Oslo

Appendix to the Climate Budget 2026

Technical appendix, Proposition 1/2026

Foto: Liz Palm

Content

1 Introduction

This is a technical appendix to the Climate Budget 2026, Proposition 1/2026, and the Economic Plan for 2026–2029. The appendix describes the methodology behind the results presented in the Climate Budget 2026.

1.1 Adopted Measures

Adopted measures are to be implemented during the 2026–2029 economic planning period, where a formal decision has been made and/or there is a clear commitment to implementation through allocated financial resources or staffing.

Measures that are already fully implemented do not appear in the Climate Budget. For measures targeting direct emissions, this means their effect is included in the baseline scenario (see Chapter 2.2.1). All municipal measures appear in the Climate Budget at least once before being considered fully implemented. However, some will remain in the Climate Budget over several years, typically those requiring continued follow-up, reporting or financing in order to realise their expected emission-reduction effect.

1.2 Identified Measures

Identified measures are not politically adopted, either locally or nationally. They are measures with future potential to help achieve Oslo's climate goals. The process of identifying new measures is carried out in collaboration between the Climate Agency and other municipal agencies and expert communities. The purpose is to highlight the potential for additional climate action, including areas where measures are not yet ready for political decision-making or where further analysis and dialogue are required.

Identified measures form part of the background material for political consideration and assessments and ensure that the municipality maintains an overview of possible future steps, especially as technology, legislation and policy priorities evolve. Where relevant, both positive and negative side effects, such as distributional impacts or other environmental effects, are noted, but detailed assessments are conducted only when a measure becomes subject to formal decision-making.

1.3 Calculations and Assessments of Goal Achievement in 2030

The Climate Budget involves assessing the impact of measures and evaluating progression towards achieving Oslo's climate goals in 2030. The municipality's climate reporting, Climate Barometer, Energy Barometer and the Norwegian Environment Agency's Greenhouse Gas Emisions Inventory and Greenhouse Gas Emissions and Uptake Inventory for Land-Use and Forestry, provide important information for assessing progress and goal achievement. For progression related to direct emissions, there are solid data sources. For other climate goals, however, there are currently fewer local data and no standardised methods for analysing progress.

The Climate Agency is responsible for calculating the effects of measures in the Climate Budget. These calculations are developed and/or updated annually and aim to quantify impacts as thoroughly and consistently as possible. Although the Climate Agency has made significant progress towards quantifying the effects of measures, the work remains methodologically demanding and is often time-consuming. In some cases, robust methods for estimating the effects of measures do not yet exist.

Emission reductions are often the result of a combination of factors: multiple measures, technological developments, and behavioral changes. For example, Oslo's increase in electric vehicle use is driven by a mix of tax exemptions, toll incentives, support for charging infrastructure, and advancements in battery technology, making it difficult to isolate the effect of each individual factor.

How measures are calculated depends on the type of measure, as well as the availability of data and calculation tools. Measures involving technology (such as carbon capture) can often be quantified more precisely, whereas enabling measures or measures involving behavioral changes (such as taxes or building cycling infrastructure) are inherently more uncertain because they depend on changes across large groups of people or businesses. Behavioral change often results from a package of measures, making it difficult to isolate the effect from a single measure.

2 Direct Emissions

Oslo's direct emissions are emissions that occur within the municipality's geographical boundary, so-called Scope 1 emissions. This chapter documents the methodological approach and assumptions used in the Climate Budget analysis. This includes the use of a baseline scenario, calculations of effects of measures, and a gap analysis toward the climate goal in 2030.

2.1 Greenhouse Gas Emissions Inventory for Oslo

The Norwegian Environment Agency publishes an annual Greenhouse Gas Emissions Inventory, which provides important management data for Norwegian municipalities. This forms the primary data source for Oslo's Climate Budget analysis of direct emissions.

In addition, the municipality collects local data, such as traffic volumes from the toll ring and fuel consumption from municipal operations and suppliers. This data is used as supplementary input, both to track emissions trends and to estimate the effect of measures included in the Climate Budget.

2.1.1 Uncertainties in the Greenhouse Gas Emissions Inventory

The Norwegian Environment Agency's Greenhouse Gas Emissions Inventory uses solid data sources for most emission sectors when calculating Oslo's direct emissions. Nevertheless, there are still significant uncertainties, and the inventory is under continuous improvement. The Climate Agency, therefore, collaborates closely with the Norwegian Environment Agency so that the Greenhouse Gas Emissions Inventory better can reflect actual emissions at the municipal level.

A key source of uncertainty is associated with sectors where national emissions are allocated to municipalities using “allocation keys”, which can result in the inventory not capturing the effect of local measures, instead, emission reductions are distributed equally across all municipalities in Norway.

This issue is particularly relevant in the sector *Other mobile combustion* (mainly non-road machinery). For example, emissions from construction do not reflect the use of zero-emission machinery on Oslo’s construction sites. This is because emissions are estimated based on national sales of tax-exempt diesel, which are then allocated based on construction per municipality, rather than actual diesel use.

Similarly, in the *Transport-related services* category, national sales of tax-exempt diesel are distributed based on the number of employees in the sector per municipality. Since Oslo hosts many company headquarters, it is assigned a disproportionately large share. In 2023, Oslo was allocated over 58,000 tons of CO_2 equivalents from this source in the national inventory. On behalf of the Climate Agency, Cicero and Sweco have mapped emissions from this source in Oslo. The mapping shows an annual diesel consumption of between 4 and 6 million liters, corresponding to 11,000–16,000 tons of CO_2 equivalents. This indicates that emissions from this source are very likely overestimated in the national inventory. The emissions originate from the use of tax-exempt diesel in refrigeration units on lorries or trailers, as well as machinery used at the Port of Oslo and Alnabru terminal.

Similar challenges apply in the *Heating* sector. National emissions from LPG are allocated to municipalities based on storage volumes exceeding 0.4 m^3 within the municipality, rather than actual consumption. This may result in an overestimation of Oslo’s reported emissions.

