research organisations (OsloMet/SIFO, NORSUS and CICERO). The aim of the project is to develop indicators which illustrate consumption trends in Oslo, both amongst inhabitants and the municipal entities and within the business community. The Agency for Urban Environment has received funding from the *Klimasats* grant scheme to continue some of this work beyond 2021.

In order to analyse indirect GHG emissions from road transport, the project is using a consumer-based model as a starting point. This model is based on the number of kilometres driven per year by all types of vehicles registered in Oslo and journeys made by persons resident in the municipality. The preliminary findings show that journeys made by the inhabitants account for by far the largest contribution both to the number of vehicle kilometres driven and to indirect emissions, followed by transport within the business community. The results indicate a modest increase in travel amongst the City of Oslo's own employees, while use of the municipality's own vehicles has decreased somewhat. The number of vehicle-kilometres rose slightly for both Oslo residents and the business community in the municipality during the period 2017-2019. The results also indicate that the increase in the use of electric cars as a substitute for petrol and diesel cars, the transition to biofuels such as biogas and the increase in the use of public transport services resulted in a reduction in indirect emissions during the period.

In order to assess a trajectory towards more sustainable and reduced food consumption, the quantity of food purchased by the City of Oslo is being analysed as an indicator of food consumption. Preliminary findings indicate that the consumption of fish, chocolate and sugar/artificial sweeteners, edible oils and fats, grain and legume products and fresh vegetables rose significantly during the period 2017-2019. Meat consumption also increased slightly during the period, while the consumption of fresh fruit and frozen and canned vegetables fell. The preliminary calculations indicate that this resulted in a slight increase in total indirect emissions from food, while the weight of purchased food decreased. This suggests that more food with a higher indirect discharge per kilogram was purchased in 2019 compared with 2017.

Climate requirements in procurements

Targeted and systematic work relating to the imposition of climate requirements in procurements which impact on indirect emissions is a new and wide-ranging priority area. In 2018, AsplanViak analysed the climate footprint of the City of Oslo's own operations with a focus on the joint procurement agreements dating from 2016. The analysis showed that the majority of the climate footprint from the municipality's activities originates from the purchase of goods and services, and that the joint procurement agreements account for just under 10 % of the total climate footprint of the municipal entities. A number of processes have been initiated to reduce emissions resulting from the municipality's procurements. The municipality has developed a guide for reduced and smarter use of plastic in procurements, along with a guide to the circular economy in procurements. The latter explains how the municipal entities can contribute to sustainable and reduced consumption through measures such as prioritising reuse, repair and upgrading over new purchases. The municipality is also aware that additional measures may be appropriate in order to reduce indirect emissions linked to transport under goods and services contracts, and will therefore consider the imposition of requirements across more of the transport chain. Indirect emissions from the municipality's own vehicle and machinery fleet can be reduced if businesses share machinery and vehicles both internally and with each other, as well as through the procurement of sharing services where possible. The Agency for Improvement and Development is assessing this in more detail.

Targets for reduced emissions from construction materials

Emissions associated with the production and handling of construction materials are amongst the largest sources of emissions outside Oslo's boundaries, both from the City of Oslo's operations and from across the city as a whole. Reducing such emissions will be important in meeting the goal of the Climate Strategy that Oslo's contributions to GHG emissions outside the municipality will be significantly lower in 2030 than in 2020, and "The City Government shall" point: "By 2021, we shall set a quantified target for reductions in consumption-based greenhouse gas emissions from municipal construction projects".

As mentioned previously, the City Government is now working to set an ambitious target to reduce GHG emissions from the use of materials by its own entities. This work is viewed in light of the goals of the C40's Clean Construction Declaration, which the City of Oslo has endorsed. A digital tool will be developed for use in connection with life-cycle calculations in building and

construction procurements. This will be important in the planning, comparison, follow-up and reporting of indirect emissions in building and construction projects. Standard specifications of requirements for purpose-built buildings will also be developed to meet strict climate and environmental requirements for the municipality's buildings.

Dramatically Reducing Embodied Carbon

Through the Carbon Neutral Cities Alliance (CNCA), the City of Oslo is participating in the Dramatically Reducing Embodied Carbon project, which aims to develop a framework for cities seeking to reduce their consumption-based emissions within building and construction projects, infrastructure and urban development. The aim is to examine the instruments that cities or municipalities have at their disposal to influence indirect emissions from this sector, e.g. through requirements, administrative decisions and regulations. Through the project, the City of Oslo will receive feedback on which potential measures and instruments will be most effective in reducing these emissions.

Cities4Forests

The City of Oslo has endorsed the international "Call for Action on Forests and Climate" concerning the conservation of forests and sustainable forest management. The municipality is in dialogue with Cities4Forests regarding regulations concerning the purchase of timber from sustainable logging in order to avoid products which have caused tropical deforestation. Many measures under the auspices of Cities4Forests are being assessed.

Sustainable food

Food generates large quantities of indirect emissions. The City of Oslo aims to significantly reduce meat consumption in the municipality's canteens and institutions, while at the same time facilitating a more plant-based diet. The key guidelines are set out in the City Government Declaration 2019-2023, the strategy for sustainable and reduced consumption 2019-2023 and the Climate Strategy for Oslo towards 2030. The City Government is working to halve food waste per capita by 2030. Meat consumption will be halved by 2023, and the proportion of fruit, vegetables, legumes and seasonal goods will be increased amongst municipal entities. The indicator project for reduced and sustainable consumption and consumption-based GHG emissions will provide important information about trends in food consumption in Oslo. The Agency for Improvement and Development, the Agency for Urban Environment and the Nursing Home Agency have all been allocated funding from the Klimasats grant scheme for work relating to sustainable food and the reduction of food waste. The Agency for Improvement and Development will be the municipality's driving force, coordinator and facilitator in the efforts being made to promote healthy and sustainable food. One measure will be to establish a sharing platform for climate-friendly menus in the municipality. UKE will also work to ensure that the municipality's joint procurement agreements support the City Government's ambitions and goals in this area, as well as help other businesses within the municipality to use procurement strategically to reduce meat consumption and promote plant-based diets.

The work relating to sustainable food also forms part of the municipality's work concerning urban agriculture, plastics and marine littering, as well as that relating to environmental management and Eco-Lighthouse certification within the municipality. The Agency for Urban Environment is contributing to guidance for use by municipal service centres in the transition to sustainable and healthy food with reduced food waste, partly through the Horizon2020 project FUSILLI: "Fostering the Urban Food System Transformation Through Innovative Living Labs Implementation". Together with eleven other cities, the City of Oslo will look at solutions for sustainable food and establish a "living laboratory" to test solutions. The municipality is also participating in the C40 Food Systems Network, which has collectively created the "Good Food Cities Declaration".



Oslo

Appendix to proposition 1/2022



Methodology, emissions limit,
calculation of effect of measures
and references

Appendix

The 2022 Climate Budget is the sixth in the series of climate budgets. The methods used for the assessments in the climate budget are continually being developed, and there is an ongoing need to further develop, update and improve the underlying knowledge base.

This appendix elaborates on the measures in the 2022 Climate Budget, as described in Proposition 1/2022, the City Government's budget proposal for 2022 and the economic plan 2022-2025, Chapter 2. These documents should therefore be read in context. The appendix describes the adopted methodology and analysis for calculating the impacts of measures, the potential for further emission reductions in the climate budget and the use of emission limits. In addition, other impacts are presented over and above reductions in greenhouse gas (GHG) emission which the measures in the Climate Budget could potentially lead to.

Background documentation and technical reports used in the preparation of the 2022 Climate Budget are available from: www.klimaoslo.no/category/klimabudsjettet/

1 Projection of emissions and calculation of the impact of measures

1.1 Projection of emissions to 2030

The City of Oslo's Climate Budget is based on the Norwegian Environment Agency's emission inventory at municipal level (Norwegian Environment Agency, 2021a), which covers the years 2009-2019. A brief description of developments in GHG emissions in Oslo is included in Proposition 1/2022, Chapter 2.3.

Impact calculations for measures in the Climate Budget are based on a projection of the City of Oslo's emissions through to 2030 (CICERO, 2019). This projection is often referred to as a 'baseline trajectory' and represents an estimate of how emissions might develop in the absence of new measures. The projection is based on the best available information concerning the factors that will impact on GHG emissions through to 2030, including population growth, technological advances and economic development.

The coronavirus pandemic has so far had major consequences for Oslo in both 2020 and 2021. The pandemic resulted in an economic downturn, and may have impacted on factors such as population growth in Oslo and technological advances. The long-term effects are hard to predict. Infection control measures to combat coronavirus have resulted in changes in travel habits and commercial activity, amongst other things. Overall, this could impact on the level of GHG emissions in both the short and the longer term. The knowledge base that will be needed to correct for this uncertainty in the projection or the climate budget analysis is still inadequate.

The projection includes the emission-reducing impact of approved central government, regional and municipal policies as of May 2018. The impact of municipal climate measures adopted thereafter is not included. Developments in emissions in the projection assume that adopted policies are implemented as planned, and trigger effective measures without any delays. The following measures and instruments are included in the projection:

- Road toll payment system: Revised agreement concerning Oslo Package 3 for 2017-2036 of 5 June 2016 and the supplementary agreement of 13 June 2017
- National ban on the oil-fired heating of buildings from 1 January 2020
- National sales requirement for biofuel for road transport use (it was decided to maintain the proportion of biofuel at a constant 2019 level (16 percent in real volume terms) during the period 2020-2030)
- Extraction of landfill gas

The projection is recalculated in the event of updates to the municipal emission inventory and has been updated with historical emissions for the years from 2009 to 2017 (Norwegian Environment Agency, 2021a). Compared with the baseline year 2009, the projection shows estimated decreases in GHG emissions of 22 % in 2020, 27 % in 2025 and 33 % in 2030. Historical emissions and the projection of emissions in the absence of new measures after 2017 through to 2030 are shown in Figure 1.

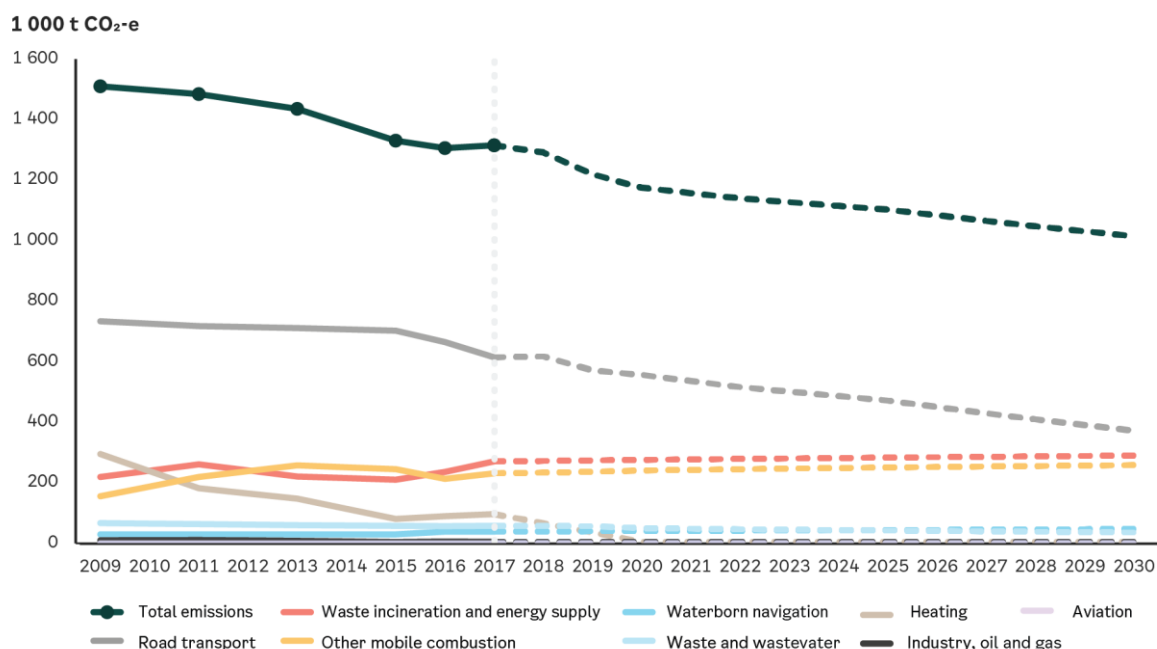


Figure 3: Development in historical emissions during the period 2009-2017 and emission projections for the period 2018-2030, assuming no additional measures from 2018

With regard to road transport, emissions from cars are expected to decline sharply through to 2030. This is partly due to the transition from fossil fuel cars to electric cars, an increase in the use of biofuels and a reduction in the number of kilometres driven per person. Implementation of the revised agreement concerning Oslo Package 3 (the road toll payment system) will be crucial for realising this emission reduction. Although emissions from road transport are expected to decline overall, it is estimated that emissions from heavy vehicles will increase through to 2030 if no new measures are implemented.

The ban on oil-fired heating from 2020 is expected to result in a decrease in emissions from heating. Decreases in emissions from landfill sites, biological waste, wastewater and industry are also projected, but these emission sources do not have a major impact on overall emissions.

In the other emission sectors, a slightly rising trend in emissions is projected through to 2030 as a result of both population growth and economic growth. This particularly applies to waste incineration and energy supply. The emissions sector accounted for around 21 % of emissions in 2017, but its share of Oslo's GHG emissions will increase to around 29 % in 2030. In the "other mobile combustion" emissions sector, emissions from diesel-powered motorised equipment (including construction machinery) in the construction sector are dominant. It is estimated that these emissions could increase by around 12 % by 2030 compared with 2017. This assumes that the growth is proportional to the population of Oslo.

Road transport is still projected to be the largest emission sector in 2030, but waste incineration and energy supply and other mobile combustion (e.g. construction machinery) are well on their way to taking over the position of dominant emission sectors.

1.2 Calculation of the impact of measures in the Climate Budget

There must be transparency regarding assumptions and the methods used in assessments of the emission-reducing impact of measures in the Climate Budget. All assessments must be verifiable. A description is given below of the methods used to estimate the impacts of the measures described in Table 2.2a of Proposition 1/2022, Chapter 2. For further information on methodology, see Chapter 5 later in this document.

Measure 1. Phasing out of oil-fired heating of buildings

The emission-reducing impact of the measure is included in the projection. The measure is the main reason why emissions from heating have declined sharply in recent years, and the projection assumes that emissions from fossil fuels will drop to zero in 2020 as a result of the ban on oil-fired heating from 1 January 2020. However, the Norwegian Environment Agency's emissions inventory indicates that emissions from heating using fossil gas are higher than expected, and that the assumption that fossil fuel emissions will drop to zero in 2020 remains unlikely to be fulfilled. The projection has therefore been updated with an increase of around 24,000 tonnes CO₂e through to 2030, which corrects for the overestimated impact in the projection. Although it is possible to apply for an exemption/dispensation from the ban, only one

dispensation is valid as of May 2021. It has therefore been assumed that emissions from fossil oil for heating purposes will be zero from 2022 onwards.

Measure 2. Phasing out of fossil oil and gas in district heating (peak load)

The impact of the measure is estimated at 2,700 tonnes CO₂e in 2022 and 2,600 tonnes in 2025. The calculation for the measure is based on activity data from Fortum Oslo Varme AS (Fortum Oslo Varme AS, 2020 and 2021) for the years from 2015 to 2020 and the first quarter of 2021, along with activity data from Avantor and Nydalen Energi AS (Avantor, 2020; Nydalen Energi AS, 2021) for the years from 2015 to 2020. Estimates for methane and nitrous oxide emissions from biofuels have also been added to the calculation, based on the indicator for the proportions of methane and nitrous oxide in emissions from district heating from the Norwegian Environment Agency (2021a).

The impact of the measures shows the difference between the projection and the estimated residual emissions following the measure. The projection already includes an expectation that emission levels will be reduced through to 2030. This means that the impact of the measures will be reduced correspondingly over the period, even though the residual emissions after the measure are assumed to be constant. The impact of the measure for 2022 is therefore greater than that for 2025.

From 2022, it is assumed that residual fossil emissions from peak loads will be fixed at around 800 tonnes and 70 tonnes CO₂e annually from Fortum Oslo Varme AS and Nydalen Energi AS respectively. This is due to the fact that some fossil gas will be used for pressure relief of the system and test operation. The fossil share may increase, e.g. in the event of the poor availability of biofuel. The impact of the measure is uncertain, as the calculation was based on Fortum Oslo Varme AS' objective.

Measure 3. Extraction of landfill gas

The emission-reducing impact of the measure is reflected in the municipal emissions inventory and is included in the projection. In the 2022 Climate Budget, the measure has been moved from Table 2.2b to Table 2.2a due to methodological improvements in the calculation which ensure that the impact of the measure is reflected in the emissions inventory and is therefore included in the projection. The measure concerns the landfill sites at Stubberud, Rommen and Grønmo.

Measure 4. National sales requirement of 24.5 % biofuel

The emission-reducing impact of the measure is included in the projection. However, biofuel sales fell by 2 percentage points in 2020 (Norwegian Environment Agency, 2021d), partly as a result of tax changes. This meant that biofuel sales were lower than assumed in the projection for 2020. The projection has been corrected accordingly. A further increase in the sales requirement could result in the measure having an additional impact in future climate budgets.

Measure 5. Road toll payment system

The emission-reducing impact of the measure is included in the projection. The impact of the measure is mainly due to the phasing in of electric cars. As of the first half of 2021, developments in the proportion of electricity are somewhat higher than assumed in the projection. The projection shows an estimated decline in emissions from road transport of 9 % from 2022 to 2025. Much of this decrease can be attributed to the impact of the road toll payment system, but other policies relating to road transport, such as central government and local electric car benefits, also play a role.

Measure 6. Zero emissions/sustainable biofuels in the municipality's vehicle fleet

The impact of the measure is estimated at 1,700 tonnes CO₂e in both 2022 and 2025. The impact of the measure was calculated using data from the Agency for Improvement and Development concerning the municipal vehicle fleet, along with actual data concerning the average distances travelled by the City of Oslo's vehicles (Development and Competence Agency, 2021). Emissions for 2018, 2019 and 2020 are used as a basis in the calculation of the impact of the measure, and as a baseline, it is assumed that the vehicle fleet and distance travel will remain constant at the 2018 level. It is assumed that emissions will be reduced by 50 % in 2021 compared with 2020, and that emissions will be close to zero in 2022. In order to achieve the estimated impact of the measure, it will be important that the goal of a complete transition to zero emissions or sustainable biofuels is followed up within relevant municipal enterprises.