In the *road traffic* sector, the current methodology does not adequately capture the electrification of vehicles, especially for heavy vehicles, vans, and buses. Oslo municipality holds local data on road traffic, particularly on which types of vehicles are present in the city and how many electric and biogas vehicles pass through the toll ring. Using this local data on vehicle stock and toll ring passages, the Climate Agency estimates that emissions from road traffic are likely 30,000–40,000 tons CO_2 equivalents lower than what the national inventory reports. This discrepancy arises because the Norwegian Environment Agency uses vehicle-kilometers travelled reported by Statistics Norway (SSB), which to a limited extent reflects where vehicles in a municipality actually drive. With an adjustment of approximately 30,000–40,000 tons CO_2 equivalent, total emissions in Oslo may have been reduced by 32–33% compared with 2009 levels, whereas the national Greenhouse Gas Emissions Inventory shows a reduction of 30%.

2.2 Climate Budget Analysis of Direct Emissions

The Climate Budget presents estimates of how emissions may develop toward 2030 and the size of the gap in accordance with the 95% reduction goal in 2030. The analysis consists of three different projections; a baseline scenario, scenario showing the estimated development with adopted measures, and a scenario showing the estimated development if all identified measures are adopted and implemented. The following subsections describe each of these scenarios and the calculations used in the analysis.

Table 1: Explanation of the trajectories in the climate budget analysis, including estimated emission reductions (the figure showing projected emission developments toward 2030 - Climate Budget 2026, Proposition 1)

Scenario	2026	2027	2028	2029	2030
Baseline scenario	**-40 %**	**-42 %**	**-45 %**	**-47 %**	**-49 %**
	A projection of how greenhouse gas emissions in Oslo may develop toward 2030, assuming that laws, regulations, taxes, and other adopted policy instruments are continued. It is based on the best available knowledge of historical greenhouse gas emissions and trends (Norwegian Environment Agency, 2024), as well as projections for future population growth, technological development, activity levels, and economic growth toward 2030. The baseline scenario is updated annually by the Climate Agency.				
Adopted measures	**-47 %**	**-50 %**	**-53 %**	**-63 %**	**-70 %**
	An emissions scenario that shows how greenhouse gas emissions in Oslo may develop toward 2030 with adopted measures in the Climate Budget. The annual climate effect of adopted measures is calculated as a reduction in emissions compared to the baseline scenario for the same year. Adjustments are made to avoid double-counting between measures that affect the same emission source.				
Identified measures	**- 47 %**	**-52 %**	**-58 %**	**-74 %**	**-81 %**
	An emissions scenario that shows how greenhouse gas emissions in Oslo may develop toward 2030 if the identified measures presented in the Climate Budget are adopted and implemented as described. The total climate effect is adjusted to avoid double-counting between measures, while the effect stated for each individual measure is its isolated effect beyond the adopted measures. This means the effect of the measure if no other identified measures are implemented. This approach is used to illustrate the emission reduction potential of each measure if it is adopted and implemented.				

2.2.1 Baseline Scenario

The baseline scenario is a projection of how greenhouse gas emissions in Oslo may develop toward 2030, assuming that existing laws, regulations, taxes, and other adopted policy instruments are maintained.

In Oslo's baseline, a 49% reduction in greenhouse gas emissions by 2030 compared to 2009 levels is estimated. Historical emission reductions (2009–2023) are primarily due to the ban on oil heating, electrification of the passenger car fleet, and blending of biofuels. For the baseline scenario (2023–2030), emissions are expected to continue to decrease, mainly due to the continued electrification of passenger cars and a slightly higher share of electricity and biogas use in vans and heavy vehicles. Emissions from the *Waste and wastewater* sector are expected to decline, as the amount of biodegradable material in landfills continues to decrease, producing less methane and other greenhouse gases. Emissions from heating are also expected to fall due to the ban on fossil gas for temporary heating, effective from 1 July 2025. Emissions from *Maritime transport* are expected to remain relatively stable through 2030. Emissions from

Waste incineration and energy supply are also expected to remain relatively stable, with a slight decrease toward the end of the period due to increased plastic sorting by households and businesses. *Carbon capture at Klemetsrud*, which was fully funded in January 2025 (after the publication of the previous Climate Budget), is not included in the baseline scenario but is instead part of the Adopted measures. For *Other mobile combustion*, emissions are expected to increase slightly due to population and economic growth, which will likely lead to increased construction. This trend could change if electric construction sites become more widespread or if construction decreases. In other sectors, only minor or negligible changes in emissions are assumed between 2023 and 2030.

The baseline scenario is updated annually by the Climate Agency and is based on the best available knowledge about future emissions, including assessments of population growth, technological development, activity levels, economic growth and effects of implemented policy measures. Although the baseline estimates are subject to uncertainty, they offer valuable insights into how societal trends and implemented instruments may affect emissions.

The Climate Agency mainly follows national and international guidelines when calculating the baseline scenario. The starting point for Oslo's baseline scenario is to be set to the publication of the previous Climate Budget each year.

The climate effect of a measure is included in the baseline if:

- The measure is fully implemented before the baseline scenario start date — meaning the measure is completed, legally adopted (e.g. through a regulation or tax decision), or if financial agreements or commitments are in place.
- National policy instruments have been implemented or adopted in the form of regulations or tax decisions in time for the budget proposal, provided they do not require municipal follow-up.

Following updates are implemented in the baseline scenario in the Climate Budget 2026:

- Traffic growth for passenger cars is adjusted based on the latest data. Toll ring data and traffic measurements (Byindeksen) show that traffic has remained stable in Oslo in recent years, despite a sharp increase in electric vehicles. Therefore, near zero growth is assumed in traffic from 2023 to 2030. However, in projecting traffic volume, there is a significant discrepancy between historic traffic volume in the national model used by the Norwegian Environment Agency for Oslo and actual traffic measurements, from toll ring data and traffic measurements (Byindeksen). Compared to traffic data and measurements in Oslo, the model used in the Norwegian Environment Agency's Greenhouse Gas Emissions Inventory shows greater growth in traffic volume.
- Electric share of passenger car driving is slightly increased due to higher electric car sales in Akershus in 2024 and early 2025.