Measure 7. Better cycling facilities

The impact of the measure is estimated to be 2,200 tonnes CO₂e in 2022 and 2,900 tonnes CO₂e by the end of 2025. The emission-reducing impact of the measure is calculated as a result of cycling replacing car travel. The impact is calculated based on a reduction in the number of kilometres travelled by car, corrected for the proportion of electric cars. The rate of phasing in is based on population figures and the current shares of bicycle and electric car use through to 2025 from the projection. The median travel distance for journeys made by bicycle is estimated to be 3 km (IRIS, 2017). The proportion of new bicycle journeys transferred from car journeys is set to an average of a lower and an upper estimate of 11 % and 34 %. The prerequisite for the lower estimate is based on 11 % of those cycling in Oslo today citing the car as their alternative means of transport (Urbanet Analyse, 2015). The upper estimate is based on the assumption that the transfer is proportional to the distribution of transport means.

The Agency for Urban Environment (2021a) has assessed realistic bike shares through to 2025 using data from the city's bicycle counters and the national travel habits survey (Norwegian Public Roads Administration, 2020; Urbanet Analyse, 2021). A one percentage point increase has been incorporated from 2022 to 2025.

Measure 8. Legislation for taxis: zero emissions by 2025

The impact of the measure is estimated to be 4,400 tonnes CO₂e in 2022 and 15,300 tonnes CO₂e in 2025. The impact of the measure was estimated on the basis of figures from Statistics Norway (2021c) concerning annual distance travelled and an estimated growth in traffic in line

with the projection, i.e. +0.81 % annually². It is assumed that the proportion of zero-emission taxis without this measure (the zero alternative) will develop more slowly than the development in electric in the projection for the City of Oslo's emissions through to 2030. This is because taxis are used more continuously and have different charging requirements than ordinary cars. Actual data for the renewable share in the vehicle fleet in 2018, 2019 and 2020 was taken from the taxi centres (Agency for Urban Environment, 2021b). It has not been possible to obtain complete data for 2021 due to new national regulations. The assumptions regarding the phasing-in rate are based on best judgement, with gradual phasing-in of 30 % in 2022, 60 % in 2023, 80 % in 2024 and 100 % from 1 January 2025.

The impact of the measure assumes that the environmental requirement is enforced. Under the professional transport regulations, it is the police and the Norwegian Public Roads Administration that are the control authority. The greatest uncertainties in the calculation are linked to the number of taxis, the distance they travel, the impact of the coronavirus pandemic on the industry, and the rate at which zero-emission taxis are phased in.

Measure 9. Zero-emission goods and service transport vehicles

The impact of the measure is estimated to be 1,200 tonnes CO₂e in 2022 and 6,100 tonnes CO₂e in 2025. Much of the impact of the electrification of vans is already included in the projection, and this measure is based on further increases in the proportion of electric vans. The impact of the measure was calculated based on estimated sales figures for electric vans in Oslo. The reason why the impact of the measure in the 2022 budget was lower compared with the 2021 budget is that, although the market share for electric vans in 2020 and 2021 was high, the rate of phasing-in was overestimated in the 2021 budget.

It is assumed that everyone who switches to an electric van will use Enova's support scheme, and this is therefore used as an indicator of developments in the sales figures for electric vans. The analysis indicates that 27 % of vans operating in Oslo in 2025 could be electric, 5 percentage points above that assumed in the projection. An important prerequisite for achieving the impact of the measure is that the instruments for the measure (presented in Table 2.2a of Proposition 1/2022) are implemented in full. If instruments are not fully implemented, the development will be approximately the same as the share of electric vans in the projection for Oslo. The provision of sufficient charging facilities for vans is considered to be particularly important for continuing the development.

Measure 10. Zero-emission buses in public transport

The impact of the measure is estimated to be 11 900 tonnes CO₂e in 2022 and 20,500 tonnes CO₂e in 2025. In previous climate budgets, the impact of the measure has been calculated by comparing emissions after the implementation of measures with a zero alternative which includes the use of biofuel, in line with the goal for Ruter's buses to be fossil-free by 2020. Given that the Norwegian Environment Agency's emissions inventory does not reflect the impact of the

² As regards traffic growth during the years from 2021 to 2030, the figures for 2019 were used as a basis because the coronavirus pandemic has resulted in the distance travelled for taxis in 2020 being lower than normal.

measure, a zero alternative without the use of biofuel is used in this climate budget. The calculations are partly based on assessments relating to electric buses in future Oslo contracts (Ruter, 2021) and assume 100 % implementation in Oslo South from 1 January 2022, in Oslo Central from 1 January 2023 and in Oslo Northeast and Østensjø from 1 January 2024. One bus route which is included in the calculation will remain unelectrified because the route over the Ulvøybrua bridge cannot be electrified at present because the bridge is unable withstand the weight of electric buses. The number of kilometres in the various contracts and the total share of zero-emission traffic are used as a basis in the calculation. Ruter's buses operate in both Oslo and Viken. The city buses primarily operate in Oslo, while the regional buses mainly operate in Viken, but they also serve Oslo bus terminal. To ensure that the impact of the measure is not overestimated, only the city buses are included in the impact calculation. This will probably result in the potential for reduction being somewhat underestimated, as the regional buses also operate in Oslo.

Measure 11. Zero emissions/sustainable biofuel in the transport of bulk materials and waste from construction sites on behalf of the City of Oslo

The impact of the measure is estimated to be 2,000 tonnes CO_{2e} annually during the term of the economic plan. The calculation is based on the assumption that total emissions from trucks carrying bulk materials in the City of Oslo according to the Institute of Transport Economics (2019) amount to around 10,000 tonnes CO_{2e} and that the City of Oslo accounts for around one fifth of the turnover (*Entreprenørforeningen for bygg og anlegg*, 2019) in the construction market. The impact assumes that all heavy vehicles used for transporting bulk materials and waste which are collected from and delivered to municipal construction sites are zero-emission or will use sustainable biofuel from 2022. It is considered that the players in the market will need some time to adjust to the transition, and that it will take a little while before all contracts are implemented with zero-emission/sustainable biofuel. A half-impact has therefore been used in 2020 and 2021.

Measure 12. Pilot city for zero-emission heavy vehicles

The impact of the measure is estimated to be 3,800 tonnes CO_{2e} in 2022 and 17,400 tonnes CO_{2e} in 2025. This is in addition to 2,000 tonnes CO_{2e} per year from climate requirements for bulk material transport (measure 11). The calculation of the impact of the measure is based on a trend in the development of the number of registered electric and biogas-powered trucks in Oslo. For electric trucks, further exponential growth is expected through to 2025. Further linear growth is expected for biogas-powered trucks. A ceiling has been established according to which the proportion of electric and biogas-powered vehicles cannot exceed 45 %, as surveys from Hafslund (2021) and ZERO (2021) indicate that not all areas of the truck market will be electrified by 2025. The calculation assumes that all existing instruments will continue at full strength. The provision of sufficient charging facilities for heavy vehicles is considered to be particularly important for continuing the development.

Measure 13. Zero emissions/sustainable biofuel in municipal machinery

The impact of the measure is estimated at 900 tonnes CO_{2e} in 2022 and 1,600 tonnes in 2025. The calculation for the measure is based on reported figures for diesel consumption by

construction machinery in the City of Oslo's Environmental and Climate Report 2020 (City of Oslo, 2021). The emission level from 2018 is used as a baseline in the calculations, i.e. it is assumed that consumption will remain constant at the 2018 level and that emissions will be zero in 2023. It is assumed that emissions will be reduced by 50 % from 2020 to 2022.

Measure 14. Zero-emission public transport – ferries

The impact of the measure is estimated to be 6,500 tonnes CO₂e in 2022 and 9,000 tonnes in 2025 in total for the Nesodden ferries, island ferries and high-speed ferries (from 2025). The estimated reduction in emissions upon transition to all-electric operation for the Nesodden ferries is estimated to be around 5,900 tonnes CO₂e collectively for the three ferries “Kongen”, “Dronningen” and “Prinsen”. This impact will be achieved from 2020. The measure will reduce GHG emissions by 100 % in the port and during crossings. The estimated impact of the measure is based on consumption data reported by Ruter for 2019 (Ruter, 2020b). The reduction in emissions arising from the electrification of the island ferries has been estimated at around 700 tonnes CO₂e from 2022. The calculations are based on reported fuel consumption from 2017-2019. Fuel consumption varies greatly with the weather, and an average from the last three years has therefore been assumed. The current operator uses biodiesel (HVO 100), so the reduction in GHG emissions will in reality be lower. Ruter expects traffic on the island ferries to increase (by 8 %) when the Langøyene route opens following restoration, but this route will be covered by electric operation and is therefore not included in the calculation. The high-speed ferries are expected to switch to zero-emission operation under a new contract in 2024, resulting in a reduction in emissions of 2,300 tonnes CO₂e (Port of Oslo, 2018) per year from 2025. To ensure that the impact of the measure is not overestimated, the calculation only includes emission reductions which are expected to occur within the City of Oslo's boundaries.

Measure 15. Establishment of shore power

The impact of the measure has been calculated to be 3,800 tonnes CO₂e in 2022 and 3,900 tonnes in 2025 in total for the international ferries and cement ships. The reduction in emissions resulting from the transition to shore power for the international ferries is estimated to be around 2,300 tonnes CO₂e overall for the three ferries “Pearl Seaways”, “Crown Seaways” and “Stena Saga”. The impact will be achieved in 2020. The calculations for Pearl and Crown are based on reported figures concerning the use of shore power in 2019. The calculation for Saga is based on activity data and was taken from the Action plan for Port of Oslo as a Zero-emission Port (Port of Oslo, 2018). Stena Line closed the route to Frederikshavn in spring 2020. Shortly afterwards, DFDS announced that it was planning to launch a new service on the same route, but using the vessels that currently serve the Oslo-Copenhagen route. Whether this will lead to an increase in traffic or reorganisation of the timetable which will result in a reduction in traffic between Oslo and Copenhagen is uncertain, but an increase in traffic is assumed corresponding to what Stena Line has experienced on the route. Overall, there is therefore no change in traffic on the routes between Oslo and Denmark. The reduction in emissions upon transition to shore power for the cement ships at Sydhavna is estimated to be around 1,500 tonnes CO₂e in 2022 and 1,600 tonnes in 2024. These calculations are based on activity data for 2017 and are taken from the Action plan for Port of Oslo as a Zero-emission Port (Port of Oslo, 2018). For the

cement ships, there is some risk of underestimation, as the current method does not reflect fuel consumption to power the large pumps that are used while the vessels are in port.

1.3 Uncertainty regarding the measures for which the impact has been calculated

All quantified measures in the Climate Budget were calculated based on the best available knowledge base and methodology. The measure analysis is based on a series of assumptions concerning changes in variables such as activity levels or technology as a result of measures and instruments that are introduced. There is considerable uncertainty associated with both the magnitude of the emission reductions and the timing of implementation.

The measure analysis in the 2022 Climate Budget is based on updated emission figures for 2019 from the Norwegian Environment Agency's municipal emissions inventory. Through the climate budget analysis, assumptions are incorporated linked to whether measures or other factors will impact on developments in emissions from 2020 to 2030. For some measures, actual activity data from 2020 is used as a starting point for calculating the future impact. There is uncertainty associated with all prerequisites and assumptions, even though they have been prepared using the latest available knowledge base.

The emission-reducing impact of the measures in the Climate Budget is dependent on actual implementation. The measures must be implemented as planned and without any delays if the overall impact described in the Climate Budget is to be achieved. The emission-reducing impact may be greater or less than estimated.

Table 2 presents an overview of uncertainty linked to the estimated impact of measures in Table 2.2a of Proposition 1/2022, Chapter 2, Climate Budget. The uncertainty is linked to assumptions regarding implementation of the measure (the rate of phasing-in) and the possibility of over- or underestimating impacts. The uncertainty is classified as high, medium or low. An assessment has also been included of the consequences that this will have on the attainment of emission reduction targets in the short term (2025) and the longer term (2030). The consequence is assessed according to the magnitude of the impact of the measure, and is classified as high, medium or low. These are discretionary assessments made by the Agency for Climate.

Table 2: Uncertainty per quantified measure in Table 2.2a in Proposition 1/2022

No.	Measures and instruments	Description of uncertainty
1	Phasing out of oil-fired heating of buildings Uncertainty: Medium Consequence: Low	There is potential for the impact to be underestimated, as a correction has been made with a negative impact of the measure due to the greater use of gas than assumed in the projection. The emission data concerning the use of gas for heating purposes is uncertain.

2	Phasing out of fossil oil and gas in district heating (peak load) Uncertainty: Low Consequence: Low	There is potential for the short-term impact to be overestimated, as a result of the measure not being implemented as planned. The measure is based on Fortum Oslo Varme AS' objective and would have been more effective had it been regulated by the municipal authority or the central government, e.g. through a ban. There is also a risk that the consumption of fossil energy sources will be greater than expected due to the supply obligation and access to and prices of renewable alternatives in the market.
3	Extraction of landfill gas Uncertainty: Low Consequence: Low	The measure is reflected in the emissions inventory and is therefore included in the emission projection. The method used in the last publication has been improved and the emission data is considered to be robust.
4	National sales requirement of 24.5 % biofuel Uncertainty: Low Consequence: Low	The possibility of over-/underestimation of the impact depends on how much advanced biofuel is sold. The scope of the sales requirement was revised with effect from 1 July 2020.
5	Road toll payment system Uncertainty: Low Consequence: Low	The possibility of over-/underestimation of emission reduction is of equal magnitude in both directions.
6	Zero emissions/sustainable biofuels in the municipality's vehicle fleet Uncertainty: Medium Consequence: Low	There is potential for the impact to be overestimated in the short term. There will be a possibility that some of the municipality's vehicles will continue to be powered by fossil fuels after 2021.
7	Better cycling facilities Uncertainty: Medium Consequence: Low	There is particular uncertainty associated with the projection of the share of cycling, which could result in the impact of the measure being overestimated.
8	Legislation for taxis: zero emissions by 2025 Uncertainty: High Consequence: Medium	There is potential for the impact to be overestimated in the short term. The uncertainty is linked to the release of taxi licences in 2020 and the impact of coronavirus on travel behaviour and demand for taxis over the next few years. The release could result in an increase in emissions during the period 2020-2024. The full impact will be achieved

		when the environmental requirement enters into force on 1 November 2024.
9	Zero-emission goods and service transport vehicles Uncertainty: Medium Consequence: Medium	There is potential for the impact to be overestimated in the short term. The impact of the measure depends on the phasing in of electric vans and has been calculated based on the assumption that all instruments will be implemented to their fullest extent. The share of electric vans could be lower than estimated and end up closer to the level assumed in the projection if not all instruments are implemented.
10	Zero-emission public transport – buses Uncertainty: Low Consequence: Low	The uncertainty is considered to be low, as the calculation is based on reported fuel consumption data and a review of when Ruter will enter into new contracts using zero-emission vehicles.
11	Zero emissions/sustainable biofuel in the transport of bulk materials and waste from construction sites on behalf of the City of Oslo Uncertainty: Low Consequence: Low	As it will take some time for the market to adjust, a half-impact has been applied for the first few years. However, this could be an overestimation in the short term. The impact of the measure could be underestimated in the longer term due to uncertainty linked to the actual transport level, which could potentially be higher.
12	Pilot city for zero-emission heavy vehicles Uncertainty: Low Consequence: Low	The calculation of the impact of the measure is considered to be relatively robust, as it is based on the development in the number of registered electric and biogas-powered trucks in Oslo.
13	Zero emissions/sustainable biofuel in municipal machinery Uncertainty: Medium Consequence: Low	There is potential for the impact to be overestimated in the short term. This uncertainty arises from the fact that there is a possibility that some machines will continue to use fossil fuels even after 2020. Towards 2024, the full impact is expected to be achieved.
14	Fossil-free public transport - ferries Uncertainty: Low Consequence: Low	The estimated impact of the measure is based on actual fuel consumption data and is therefore robust.

15	Establishment of shore power Uncertainty: Low Consequence: Low	The impact of the measure for international ferries is based on data concerning the actual consumption of electricity. The calculations for the cement ships are also based on actual consumption data. These calculations are therefore considered to be robust and the uncertainty is low. There is potential for the impact for the cement ships to be underestimated because some of the activity (the use of pumps while the vessels are in port) are not reflected by the method currently used for data capture.
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2 Emission limits towards 2030 and opportunities for target attainment

The City of Oslo has set very ambitious climate targets. The Climate Budget is a management tool regarding the way in which the municipality will achieve its climate targets.

2.1 Determination of emission limits

In order to steer emissions over the term of the economic plan towards attainment of the climate target in 2030, annual emission limits are established through the Climate Budget. These emission limits are an aid in budgeting for a steady downward trend in emissions through to the targets in 2023 and 2030, and are used as a basis for prioritising and implementing measures in the Climate Budget. Developments in emissions are likely to be different in reality, which means that the emission limits between 2020 and 2030 can be adjusted in the annual climate budgets as new information becomes available.

The 2022 Climate Budget applies to the period covered by the economic plan of 2022 to 2025. The budget is aimed at achieving a reduction in emissions of 43 % in 2022 and 60 % in 2025, compared with 2009 levels (see Table 3 below). In the 2022 Climate Budget, the emission limit has been adjusted relative to previous climate budgets. The climate budgets of previous years assumed that the adopted target of a 41 % reduction in emissions in 2020 would be achieved. The City Government's annual report for 2020 warned that the 2020 target was unlikely to be met, and that the emission limit would therefore not pass through this target. In the 2022 Climate Budget, the emission limit will start from the most recent emissions inventory in 2019, with a straight line down to the target of a 52 % reduction in emissions in 2023. The updated emission limit represents a more realistic emission limit to strive for.

2.2 Potential for further emission cuts and opportunities for target attainment

Figure 3 of Proposition 1/2022, Chapter 2 presents an analysis of the climate impact of adopted measures where emission impacts are highly uncertain, and new measures under consideration. This analysis indicates that there is potential for further cuts in emissions over and above those

brought about by the measures for which the impact is calculated in Table 2.2a of Proposition 1/2022. The analysis was carried out to estimate how close to the 2030 climate target the City of Oslo will come using measures which we are aware of today. The calculations are subject to considerable uncertainty, yet they show the possible development in emissions if these measures are implemented with full target attainment. If all the measures and instruments are implemented with the assumptions that have been applied, it may be possible to achieve an emission reduction of 72 % by 2030.