- Electric and biogas share for trucks is increased due to stronger national incentives, tech developments, and new measures under the “heavy vehicle package” in the National Transport Plan 2025–2036.
- Use of propane gas (LPG) for heating is decreased toward 2030 due to the ban on fossil gas for temporary heating, effective 1 July 2025. LPG is mainly used for permanent heating in agriculture and in areas with developed pipeline networks (such as in Rogaland), and for temporary heating at construction sites (construction heating). Since Oslo does not have a developed pipeline network for LPG or many agricultural buildings, it is assumed that the use of LPG in Oslo primarily comes from construction heating and is therefore covered by the ban. Due to limited data on LPG use, a conservative estimate has been applied, assuming that half of the emissions from LPG in Oslo are covered by the ban.

2.2.2 Calculations of Adopted Measures

The table below describes how the effect of the adopted measures is calculated. While some climate initiatives are influenced by a single measure, there are other climate initiatives where several different measures affect emissions from the same emission source. In such cases, overlapping effects must be accounted for to avoid overestimating total emission reductions. For measures that affect the same emission source, the measure listed first in the table *“Adopted measures to reduce emissions within Oslo’s boundaries”* in the Climate Budget 2026 is calculated with full effect. Subsequent measures take into account overlapping effects. This means that measures organized following another measure that targets the same emission source will have a lower reported effect than if calculated in isolation. For example, the reported effect of the measure *“Incentives for zero-emission vans”* is lower than it would be in isolation, as the calculation considers that a share of vans has already been electrified due to the measure *“Procurement of zero-emission (including biogas) vehicles for the municipality”*, which appears earlier in the table.

Some measures are so closely linked that it is not possible to calculate their effects separately. This applies, for instance, to the measures related to *Incentives for zero-emission trucks*, where it has not been possible to separate the effect of how charging infrastructure and toll exemptions influence the uptake of electric trucks operating in the Oslo area. Calculating the combined effect helps reduce uncertainty.

The uncertainty in the calculations is assessed as either high, medium, or low. These are qualitative assessments made by the Climate Agency based on available data sources and uncertainties in the Greenhouse Gas Emissions Inventory. If the uncertainty in the estimate is considered to potentially amount to 10,000 tons of CO_2-equivalents or more, the consequence is considered *high*. An uncertainty in the range of 5,000–10,000 tons is considered *medium*, while below 5,000 tons is *low*. The table below shows how the climate effect of the adopted measures in the Climate Budget 2026 has been calculated. Measures without calculated effects are not included.

Table 2: Calculations of adopted measures

No.	Measures	Effect 2026 (tons CO_2e)	Effect 2029 (tons CO_2e)
Waste incineration and energy supply			
1	Carbon capture at Klemetsrud	0	100 400
	Calculation: The carbon capture facility is expected to start operations in the third quarter of 2029. In the calculations, it is assumed that the facility will be in full operation from 2030. It is estimated that 90% of CO_2 emissions will be captured in a normal year of full operation. While the facility is designed for a capture rate of approximately 95%, the estimate accounts for some expected downtime. In addition to capturing fossil CO_2, the facility will also capture a similar amount of CO_2 from the combustion of biogenic material. However, this is not included in the emission reduction calculations. CO_2 emissions from the combustion of biogenic material are not included in greenhouse gas inventories because the carbon is assumed to be reabsorbed by plants and trees in the short carbon cycle, provided that the land is managed sustainably. When biogenic CO_2 is captured and stored, it is referred to as negative emissions. Capturing biogenic CO_2 is just as beneficial to the atmosphere as reducing fossil emissions. **Uncertainty and consequence:** There is low uncertainty in the calculation. The carbon capture technology is proven, and the facility has processed a stable amount of waste in recent years. The main uncertainty lies in a potential overestimation of the short-term effect, due to possible delays in the project timeline. Despite low uncertainty in the data basis, the potential consequence of any error in the estimates is high, as the facility accounts for a significant share of Oslo's total greenhouse gas emissions.		
Road traffic			
3	Procurement of zero-emission (including biogas) vehicles for the municipality	700	2 100
	Calculation: The emission reduction effect has been adjusted downward from previous climate budgets, so that only the effect of replacing the remaining fossil-fuel vehicles is shown in the table. The effect of vehicles already replaced is included in the baseline scenario. The calculation is based on data from the Agency for Improvement and Development (UKE, 2025) on the number of vehicles and the share of electric vehicles in the municipal fleet, combined with estimated kilometers driven based on average annual mileage from Statistics Norway (SSB, 2025). It is assumed that from 2026, all municipal passenger cars and approximately 70% of vans and heavy vehicles are zero-emission. For vans, it is assumed that all will be electric by 2028, while for heavy vehicles, 75% are expected to run on biogas and the remaining 25% will be electric by 2028. **Uncertainty and consequence:** The uncertainty is low, as the municipality has good control over its own vehicle fleet and the replacement of vehicles. The potential consequence of any error in the estimates is also low.		
5	Zero-emission (including biogas) transport of materials and other transport in the municipality's construction projects	3 700	3 300
	Calculation: The calculation is based on reported data from the municipality's extended climate and environmental reporting on kilometers driven for the transport of masses on behalf of the municipality. The use of different fuel technologies is assumed to remain at 2024 levels throughout the entire period.		

	Uncertainty and consequence: The uncertainty is considered high, as the effect of other types of transport has not been included, while the consequence of any potential error in the estimates is low.		
11	Incentives for zero-emission vans	7 000	9 400
	Calculation: It has not been possible to isolate the effects of the individual policy instruments or to distinguish between the contribution from new developments during the economic planning period and already established infrastructure. Therefore, the calculation in its entirety is based on Oslo's initiative to promote electric vans. The estimate is based on a qualitative assessment of the market share of new electric van sales in Oslo and Akershus toward 2030, compared to the rest of Norway. This estimate is combined with statistics on annual mileage for vans of different ages to calculate the climate effect. The sales projections are based on historical trends, knowledge of technology development and the future range of vehicle models across all van categories, as well as cost analyses that show how economic instruments, such as toll exemptions, affect the competitiveness between electric and fossil vans in different market segments in Oslo. **Uncertainty and consequence:** Such estimates are always subject to considerable uncertainty, but this policy measure does not account for a large share of the total emission reduction potential. The consequence of any potential error in the estimates is assessed as moderate.		
13	Incentives for zero-emission trucks	6 600	20 200
	Calculation: It has not been possible to isolate the effects of the individual policy measures or to distinguish between the contribution from new developments during the economic planning period and already established infrastructure. The calculation therefore includes the entire scope of Oslo's efforts related to electric and biogas vehicles. The estimate is based on a qualitative assessment of new sales of electric and biogas trucks in Oslo and Akershus up to 2030 compared to the rest of Norway. This estimate is combined with statistics on annual mileage for heavy vehicles of different ages to calculate the climate effect. The assumptions for new vehicle sales are based on historical trends, knowledge of technological developments and the future availability of models across all truck categories, as well as cost analyses showing how economic measures such as toll exemptions impact the competitiveness of electric, biogas, and fossil fuel trucks in different segments in Oslo. **Uncertainty and consequence:** Such analyses are always subject to significant uncertainty, as they are based on discretionary assessments of how new vehicle sales will develop. For trucks, there is considerable uncertainty regarding the availability and development of suitable models. This policy measure represents a large share of the total estimated emissions reduction potential, and the consequences of any inaccuracies in the estimates are therefore assessed as high.		
Other mobile combustion			
14	Requirement for zero-emission construction on behalf of the municipality from 2025	18 500	18 900
	Calculation: The calculation is based on data collected from the municipality's contractors and compiled through the municipality's extended climate and environmental reporting. The data shows that the share of electric machinery on municipal construction sites was 85% in 2024. The calculation further builds on the requirement that all construction commissioned by Oslo municipality must be zero-emission from 2025. It is estimated that the municipality accounts for 30% of construction in Oslo. This estimate is based on the *Byggfakta* database of private and public construction projects from 2020 to 2023 (Byggfakta, 2023). The calculation assumes some use of biofuels (10%) from 2025 to 2027. From 2028, it is assumed that all work on municipal construction sites is fully zero-emission.		

	Uncertainty and consequence: There is uncertainty associated with the data collected from contractors, as the collection methods vary between entities. Additionally, the data basis for greenhouse gas emissions from all construction sites (including state and private sector activities) are insufficient, which results in high uncertainty in the calculation. However, the consequence of any potential error in the estimates is considered moderate.		
15	Requirement for zero-emission construction in zoning plans	31 900	37 500
	Calculation: It is estimated that state and private actors account for 70% of construction activity in Oslo. This estimate is based on data from *Byggfakta's* database of private and public construction projects from 2020 to 2023 (Byggfakta, 2023). The calculation is further based on a mapping conducted by the Planning and Building Agency (PBE), which estimates the share of construction sites in Oslo that will be subject to the requirement for fossil-free construction activities in the years leading up to 2030. According to the mapping the requirement will cover 55% of construction sites in 2025, 84% in 2028 and 86% in 2030. **Uncertainty and consequence:** The data basis for greenhouse gas emissions from construction sites in Oslo is incomplete, and both the mapping from the Planning and Building Agency (PBE) and the estimate that private and state actors account for 70% of emissions from construction sites in Oslo are uncertain. This means the uncertainty in the calculation is considered high. The measure is estimated to have a significant effect, and the consequence of any error in the estimates is therefore also high.		
16	Facilitate the use of zero-emission machinery for handling goods and cargo at the Port of Oslo	1 700	2 200
	Calculation: The calculation includes the effect of the transition to zero-emission handling of goods and cargo at the Port of Oslo. This includes reach stackers (machines used to handle and move containers in the port), tractors, and cranes that currently use tax-exempt diesel. The calculation is based on data from the Port of Oslo on diesel consumption from operators active at the port in 2023 (Cicero, 2025). Based on conversations with the port, it has been assumed that 60% of the activity related to the handling of goods and cargo will be zero-emission by 2025, and 95% by 2030. This is lower than the goal of zero-emission operations by 2025 set in the 2018 action plan for a zero-emission port. **Uncertainty and consequence:** The calculation is assessed to have medium uncertainty, but a low consequence of errors in the estimates. The main uncertainty lies in the pace of the transition to zero-emission operations toward 2030, particularly related to the future availability of electric machinery and the actual replacement rate resulting from the facilitation of zero-emission operations.		
17	Procurement of zero-emission machinery for Oslo municipality's fleet	400	1 300
	Calculation: The calculation is based on reported data from the municipality's entities on diesel, biodiesel, and electricity consumption in municipal machinery up to and including 2024. Only the effect of further replacements from 2026 onward is included in the emissions impact calculation. The effect of what has already been replaced is included in the baseline scenario. The calculation assumes that all municipal machinery will be 100% zero-emission by 2028. **Uncertainty and consequence:** The municipality has good control over the replacement of its own machinery. The uncertainty is assessed as low, although there is still some uncertainty related to when various machines will become available and can be delivered, which affects the implementation rate of the measure. The consequence of any error in the estimates is considered low.		
18	Manage grants for electric machinery and motor equipment	600	1 300

	Calculation: The calculation is based on the number of grants awarded by the Climate and Energy Fund from 2021 to 2024 and projected with an estimated increase towards 2027. It is uncertain whether the grant scheme will continue beyond 2027, so no additional effect is included after that. A gradual increase up to 30 grants in 2027 is assumed. This is a downward adjustment from Climate Budget 2025, where the assumption was 50 grants in 2027. **Uncertainty and consequence:** The calculation is considered to have high uncertainty, but a low consequence if the estimates turn out to be incorrect. It is uncertain how many will make use of the scheme and how much diesel will actually be replaced in the given projects.		
Maritime transport			
19	Establish shore power for tankers and follow up the use of shore power for container and cruise ships	4 500	9 500
	Calculation: The impact assessment is based on information from the Port of Oslo regarding the timeline for the establishment of facilities, estimates of how much energy at the port can be replaced with shore power, and how quickly ships will be upgraded to be able to use shore power. The EU has also adopted a requirement for the use of shore power for container and passenger ships over 5,000 gross tons from 2030, which will contribute to the facilities being utilized even before 2030. **Uncertainty and consequence:** The calculation is considered to have low uncertainty and low consequence of errors in the estimates. There is some uncertainty regarding the extent to which the shore power facilities will be used, as this depends on adaptations on individual ships and may also rely on environmental differentiation of port fees.		