Table 3: Background figures for Figure 3 in Proposition 1/2022, Chapter 2, with emissions trajectory, emission limit and analysis of the potential for further target attainment

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Emissions trajectory	22%	24%	26%	28%	29%	31%	32%	34%	35%	36%	38%
Measures where emission impacts are uncertain	22%	24%	28%	33%	35%	39%	55%	56%	59%	61%	62%
New measures under consideration	22%	24%	29%	35%	38%	42%	64%	66%	69%	71%	72%
Annual targets	25%	34%	43%	52%	56%	60%	79%	83%	87%	91%	95%

The table above shows the potential for reductions in emissions compared with 2009 levels from the analysis, as well as the annual targets and emissions trajectory (impact of the measures in Table 2.2a of the Climate Budget included in the projection) contained in Figure 3 of Proposition 1/2022, Chapter 2. *Measures where emission impacts are uncertain* estimates the climate impact of measures and instruments from Table 2.2b in Proposition 1/2022, including carbon capture and storage at Fortum Oslo Varme AS' facility at Klemetsrud, which is presented in Table 2.3. These measures have been adopted politically at either central government or municipal level, but are not included in the quantified measures in Table 2.2a of Proposition 1/2022 due to uncertainty associated with the figures, orientation and implementation:

- Carbon capture and storage (CCS) at Klemetsrud from 2026 (from Table 2.3)
- Ban on the use of mineral oil for temporary heating from 2022 (measure 27 in Table 2.2b)
- Requirements regarding fossil-free construction sites in all new zoning plans (measure 24 in Table 2.2b)
- Zero-emission zone within the Car-free city living area from 2023 (measure 20 in Table 2.2b)
- Measures from Table 2.2b with relatively low estimated emission reductions: Increased investment in public transport, climate-friendly travel to/from work, zero-emission

motorised equipment, zero-emission/sustainable biofuel for non-Ruter buses and in transport of the municipality's procurement

The calculations for *New measures under consideration* includes an estimate for the climate impact of measures which are being assessed, where the direction has not been clarified and where no firm decision concerning implementation has yet been made.

- Zero-emission zone within Ring 2 from 2026
- Carbon tax corresponding to NOK 2,000 in 2030 (without compensation in the form of relief from road use tax, etc.)
- Gradual escalation of prices in the road toll ring for fossil fuel cars (+NOK 100 for fossil cars per passage compared with zero-emission vehicles in 2030)
- Escalation of the sales requirement for biofuel to 40 % in road transport in 2030
- Elimination of emissions from the incineration of household waste

To prevent overlapping, and therefore the overestimation of the impacts of measures, consideration has been given to how the measures collectively impact on activity, technological choices and fuel amongst the various emission sectors. Nevertheless, there is considerable uncertainty linked to possible overlapping between the measures. There is also uncertainty associated with overlapping between the measures in this analysis and the measures quantified in Table 2.2a in Proposition 1/2022.

A more detailed description is presented below of how these measures and instruments have been calculated.

2.2.1 Potential for emission cuts from adopted measures with uncertain calculations

Carbon capture and storage at Klemetsrud from 2026

The calculation is based on CO₂ emissions from Klemetsrud originating from the incineration of household waste outside Oslo, industrial waste and imported waste. This is related to population development and waste volumes in the projection. Carbon capture and storage at Klemetsrud may not be fully operational until 2026 at the earliest. The potential for emission reductions is estimated to be just under 200,000 tonnes CO₂e annually. The calculation only includes the fossil fraction in the waste (fossil CO₂).

Requirements regarding fossil-free construction sites in all new zoning plans and a ban on the use of mineral oil for temporary heating from 2022

The calculation includes an estimate of the type of impact that the requirement for fossil-free construction sites in new zoning plans could have. This is based on estimates of the number of square metres of buildings (housing and industry) which will be covered by the requirements in zoning plans through to 2030. The Agency for Planning and Building Services has estimated a

gradual increase of up to 86 % in 2030, based on empirical figures. As there is no underlying data for a zero alternative, expected emissions from the entire emissions sector "other mobile combustion" are used in the calculation. A discretionary downward adjustment of the projections of 30 % in each year has also been implemented. This is partly based on the assumption that 20 % of the construction activity is municipal (which is already fossil-free), and that there is a given share in other mobile combustion that is used for other purposes. In isolation, this measure could cut emissions by up to 155,000 tonnes CO₂e in 2030.

A ban on the use of mineral oil for temporary heating is also included in the calculation. This is based on the Norwegian Environment Agency's study concerning the potential impact of a ban on the use of mineral oil for heating buildings through to 2030 (Norwegian Environment Agency, 2021c). The Norwegian Environment Agency estimates that the measure could result in an annual national reduction of just under 85,000 tonnes CO₂e. For Oslo, the impact of the measure was calculated by using the Norwegian Environment Agency's estimate, scaled down for the population projections for Oslo from 2022 to 2030, which are included in the projections. The scaling down from the national estimate leads to considerable uncertainty in the calculation, partly because demand for heating will differ between the regions. However, it is the best underlying data that is available. In 2022, it is estimated that the ban could have an impact of up to 11,000 tonnes CO₂e.

Overlap assessments of the two measures have been carried out, where the ban on the use of mineral oil for temporary heating was scaled down over the period, as it will be covered by the requirements concerning fossil-free construction sites. This means that the impact on emissions of a ban on the use of mineral oil for temporary heating is set to zero in 2030. The uncertainties in the data mean that the Agency for Climate has no basis on which to assess whether the impacts of the two measures are conservative or optimistic, and the impact calculations should only be seen as illustrations of possible climate impacts.

Zero-emission zone within the Car-free city living area from 2023 - 2030

The calculation is based on a report from Norconsult (2021) concerning the isolated emission-reducing impact of introducing a zero-emission zone within the "Car-free city living" area (Kvadraturen and adjacent areas in central Oslo) from 2023, with expansion to within Ring 2 from 2026 to 2030. The report assumes that the zero-emission zone will result in a reduction in the use of fossil fuel-powered cars, vans and heavy vehicles. The impact of introducing a zero-emission zone within the Car-free city living area is estimated to be 8,000 tonnes CO₂e in 2023. This is only the impact within the boundaries of the City of Oslo itself. If the potential impact of such a zone for road transport generally (including that outside the boundaries of the City of Oslo) is also considered, it could have an impact of up to 27,000 tonnes CO₂e.

The calculations performed by Norconsult (2021) indicate the impact of introducing a zero-emission zone within the Car-free city living area from 2023, with expansion to within Ring 2 from 2026 to 2030. Thus, they have not provided any figures for a zero-emission zone within the Car-free city living area from 2026 to 2030. The Agency for Climate has therefore projected a

linear decrease in the number of fossil kilometres travelled corresponding to the decline calculated by Norconsult for the period 2023-2025.

Measures from Table 2.2b with relatively low estimated emission reductions

The analysis also includes the possible impact of measures from Table 2.2b in Proposition 1/2022, Chapter 2, where the basis for the figures has made it possible to estimate the impacts of measures. The measures for which a possible impact has been estimated are: measure 17 *Increased investment in public transport*, measure 18 *Zero emissions/sustainable biofuels in transport in connection with the purchase of goods and services*, measure 21 *Climate-friendly travel to/from work*, measure 23 *Zero emissions/sustainable biofuels in non-Ruter buses*, and measure 26 *Zero-emission motorised equipment*.

The calculations were partly based on how the measures impact on the level of activity in road transport and the phasing in of electricity, compared with the projection.

2.2.2 Potential for emission cuts resulting from declarations of intent and assessed measures with uncertain calculations

In the analysis of the measures which impact on road transport, corrections have been made for overlaps in order to avoid the double-counting of impacts. The overlap assessments represent a considerable uncertainty in the analysis.

Zero-emission zone within Ring 2 from 2026

The calculations were taken from a report by Norconsult (2021) on the emission impacts of zero-emission zones in Oslo. They calculated that a zero-emission zone within Ring 2 from 2026 could have an emission-reducing impact within the City of Oslo's boundaries of 31,000 tonnes CO₂e. Such a zone would also have an impact outside the boundaries of the City of Oslo, as the vehicles which are converted will also be used outside the boundaries of the municipality. Norconsult has calculated the overall impact of a zero-emission zone within Ring 2 from 2026 to be a reduction in emissions of up to 73,000 tonnes CO₂e. The figures refer to the isolated impact of a zero-emission zone, and have not been assessed with respect to other instruments such as the road toll ring or similar.

In the calculation, the Agency for Climate subtracted the impact that was added from 2026-2030 for the zero-emission zone only within the Car-free city living area (see above).

Carbon tax equivalent to NOK 2,000 in 2030

The calculation assumes that a carbon tax corresponding to NOK 2,000 in 2030 will affect the number of vehicle-kilometres travelled by cars, vans, heavy vehicles and buses. The calculation does not include the effect of carbon tax for non-road vehicles, industry, etc. An increase in the carbon tax of NOK 2,000 per tonne corresponds to NOK 3/litre (including deduction from the blending of biofuel). It is estimated that this will result in a reduction in the number of vehicle-kilometres from fossil fuel cars of around 3 % in 2030. It is also estimated that an increase in carbon tax in 2030 would result in a transfer of goods to sea and rail of 2.5 %, along with a

reduction in the number of vehicle-kilometres of 20 % as a result of the optimisation of logistics. The assumptions are the same as those used in national calculations of the impact on an increase in the carbon tax. The calculations assume that road use tax will not be adjusted to compensate for the increase in carbon tax. In total for all road transport, an isolated reduction of around 51,000 tonnes CO₂e can be achieved in 2030 with a carbon tax of NOK 2,000, with the largest reduction stemming from heavy vehicles. A tax increase will have the greatest impact for those who travel the longest distances and could therefore act as a stimulus for those who travel extensively, e.g. taxi drivers, to change their vehicle sooner than they would otherwise have done. In order to avoid any overlap between the impact of the zero-emission zone and the carbon tax, an assumption has been made regarding the overall impact on the number of vehicle-kilometres arising from the two measures.