2.2.3 Calculations of Identified Measures

The table below explains the emission reduction calculations for the identified measures. The uncertainty in these calculations is always high, as the scope, design, and/or timing of implementation have not yet been determined. The tables show the isolated effect of the identified measures, meaning the effect beyond the adopted measures, without accounting for potential overlap with other identified measures.

Table 3: Calculations of identified measures for direct emissions

Identified measures	**Isolated effect 2030 (tons CO_2e)**
Waste incineration and energy supply	
Carbon capture from household waste from Oslo municipality	40 000 – 50 000

Calculation: An effect has been calculated assuming that emissions from household waste are incinerated with carbon capture from 2030, where 90% of the emissions are captured. If the waste sorting measures described below are implemented, this will result in overlapping effects. When corrected for this overlap, the effect of carbon capture will be adjusted to around 20,000 tons of CO_2 equivalents. **Uncertainty:** The calculation is based on a scenario where emissions are reduced by 90%. The actual emission reduction will depend on whether the municipality chooses to build a carbon capture facility itself or procure the service from the market.	
Phasing out fossil materials at Hafslund Celsio's waste incineration plant at Haraldrud	20 000 – 30 000
Calculation: In recent years, between 35,000 and 50,000 tons of commercial waste have been incinerated at Hafslund Oslo Celsio's facility at Haraldrud. The options for reducing these emissions are either to reduce the fossil content of the waste, switch to renewable fuels such as wood chips, or treat the waste with carbon capture. **Uncertainty:** The uncertainty range reflects that the different solutions may result in varying levels of emission reductions.	
Increased sorting of plastic from household waste	15 000 – 22 000
Calculation: The calculation assumes that household waste will be sorted at a post-sorting facility. It is assumed that such a facility will be able to sort out around 80% of the plastic from household waste (REG, 2024). This will reduce emissions in Oslo by sending less plastic to incineration. The effect of the measure is included from 2030. Increased sorting and material recycling can also reduce indirect emissions by replacing virgin materials with recycled plastic. **Uncertainty:** Emission reductions will vary depending on the waste management solution the municipality chooses, for example, whether the waste is source-sorted before post-sorting, whether the waste is sent to post-sorting outside the municipality, and potentially what type of post-sorting facility the waste is sent to.	
Increased collection, resale, and recycling of textiles	2 000 – 4 000
Calculation: The Agency for Waste Management (REG, 2022) have estimated that it may be possible to increase the sorting rate from 56% to 85%, based on experience from other waste streams. This could lead to emission reductions by diverting more synthetic textiles from incineration. The measure depends on the development of extended producer responsibility for textiles, which means that producers placing textiles on the Norwegian market must cover the costs of collecting and managing their products once they become waste. The Norwegian Environment Agency is working on drafting a regulation and consultation paper on producer responsibility for textiles (Norwegian Environment Agency, 2025). Increased sorting and material recycling also reduce indirect emissions by replacing virgin materials with recycled ones. **Uncertainty:** There is uncertainty both regarding the amount of textile waste currently ending up in residual waste and the extent to which it is possible to increase sorting.	
100% zero-emission district heating	6 000 – 9 000
Calculation: During periods of high electricity prices or low temperatures, some fossil gas is still used in district heating production. The amount used varies depending on temperature, electricity prices, and demand for district heating. In the calculation, a gradual phase-out of fossil gas use of 40% from 2026 is assumed, with a linear decline towards fossil-free operation from 1 January 2028.	

Uncertainty: The uncertainty in the calculation lies in the annual variations in the use of peak load.	
Road traffic	
CO_2 tax equivalent to NOK 2,400 per tons in 2030	6 000 – 11 000
Calculation: Following the 2021 Climate Report, there was national political agreement to increase the CO_2 tax to NOK 2,400 per tons by 2030 in 2024 prices. At the same time, with each increase since 2021, the road usage tax has been reduced as compensation for the higher CO_2 tax, resulting in lower pump prices and reducing the effect. The estimated effect here assumes that the CO_2 tax is increased without compensation. The impact of the increased CO_2 tax for Oslo is estimated based on the Institute of Transport Economics (TØI, 2023), which has compiled studies examining the effect of fuel price increases on passenger cars. Due to a lack of methodological data, these results have also been applied to vans and heavy vehicles, a simplification that increases uncertainty. The effect of the measure has been adjusted downward from previous years, where an older calculation from national authorities based on 2019 prices was used. Since then, for example, fuel prices have already risen significantly, and it can be assumed that part of the climate effect has already been realized. **Uncertainty:** Calculating the climate effect of economic instruments always involves significant uncertainty, as the emission effect depends on the behavior of thousands of individuals and businesses. How an increasing tax will affect vans and heavy transport is uncertain, as the range of electric vehicle models in this segment is rapidly developing.	
Increase of the national biofuel blending mandate to 33% in road traffic by 2030	6 000 – 11 000
Calculation: The climate effect of the measure is calculated based on the difference between the blending mandate of 33% and the share of biofuels included in the baseline scenario. In Oslo's baseline scenario, the share of biofuels in road transport is set at 14.9% (measured by volume) for the period from 2023 to 2030, based on the current regulatory level. Since the Government has only issued a statement of intent to increase the blending mandate, and this has not yet been established by regulation, the 2030 ambition has not been included in the baseline scenario. The calculation has been adjusted downward from the Climate Budget 2025 because fuel suppliers in recent years have chosen to blend more biofuel into petrol and less into diesel. This reduces the effect in Oslo, as petrol is mainly used by passenger cars, and Oslo is expected to have a very high share of electric passenger vehicles by 2030. **Uncertainty:** The calculation is uncertain due to the design of the blending mandate, which allows flexibility between sectors and between different fuel products. This means that the share of biofuel in diesel and petrol in road transport can fluctuate significantly from year to year as fuel suppliers adapt to changing market prices for different types of biofuels.	
Double toll rate for new fossil passenger cars during 2026	2 000 – 3 000
Calculation: The calculation is based on an estimate of the share of total driving in Oslo that will be done by cars purchased in the period from 2026 to 2030. This estimate is based on average new car registrations in Oslo and Akershus, compared with the development of the total vehicle fleet (OFV, 2025). A discretionary adjustment has been made to the uptake of electric vehicles in new car sales, based on data from the baseline scenario and a calculation of how increased toll rates will raise the cost of purchasing a fossil passenger car in 2026 compared to an equivalent electric vehicle over its lifetime. It is assumed that a doubled toll rate will have an effect nearly equivalent to a ban on new fossil cars in Oslo. **Uncertainty:** The greatest uncertainty lies in how high the electric vehicle share in new car sales would be without this measure. A doubling of the toll rate for new fossil passenger cars should provide a sufficient incentive for nearly all buyers to choose electric vehicles when purchasing a new car.	

Double toll rate for new fossil vans	2 000 – 5 000
Calculation: A double toll rate for vans purchased from 2027 onwards could prevent new fossil vans from entering the vehicle fleet. The climate effect of the double toll rate in the toll ring is calculated in the same way as for passenger cars (see above). **Uncertainty:** The uncertainty in the calculation is somewhat higher than for passenger cars, as there is currently not as wide a selection of van models, and new van sales are not as high as those for passenger cars. This may result in a wider range of possible outcomes.	
Zero-emission zone for vans and heavy vehicles within Ring 2 (along the inner toll cordon)	8 000 – 14 000
Calculation: The calculation is based on Norconsult's report on the emission effects of zero-emission zones in Oslo (Norconsult, 2021), which presents the estimated reduction in fossil traffic resulting from the introduction of such a zone. The calculation assumes that the zone will be implemented on 1 January 2027. It is further assumed that 8% of van traffic and 25% of heavy vehicle traffic may be exempt from the ban. This is a conservative estimate to avoid overestimating the impact of the measure. The design of a zero-emission zone in Oslo does not include driving on national roads, and it is also possible that some vehicle segments may be exempt due to immature technology or emergency preparedness considerations. **Uncertainty:** The calculation is highly uncertain. The effect depends on the behavior of many individuals and businesses, and such estimates are always uncertain. There are uncertainties related to how the zone would be designed, as well as potential exemptions from the ban. A conservative estimate has been applied to avoid overestimating the impact of the measure.	
Zero-emission zone for passenger cars within Ring 2 (along the inner toll cordon)	500 – 1 000
Calculation: For the calculation of a zero-emission zone for passenger cars within Ring 2 (along the inner toll cordon) from 1 January 2028, it is assumed that 25% of passenger cars may be exempt from the ban. The calculations are based on Norconsult's report on the emission effects of zero-emission zones in Oslo (Norconsult, 2021) and show the estimated effect within Oslo's boundaries. A zero-emission zone will also have an impact beyond Oslo's borders, as the vehicles that switch to zero-emission will also operate outside the municipal boundary. **Uncertainty:** The calculation is highly uncertain. The effect depends on the behavior of many individuals and businesses. There are uncertainties related to how the zone would be designed, as well as potential exemptions from the ban.	
Introduce parking fees and reallocate parking spaces at municipal workplaces	7 00 – 1 200
Calculation: The calculation assumes that parking spaces in the outer city will become subject to a fee, with a predictable increase from NOK 0 in 2025 to NOK 100 per day in 2026 and NOK 300 per day in 2029 for fossil cars. It is further assumed that, from 2030, it will no longer be permitted to park fossil cars at Oslo municipal workplaces. Exemptions are assumed for accessible parking spaces, goods delivery, service vehicles, and shift workers. The calculation assumes that 10 to 30% of employees who currently drive fossil cars to work will continue to do so in 2030 if the measure is implemented as described. The calculation is based on findings from the 2023 travel behavior survey and the assumption that alternative, non-municipal parking options will be available nearby (TØI, 2023). **Uncertainty:** The calculation is based on a survey of employees' travel habits and involves significant uncertainty. In addition, there is uncertainty regarding the availability of alternative parking nearby.	

Doubling of public parking fees for fossil vehicles (excluding residential parking)	3 000 – 6 000
Calculation: The calculation shows the effect of doubling parking fees within Ring 3. The calculation is adapted from work carried out by Norconsult on behalf of the Climate Agency. Norconsult used the Regional Transport Model 23+ to assess the impact that parking fees may have on mode share and travel behavior (Norconsult, 2025), while elasticities from the Institute of Transport Economics assessment of toll charges were used to estimate the effect on vehicle choice (TØI, 2023). **Uncertainty:** The calculation is subject to considerable uncertainty and is based on historical data from a period when the electric vehicle market was less mature.	
Strengthened national measures for zero-emission heavy vehicles	5 000 – 10 000
Calculation: The calculation is based on current truck sales of new heavy vehicles in Oslo and the assumption that the state will introduce a package of policy measures that makes it profitable to choose electric vehicles in all segments when purchasing new vehicles in Oslo and Akershus in 2030. In 2023, the Norwegian Environment Agency and the Norwegian Public Roads Administration conducted an analysis of the types of policy instruments needed to make electric trucks a profitable investment for most operators (Norwegian Environment Agency, 2023). Their assessment was that the following package of measures could ensure profitability in nearly all segments. • Enova support covering at least 40% of the additional cost for vehicles and depot charging • Introduction of a one-time fee of at least NOK 50,000 for new fossil heavy vehicles • Gradual increase of the CO_2 tax to NOK 2,400 per tons (2024 prices) • Affordable fast charging at NOK 4/kWh or less Since then, Enova has introduced a competitive grant scheme that can cover up to 80% of the additional cost, and there has been increased investment in charging infrastructure along Norway's main roads. However, this is still not sufficient to achieve the effects estimated in the calculation, which is based on a significantly stronger policy package. **Uncertainty:** Uncertainty can be considered high, but the effect included in the calculation leans in a conservative direction. A strong policy package that makes it profitable for nearly all operators to choose electric vehicles could also accelerate the share of electric and biogas vehicles significantly faster than assumed here, particularly since the Oslo region has more charging and biogas infrastructure than the rest of the country. At the same time, the availability of new vehicle models may progress more slowly than expected.	
Requirements in permits for buses operating in Oslo (beyond Ruter)	2 000 – 4 000
Calculation: Oslo only grants route permits for fixed routes within the county and certain inter-county bus routes. The calculation is based on information from the Agency for Urban Environment regarding current permits and their expiry dates, and assumes that the permits will be renewed, but with a requirement for zero-emission buses. **Uncertainty:** There is significant uncertainty regarding how much these buses operate, and the calculation is therefore highly uncertain.	
Other mobile combustion	
Require all construction sites to be zero-emission by 2030	5 000 – 6 500
Calculation: It is assumed that all emissions from construction sites in Oslo will be eliminated if the requirement is adopted. A phased implementation of 70% in 2027 and 100% in 2030 has been included for this measure.	