Gradual escalation of prices in the road toll ring for fossil fuel cars

The calculation is based on a study by Norconsult (2020) concerning how escalation of the road toll payment system, with a gradual price rise towards +NOK 100 per passage for fossil fuel cars in 2030, would affect the phasing in of electric vehicles and the number of vehicle-kilometres travelled by cars and vans. It was only possible to obtain figures for cars and vans. This means that no impact has been assumed for heavy vehicles and buses for this measure. The impact of the measure is therefore underestimated. To include the impact relating to heavy vehicles and buses, a more thorough study will be necessary.

Norconsult (2020) shows that the measure will increase the proportion of electric vehicles in 2030 amongst cars from 64 % to 85 %. In the case of electric vans, it is assumed that the measure will result in an increase from 40 % to 58 % in 2030. In isolation, it is estimated that this measure could contribute to a reduction in emissions from road transport of just under 100,000 tonnes CO₂e in 2030.

Escalation of the sales requirement for biofuel to 40 % in road transport in 2030

The projection of Oslo's emissions through to 2030, discussed in section 2.1, includes a share of biofuel in road transport of 16 % over the period from 2022 to 2030. This is the expected actual volume percentage without the double-counting of advanced biofuels. The central government sales requirement in 2021 is 24.5 %, with a secondary requirement of 9 % for advanced biofuels. In Climate Cure 2030, a measure was considered where the blending requirement in 2030 was increased to 40 % for road transport. The analysis includes the potential impact of increasing the sales requirement for biofuel to 40 %. Advanced biofuels are counted twice, which means that only 50 % of the volume is needed if advanced biofuel is chosen over other biofuels. Based on this, a development in the sales requirement through to 2030 which follows Climate Cure has been assumed. However, for the years from 2021 to 2025, Oslo's projection for biofuels lies above Climate Cure, which means that the measure will not have an additional climate impact during these years. At the same time, the industry has pointed out that it will continue to use some conventional biofuels. An assumption has therefore been made that some conventional biofuels will continue to be used until 2024. The calculation also assumes that only advanced biofuel will be sold from 2025. This is based on the fact that advanced biofuel will be cheaper

than conventional biofuel after the road use tax is introduced on 1 July 2020 (due to double-counting).

The impact of the measure has been calculated based on the difference between the sales requirement and the bio-share assumed in the projection. A 40 % blending requirement in 2030 would give an actual volume of 20 % after the double-counting of advanced biofuel has been avoided. An additional impact from the use of 4 % additional biofuel has therefore been calculated in 2030, which corresponds to around 6,500 tonnes CO_{2e} in 2030 following an overlap correction with respect to the other measures presented here.

Waste management

The analysis also looked at the impact of eliminating all emissions from the incineration of household waste, with escalation from 2023 through to the full impact from 2026. This is based on the projection for Oslo's emissions from household waste incinerated at Haraldrud. In 2030, this corresponds to just under 70,000 tonnes CO_{2e}.

3 Other impacts of measures in the Climate Budget

3.1 Other cost-benefit impacts

Many of the measures in the Climate Budget have other benefit or cost impacts besides reductions in GHG emissions. An example of a benefit is lower air pollution and thus better air quality and health, as a result of measures which reduce car use. The measures could have economic consequences not covered by the city treasury. The electrification of vehicles is one example of a measure which could lead to higher costs for industry and residents in the short term, although lower running costs mean that the costs over the lifetime of the vehicle will not necessarily be higher. A number of measures will lead to an increase in sales of biofuels, which could potentially have negative effects for GHG emissions or biodiversity elsewhere in the world. The City of Oslo imposes requirements regarding sustainable biofuels in its procurements.

3.1.1 Distributional impacts

Measures in the Climate Budget may have different distributional impacts. The City Government wants distributional impacts to be analysed for all measures. However, this is groundbreaking work in an area where little information is currently available. A discussion is presented below of the distributional impacts of climate measures within mobility and fossil-free construction sites. The distributional impacts of the measures were assessed in isolation and independently of each other.

The distributional impacts of the following measures have been assessed:

- Measure 5: *Road toll payment system*
- Measure 7: *Better cycling facilities*
- Measure 8: *Legislation for taxis: zero emissions by 2025*
- Measures 9, 12 and 19: *Goods and service transport vehicles*
- Measure 17: *Increased investment in public transport*

- Measure 22: *Street and parking measures*
- Measure 24: Requirements regarding fossil-free construction sites

General considerations regarding mobility

Women tend to walk more than men, travel on public transport more and use a car less. People on low incomes tend to walk more and travel on public transport more. Amongst persons over the age of 24, the proportion who walk is highest amongst those with the lowest and highest education. Amongst persons over the age of 24 who do not have an education after primary school, the proportion travelling by car is lower than amongst other groups. Those with a higher income tend to travel by car more, but they also tend to cycle more. Those born in Norway tend to travel less by public transport less and more by car than those born in other countries.

The road toll payment system (measure 5)

On 1 June 2019, new road toll stations and a new road toll system were introduced, with more road toll sections in Oslo and the former Akershus. As a result, residents in all areas of Oslo now pay more to travel by car than before. Amongst residents of different districts of Oslo, the payment previously ranged from 8 % of car journeys (Bygdøy) to 45 % of car journeys made by residents of Oslo West (Urbanet Analyse, 2017). The current system means that persons living in the inner city, Oslo North, Hovinbyen, Østensjø and Bygdøy pay road tolls more frequently now than was previously the case. Persons living in the eastern part of the outer city and Oslo South also tend to pay road tolls more often than was previously the case, but the change is less for these groups. The current system is thus fairer geographically than before, and between 55 and 60 % of all car journeys made in Oslo are now subject to road tolls. Persons living outside Oslo are less affected than those who live in Oslo. No account has been taken of whether the journey was made by electric car or another type of car, as the underlying data did not include any information about this.

The analyses show that men tend to pay road tolls more often than women, because they tend to travel by car more. Households with multiple members are affected more than single persons, and those with medium or high incomes are affected to a greater extent than those with low incomes. This is because those with higher incomes tend to travel by car more to get to and from work. Travel to and from work is also affected more than other types of travel. The income disparities between those who pass road toll section boundaries are somewhat greater for rush-hour travel than for other journeys (Urbanet Analysis, 2017). Any future tax changes could have a different impact depending on the orientation of these.

The road toll payment system generates revenue which is used to increase accessibility for all road user groups and to finance road and public transport improvements. These benefits were not considered. The road toll payment system also reduces car use and GHG emissions and improves the urban environment (Norwegian Public Roads Administration, 2019).

Better cycling facilities (measure 7)

The bicycle is a readily accessible and affordable means of transport. Facilitating safe cycling thus offers the possibility of greater mobility for groups of the population who cannot afford or are unable to use a car, and in cases where public transport is not a viable alternative.

A cohesive and safe cycle path network makes the bicycle a more attractive means of transport for many groups in the population (children, women, the elderly, etc.), as road safety is improved and it feels safer to cycle on cycle paths rather than public roads. Safe cycling infrastructure offers particular benefits in areas with low public transport provision and areas with a heavily loaded public transport system and/or road network. An increase in the number of cyclists using the streets can help to improve public safety in vulnerable areas (Spacescape, Markör, 2016).

There are major health benefits associated with switching from passive to active forms of travel like cycling (Journal of the Norwegian Medical Association, 2020). Where an increase in cycling results in less car use, this will also reduce air and noise pollution, which will be especially beneficial for those living in areas with heavy traffic.

By removing parking spaces on public streets in favour of cycling infrastructure, public land will benefit more groups within the population. The reduction in the number of on-street parking spaces could disadvantage some groups, such as people with disabilities and businesses that depend on goods and service transport. The consequences of facilitating cycling are assessed in connection with the planning of new routes, and mitigation measures are implemented in order to maintain accessibility for the aforementioned groups wherever possible. Mitigation measures could for example include reserved parking for disabled persons and goods deliveries at suitable locations in areas close to where parking spaces have been removed.

Taxi legislation (measure 8)

Oslo has introduced environmental requirements for taxis. As early as 2017, a range of zero-emission cars were available which could match the overall cost of conventional fossil fuel cars. Since then, zero-emission cars have developed rapidly. It is assumed that the environmental requirement will not adversely affect the incomes of taxi drivers, if the necessary charging and refuelling infrastructure is in place before the environmental requirement enters into force (City of Oslo, Agency for Urban Environment, 2017). The coronavirus pandemic and its associated measures and new national permit regulations are likely to have a greater impact on the industry. Developments in the industry going forward as regards profitability and structure are therefore uncertain. This is discussed in a report from the Institute of Transport Economics and the Fafo Research Foundation on taxis in Norway through to 2020 (Institute of Transport Economics, 2020).

Goods and service vehicles (measures 9, 12 and 19)

Climate requirements will affect the goods transport industry, but it is uncertain exactly how it will affect the industry and what it will mean for different types of businesses. In 2020, a survey was conducted in the industry, which was followed up by a number of in-depth interviews

(Hafslund, 2021; Zero, 2021). Barriers to the transition to zero-emission heavy transport were then examined. The most important barrier highlighted by the industry is financial risk. This applies to both small and large players. It can be assumed that businesses which operate with low margins will be worst-placed to adapt and make substantial investments in new zero-emission vehicles. Predictability concerning instruments is important for businesses if they are to plan purchases and see the overall cost of their investments.

Facilitating the more efficient transport of goods and services will result in a reduction in the number of vehicle-kilometres per product. Both a reduction in the number of vehicle-kilometres and the electrification of vans and trucks will make a general contribution to lower NO_x emissions, lower noise levels, and a better urban environment for those living or staying in the area in which the transport takes place.

Increased investment in public transport (measure 17)

Good mobility solutions bring people from different parts of a region together and reduce inequality by giving everyone the practical and financial opportunity to participate in working life and lead an active life outside work (Ruter, 2020a). Public transport is for everyone and gives everyone the opportunity to travel. In Oslo, 34 % of the population live in a household which has no access to a car. In the inner-city area, this applies to more than half of the population. Attractive public transport services help to make this possible. More than half of the city's population live less than 500 metres from a public transport stop which is convenient for them. 80 % of the population live in an area with public transport services with at least four departures per hour (Urbanet Analyse, 2021).

Public transport is funded through ticket revenue, funding from the road toll payment system and public procurement. Funding through the road toll payment system involves a transfer from those travelling by car to those travelling by public transport. However, both public transport and the road toll payment system itself ensure better accessibility on the roads for commercial traffic and for those who have to travel by car, as both help to reduce traffic on the roads.

Street and parking measures (measure 22)

As far as the Agency for Climate is aware, no systematic analysis has been carried out of who will benefit or be disadvantaged by the parking measures in Oslo, or how it will impact on different groups. In recent years, the City of Oslo has redeployed many spaces for use by cyclists, to improve the accessibility of public transport and for city living. This entails the reallocation of land from those who travel by car to cyclists, public transport users and people in the city. In practice, these will often be the same people, albeit in different situations. Emphasis has been placed on ensuring access to parking for disabled permit holders, and provision for goods deliveries.

In 2015, the Institute of Transport Economics studied the distributional effects of parking facilities with regard to housing and employment (Institute of Transport Economics, 2015). The study showed that, although single people and those on low incomes do not tend to have their

own parking space, they do tend to have good public transport services close to their home. In Oslo, many buildings were completed before the municipality began to require parking spaces close to housing. The current parking regulations indicate that fewer parking spaces are being established adjacent to smaller apartments in central districts. These are apartments where small households, younger people and students on lower incomes can live. Homes with parking spaces are also more expensive than those without. As regards workplaces, there are minor differences in parking access at workplaces linked to income and household structure. People earning less than NOK 200,000 are more likely to state that they do not have their own parking space close to their workplace. However, these people have good public transport provision close to where they live. There is no difference between households with an income in excess of NOK 200,000.

The residents' parking scheme (City of Oslo, City Council, 2012) was first introduced on a trial basis in the districts of Frogner, St. Hanshaugen and Gamle Oslo in January 2009. The scheme was evaluated later the same year (Urbanet Analyse, 2009). The evaluation consisted of a pre- and post-trial survey which involved the recording of cars and questionnaire surveys. The evaluation showed that the scheme has given residents easier access to parking where they live, in accordance with the aim of the scheme. The proportion of parked cars of external origin, i.e. cars that did not belong to residents in the district, was significantly reduced, especially in Frogner and St. Hanshaugen. Nine out of every ten residents found it easier to find a parking space. More than half agreed with the statement "*Residents' parking makes it easier for me to live in central Oslo*". The picture was more mixed for the business community. When the scheme was made permanent, changes were made to the scheme to take account of this. For example, the rule concerning maximum parking time was abolished.

Requirements regarding fossil-free construction sites (measure 24)

In autumn 2020, the Vice Mayor for Urban Development pursued a dialogue with the major industry players regarding requirements for fossil-free construction sites. During these meetings, it was stated that the industry can meet the requirement, but at an additional cost. Requirements regarding fossil-free construction sites mean that biofuel must be used, which is more expensive than fossil fuels. Biofuels cost around 50 to 100 % more than traditional fuels. In addition, there are administrative costs associated with gaining access to biofuels. These costs impact equally on all players, but they can be more challenging to meet for smaller players. The municipality may therefore grant dispensations in individual cases in order to avoid imposing requirements that are either impossible or disproportionately demanding to meet, provided that the applicant can implement other measures to compensate for the lack of emission reductions.

4 Method used for the climate budget analysis

4.1 Calculation of the impact of measures and instruments in the Climate Budget

The calculations of the climate impact of measures are based on many prerequisites and assumptions. Many of the calculations are based on external analyses. Assessments of the rate of phasing in and emission-reducing impact are generally carried out by the Agency for Climate in consultation with the associated responsible municipal enterprises. This is partly based on professional assessments of practical feasibility and technological maturity.

All the measures in Table 2.2a of Chapter 2 Proposition 1/2022 were calculated with an annual measure impact during the period through to 2030. Table 2.2a presents the impact of each measure in the years 2022 and 2025.

4.1.1 Delimitation

The impact specified for the measures in the Climate Budget only include direct GHG emissions within the boundaries of the municipality. The quantified impact of measures on indirect emissions (emissions that occur outside the municipal boundary) is not included in the analysis. This is in accordance with the delimitation of the climate budget and the municipal emissions inventory from the Norwegian Environment Agency. The greenhouse gases carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) are included. Conversion of greenhouse gases to CO₂ equivalents is carried out in accordance with the Norwegian Environment Agency's guidance, using factors obtained from the UN Intergovernmental Panel on Climate Change (IPCC, 2007).

4.1.2 Comparison with projection of emissions, the zero alternative

The annual impact of a measure is calculated as the reduction in GHG emissions compared with the emission level in the projection in the same year. The projection is thus a zero alternative which shows the anticipated development in emissions in the absence of measures. In some cases, the measure analyses are based on a more detailed zero alternative than that shown in the projection for the emission source.

The impact is calculated using the following formula for each year:

$$\text{Impact} = (\text{emissions in zero alternative}) - (\text{emissions after implementation of measure})$$

Thus, the impacts of the measures presented in Table 2.2a of Chapter 2 Proposition 1/2022 for 2022 and 2025 constitute the difference between the emission levels in the projection in 2022 and 2025 and emissions after the measure has been implemented in 2022 and 2025.

4.1.3 Bottom-up and top-down approach

Measure calculations can be performed using either a top-down or bottom-up methodology. Top-down is based on total emissions and assesses the proportion of emissions that can be eliminated via the measure. In the case of bottom-up, the impact of a measure is calculated as the change in activity (activity data) or emissions per unit of activity (emission factor).

Change in emissions per year = \sum change in emissions (activity data * emission factor)

Bottom-up calculations require high-quality data concerning the change in activity or emission factor that the measure will lead to. Activity data could for example be the number of kilometres travelled, and the emission factor indicates the emission intensity of, for example, a petrol car. The change resulting from the measure could be a reduction in the number of kilometres or a transition to electric cars with zero emissions, while the emission reduction is shown as the sum of this change.

Calculations based on bottom-up methodology provide more precise estimates of the impact of individual measures than those based on top-down methodology. In the measure analyses, an attempt was therefore made to increase the proportion of bottom-up assessments relative to top-down assessments.

Bottom-up calculations have for example been performed for measure 6 *Zero emissions or sustainable biofuel in the municipality's vehicles*, where the number of vehicles, distance travelled, expectations concerning transition rate and emission factors are used to calculate the impact. An example of a top-down calculation is measure 11 *Zero emissions/sustainable biofuels in the transport of bulk materials and waste from the construction sector*, where a percentage emission reduction of the total emissions is estimated.

4.1.4 Correction for double-counting

Many of the measures in the Climate Budget affect the same emission sources. The climate budget analysis therefore ensures that the impact of a measure is not counted twice or overestimated. This is a topical issue, especially in road transport, because the measures can affect the level of activity (distances travelled), technological change (e.g. the transition from fossil to electric cars) and the type of fuel that is used (e.g. the transition to biofuels). For example, other measures which reduce car use should be taken into account when calculating the impact of a measure which involves an increase in the use of biofuels.

The impact calculations must also take into account the fact that the projections are partly based on estimates of emission reductions. Amongst other things, the projection includes electrification of the vehicle fleet and a reduction in road traffic as a result of the revised Oslo Package 3 (also referred to as the "road toll payment system"), other electric car benefits, as well as the blending of biofuels as a result of the sales requirement. If the measure is assumed to have an emission-reducing impact beyond what is already included in the projection, the impact of the measure will be included in the climate budget analysis.

4.1.5 The distinction between measures and instruments

The Climate Budget makes a distinction between measures and instruments. This distinction is described in *Climate Cure 2030* (Norwegian Environment Agency, 2020). A measure is the physical actions that various actors (businesses, households and central government and municipal enterprises, etc.) can take to reduce GHG emissions, such as investments in new technological solutions, transition to less energy-intensive energy carriers or energy efficiency measures. Instruments are the governance tools that are available to government agencies to trigger specific measures such as taxes, subsidies, orders, bans, agreements, information campaigns, etc. For example, zero-emission goods and service vehicles is a measure, while an example of an instrument that is intended to contribute to this measure is loading and unloading stations for zero-emission vans.

When assessing the climate impact of the measures in the Climate Budget, the overall emission-reducing impact of the associated instruments as a whole has been analysed.

4.1.6 Measures where the emission reduction has not been quantified (Tables 2.2b and 2.3)

Table 2.2b describes measures that are expected to result in emission reductions, but for which it has not been possible to determine the emission-reducing impact with sufficient certainty. There are various reasons why the impact of the measures cannot be quantified, e.g. because the measures are in an early design and implementation phase or because the data and knowledge base is poor or non-existent.

Table 2.3 shows activities which reinforce the climate work being carried out in the City of Oslo and which could provide a basis for further emission reductions. This applies to communication/mobilisation, facilitating measures and reports/pilots. It has not been possible to determine the emission-reducing impact of these activities.