Uncertainty: The calculation is based on the emissions allocated to Oslo in the greenhouse gas emissions inventory for construction, while the method used by the Norwegian Environment Agency is highly uncertain. Therefore, the uncertainty is in the potential for errors in the data by the Norwegian Environment Agency and is to a lesser extent related to the calculation by the Climate Agency.	
Increase of the national blending mandate for advanced biofuels to 28% for non-road machinery	8 500 – 12 000
Calculation: The climate effect is calculated based on the difference between the blending mandate of 28% and the share of biofuels included in the baseline scenario. In Oslo's baseline scenario, the share of biofuels in the *Other mobile combustion* sector is set at 10% (measured by volume) for the period from 2024 to 2030. In the calculation of this measure, a linear increase to 28% is assumed from 2025 to 2030. **Uncertainty:** The calculation is based on current use of tax-exempt diesel and biofuel blending. The uncertainty in the calculation is related to how actors choose to adapt to the requirement and the extent to which they make use of flexibility mechanisms between the blending mandates for road traffic and maritime transport.	
Maritime transport	
Set requirements or provide incentives for zero-emission arrival and departure for international ferries	5 000 – 6 000
Calculation: The measure involves either setting requirements or using economic incentives, such as environmental differentiation of port fees, to encourage international ferries to adopt zero-emission solutions and eliminate emissions. It is uncertain to what extent this measure can be triggered. It may be possible to impose requirements upon contract renewal for *Go Nordic Cruiseline's (Gotlandsbolaget)* ships operating to Copenhagen, but the contract for *Color Line's* ships will not be renewed before 2030. These ships will instead rely on economic incentives such as environmentally differentiated port fees, where zero-emission ships are rewarded. There is considerable uncertainty as to whether such incentives will be sufficient to prompt a shift to zero-emission solutions before 2030. **Uncertainty:** There have been methodological changes in the greenhouse gas emissions inventory, and several adjustments have been made to emissions from international ferries. This increases the uncertainty of the estimate. The Norwegian Coastal Administration, together with the Norwegian Environment Agency, will continue working to improve the inventory.	
Establish shore power for the remaining cargo ships currently without access	1 500 – 2 700
Calculation: The effect is calculated based on the assumption that the remaining cargo ships that do not currently use shore power (mainly general cargo vessels) will adopt it. The effect is estimated by multiplying emissions from these ships by assumptions from the Port of Oslo regarding how much of the energy demand at berth can be covered by shore power and then combining this with an assumption about the share of ships that will make use of it. For ships to adopt shore power, it must be profitable for shipowners to install the necessary equipment. The impact may therefore depend on the introduction of environmentally differentiated port fees that make the use of shore power financially attractive. The calculation assumes that the relevant ships will gradually adopt shore power from 2027 to 2030. **Uncertainty:** There is uncertainty regarding the extent to which shore power facilities will be used, as this may depend on fuel prices and other factors that affect the profitability of installing shore power equipment on ships.	
Heating	

National ban on the use of gas for permanent heating	7 000 – 11 000
Calculation: It is assumed that a ban on the use of gas for permanent heating will eliminate all remaining emissions from gas used for heating, following the ban on fossil gas use at construction sites that came into effect on 1 July 2025. The phase-in of the effect of the requirement is assumed to begin in 2027 with 33% of the effect, reaching full effect from 1 January 2028. **Uncertainty:** The calculation is based on the emissions allocated to Oslo in the greenhouse gas emissions inventory. The uncertainty lies in whether this emission level is accurate and is to a lesser extent related to the calculation by the Climate Agency.	

2.2.4 Sector-Specific Roadmaps

Sector-specific roadmaps are used to analyse the potential for further emission reductions. These are gap analyses for Oslo's emission sectors. Roadmaps have not been developed for the sectors *Aviation*, *Agriculture*, and *Industry, Oil and Gas*, as emissions from these sectors are very small. The roadmaps show the estimated development in emissions with the adopted and identified measures and highlight what further emission cuts are needed to reach Oslo's climate goal of a 95% reduction in emissions, by 2030. Oslo may have remaining emissions of 66,000 tons of CO_2 equivalents, by 2030.

The level of remaining emissions in each sector if Oslo is to reach the 95% reduction goal, is an assessment of which emissions can realistically be reduced by 2030. In some sectors, it is theoretically possible to eliminate all emissions, while in others this would be extremely difficult. The table below provides a description of the sector-specific roadmaps. All figures are rounded to the nearest 1,000 tons of CO_2 equivalents.