In the long term, it may be possible to quantify the impact of measures from Table 2.2b and transfer them to 2.2a, if the underlying data is improved. In the 2022 Climate Budget, measure 3 *Extraction of landfill gas* has been moved from Table 2.2b to Table 2.2a.

4.2 Uncertainty in the analyses

The Climate Budget was prepared on the basis of the best available knowledge base. Nevertheless, the various aspects of the climate budget analysis are subject to some uncertainty.

4.2.1 The municipal emissions inventory

The inventory of emissions from Norwegian municipalities is continually being developed, partly as a result of the fact that Oslo and other municipalities have called for greater precision and

more frequent updating. In each publication of the emissions inventory, the entire time series is recalculated whenever a new method or data is introduced.

In cooperation with the Norwegian Environment Agency, the Agency for Climate has reviewed the existing method and assessed the potential for using local data to create a more accurate historical time series. An analysis by CICERO (2020) commissioned by the Agency for Climate identified a consistent challenge that the municipal emissions inventory does not reflect the impact of local measures implemented by the City of Oslo. This is a major challenge, particularly in the emissions sector “Other mobile combustion”, where the City of Oslo imposes requirements regarding the use of biofuel, and the climate impact is not reflected in the inventory. It is important to further develop the emissions inventory so that it reflects both actual GHG emissions in Oslo and the impact of climate measures in the Climate Budget.

There is particular uncertainty associated with the historical emission figures for fossil fuel heating and diesel-powered motorised equipment. Emissions from fossil fuel-fired heating and diesel-powered motorised equipment are calculated on the basis of sales figures from Statistics Norway and are subject to considerable uncertainty. The Norwegian Environment Agency is working to improve the method by the time of the next publication in 2021.

Continual improvements to the emissions inventory are making the analyses in the Climate Budget more accurate, and it is essential to continue the work on method development in order to improve both the quality of the figures and the inventory itself.

4.2.2 Projection of emissions (baseline trajectory)

The projection is based on the best available knowledge concerning the driving forces that will impact on GHG emissions through to 2030. It is therefore an estimate of how GHG emissions will develop in a fictional future and is therefore subject to considerable uncertainty. Amongst other things, it can be challenging to determine the right assumptions for the transport sector, where rapid technological advances are taking place. The projection should therefore only be used as an indication of what could happen in the future in the absence of further climate measures.

5 Reference list

Avantor, 2020. Aktivitetsdata fra Avantor (nå Nydalen Energi) for produksjon av fjernvarme for 2015-2019, received by e-mail 18.05.20.

Bymiljøetaten, Oslo kommune, 2017. Miljøkrav til drosjenæringen. Utredning.

Bymiljøetaten, Oslo kommune, 2021a. Effekt av sykkeltiltak, received by e-mail spring 2021.

Bymiljøetaten, Oslo kommune, 2021b. Data for fornybarandel i kjøretøyparken til drosjesentralene i Oslo i 2018, 2019 og 2020, received by e-mail spring 2021.

CICERO, 2019. Referansebane og framskrivning for Oslos klimagassutslipp mot 2030 - Revisjon mai 2019.

CICERO, 2020. Lokale datakilder på klimagassutslipp.

Endringer i produktforskriften, 2018. Forskrift om endring i produktforskriften (økt omsetningskrav for biodrivstoff mv. fra januar 2019 og januar 2020 og gjennomføring av ILUC-direktivet) (FOR-2018-11-21-1731).

Entreprenørforeningen for bygg og anlegg (EBA), 2019. "Markedsrapport 2019, EBA Oslo, Akershus og Østfold".

Fortum Oslo Varme AS, 2020. Tall fra Fortum Oslo Varme AS på fossil energiforbruk i fjernvarme, received by e-mail spring 2020.

Fortum Oslo Varme AS, 2021. Tall fra Fortum Oslo Varme AS på fossil energiforbruk i fjernvarme, received by e-mail spring 2021.

Hafslund, 2021. Rapport Kartlegging av klimagassutslipp fra tungtransport i Oslo.

IPCC, 2007. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp., hentet 02.09.20. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

IRIS, 2017. S. B. Bayer. Rapport 2018/252. Reisevaneundersøkelse for Oslo 2017.

Urbanet Analyse, 2009. Kjørstad, K. N., & Opheim Ellis, I., UA-rapport 14/2009. Evaluering av prøveordning med beboerparkering i indre Oslo.

Klimaetaten, 2021. Klimabarometeret 2020.

Klimaetaten, 2020a. Klimavurderinger Oslopakke 3. Vedlegg 2, Klimavurdering av mulige takstopplegg Oslopakke 3. (Websak: 19/10358-32).

Klimaetaten, 2020b. Svar på oppdrag om estimat for utslippskutt fra bygge- og anleggsvirksomheten. (Websak: 20/1769-2).

Urbanet Analyse, 2015. Loftsgarden, T., Ellis, I., & Ovrum, A., UA-rapport 55/2015. Målrettede sykkeltiltak i fire byområder.

Miljødirektoratet, 2020. [Klimakur 2030](#).

Miljødirektoratet, 2021a. [Utslipp av klimagasser i kommuner, Oslo](#), retrieved 14.06.2021.

Miljødirektoratet, 2021b. Informasjon om de kommunefordelte utslippstallene, received by e-mail spring 2021.

Norwegian Environment Agency, 2021c. [Veileder til forbud mot fyring med mineralolje til oppvarming av bygninger \(M-1083, 2021\)](#), retrieved 24.06.21.

Miljødirektoratet, 2021d. [Mer avansert biodrivstoff på norske veier](#), retrieved 02.09.21.

Norconsult, 2020. [Trafikantbetaling som virkemiddel. Redusert klimagassutslipp og trafikk i Oslo](#).

Norconsult, 2021. [Utslippseffekter av nullutslippssoner i Oslo](#).

Nydalen Energi AS, 2021. Aktivitetsdata fra Nydalen Energi AS for produksjon av fjernvarme i 2020, received by e-mail 23.04.21.

Oslo Havn, 2018. [Handlingsplan for nullutslippshavn](#), retrieved 24.06.21.

Oslo kommune, 2021. [Oslo kommunes klimastatistikk](#), retrieved 24.06.21.

Oslo kommune, Bystyret, 2012. Sak 191/2012. Forskrift om beboerparkering i Oslo - Byrådssak 57 av 26.04.2012.

Ruter, 2018. [Utslippsfri kollektivtransport i Oslo og Akershus](#).

Ruter, 2020a. [Målbilde for bærekraftig bevegelsesfrihet](#).

Ruter, 2020b. Innrapporterte drivstofftall for Nesoddfergene og Øybåtene. Received by e-mail spring 2020.

Ruter, 2021. Informasjon om elektriske busser og aktivitetsdata i framtidige Oslokontrakter, mottatt per e-post våren 2021.

Skatteetaten, 2021. Tall fra Skatteetaten på omsetning av biodrivstoff, received by e-mail spring 2021.

Spacescape, Markör, 2016. [Underlagsrapport sykkelstrategien: Kartlegging av dagens og morgendagens syklist](#).

SSB, 2021a. [Tabell 07278](#), retrieved 24.06.21.

SSB, 2021b. [Tabell 11185](#), retrieved 24.06.2021.

SSB, 2021c. [Table 11271](#), retrieved 24.06.21.

Norwegian Public Roads Administration, 2020. [Den nasjonale reisevaneundersøkelsen 2019](#).

Statens vegvesen, 2019. [Bompengesystemet i Oslo](#), retrieved 24.06.21.

Tidsskriftet den norske legeforening, 2020. Andersen, L. B., Bere, E., [Helsegevinst ved sykling til jobb](#), retrieved 24.06.21.

Transportøkonomisk institutt, 2015. Parkeringstilbud ved bolig og arbeidsplass. Rapport 1439/2015. Christiansen, P., Engebregsten, Ø., & Usterud Hanssen, J., 2015.

Transportøkonomisk institutt, 2017. Høye, A., TØI rapport 1597/2017. Trafikksikkerhet for syklister, retrieved 24.06.21.

Transportøkonomisk institutt, 2019. Utslipp fra lastebiler knyttet til bygg- og anleggsvirksomhet i Oslo.

Transportøkonomisk institutt, 2020. Aarhaug, J., Oppegaard, S. M. N., Gundersen, F. H., Hartveit, K. J. L., Skollerud, K. H., & Dapi, B., TØI rapport Nr. 1802/2020; s. 142. Drosjer i Norge fram mot 2020.

Urbanet Analyse, 2017. Ellis, I. O., & Amundsen, M. Revidert Oslopakke 3. Fordelingsvirkninger av forslag til nye bomsnitt i Oslo (Notat UA-notat 121/2017), retrieved 24.06.21.

Urbanet Analyse, 2021. Ellis, I. O., Kjørstad, K. N., Strætkvern, A. B., & Berglund, G. Reisevaner i Oslo og Viken. En analyse av nasjonal reisevaneundersøkelse 2018/19 (Prosam rapport Nr. 242; s. 196), på oppdrag fra Prosam og Ruter. <http://prosam.org/index.php?page=report&nr=242>, retrieved 24.06.21.

Utviklings- og kompetanseetaten, 2021. Datagrunnlag for kommunal kjøretøypark og aktivitetsdata for gjennomsnittlige kjørelengder for Oslos kjøretøy, received by e-mail 09.04.21.

Zero, 2021. Virkemiddelanalyse for utslippsfri og biogass tungtransport i Oslo innen 2030.





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