Table 4: Sector-specific roadmaps for direct emissions

Sector	**Emissions in 2023 (tons CO_2e)**	**Adopted measures in 2030 (tons CO_2e)**	**Identified measures in 2030 (tons CO_2e)**	**Remaining emissions in the roadmap in 2030 (tons CO_2e)**
Waste incineration and energy supply (31% of Oslo's emissions)	283 000	106 000	33 000	21 000

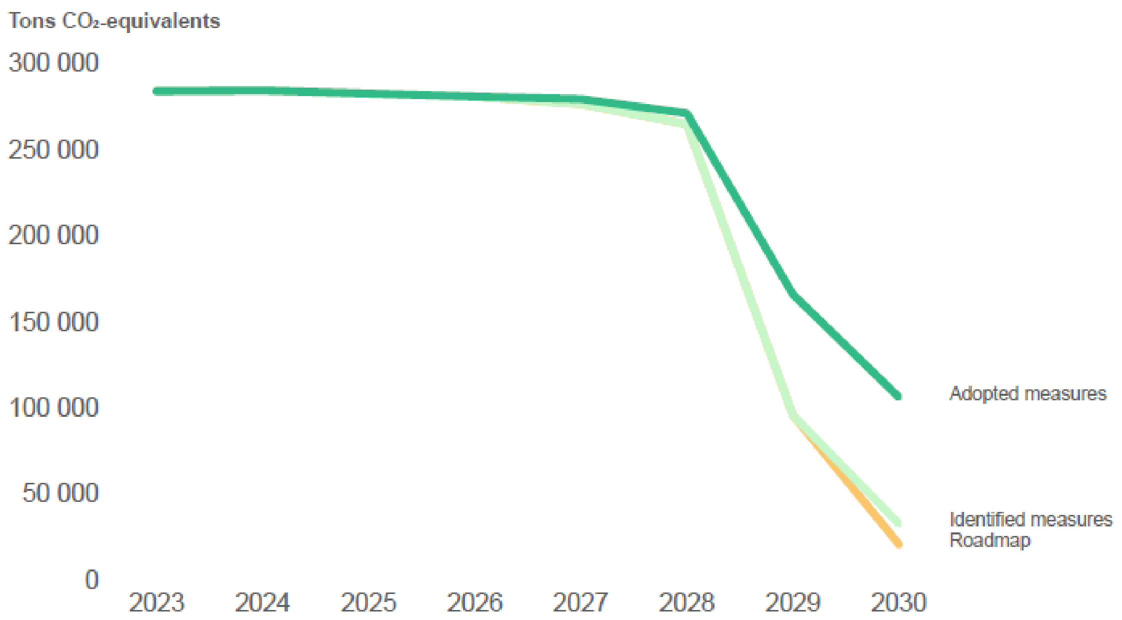

Figure 1: Roadmap for Waste incineration and energy supply

Emission sources (2023): Waste incineration at Klemetsrud (70%), Hafslund Celsio's facility at Haraldrud (10%), the municipality's facility at Haraldrud (17%), in addition to fossil sources in district heating production (3%).

Roadmap: Emissions have remained stable in recent years but are expected to decrease significantly in 2029 with the launch of carbon capture at Klemetsrud. If the identified measures are implemented and emissions from the two facilities at Haraldrud are eliminated, there will still be a small gap to the roadmap goal. Further reductions can be achieved by reducing plastic consumption, or by increasing sorting and material-recycling of plastic before the waste is sent for incineration. This applies particularly to plastic from construction, but also to household waste from neighbouring municipalities that are incinerated in Oslo. Remaining emissions, if the roadmap goal is achieved, will consist of CO_2 from fossil plastic that is not captured and emissions of methane and nitrous oxide. These emissions are difficult to reduce. This is because a carbon capture plant is assumed to capture 90% of fossil CO_2 emissions, and there are few effective policy instruments to reduce methane and nitrous oxide.

Road traffic (42% of Oslo's emissions)	426 000	154 000	114 000	29 000

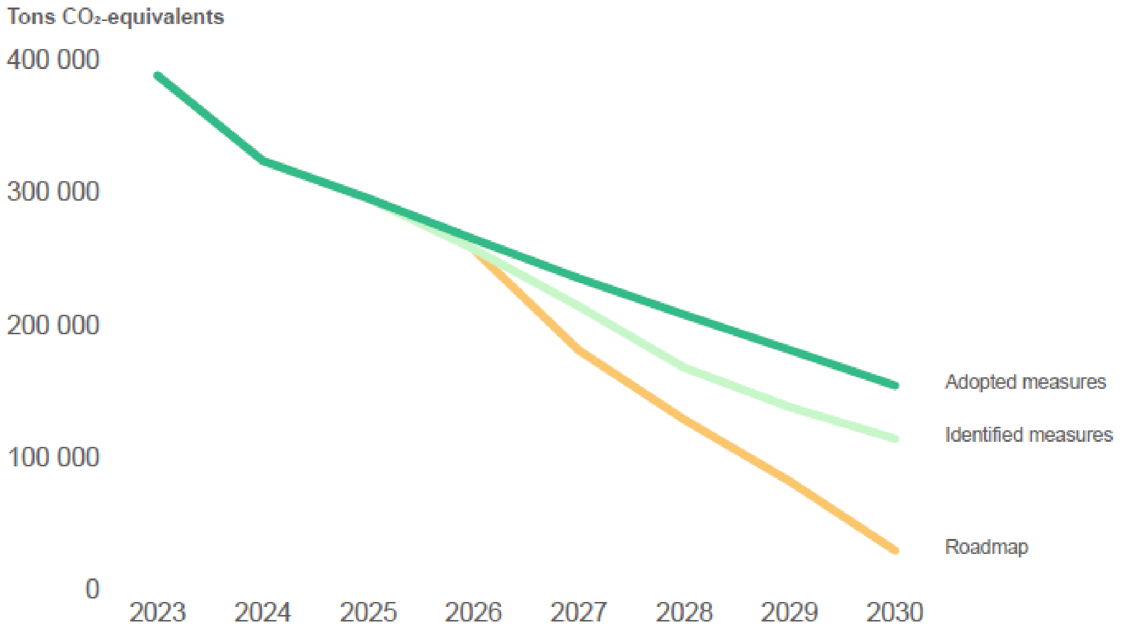

Figure 2: Roadmap for Road traffic

Emission sources (2023): Passenger cars (36%), vans (23%), heavy vehicles (31%), and buses (10%).

Roadmap: Emissions have decreased significantly in recent years, mainly due to the electrification of passenger cars. To achieve the roadmap goal, the replacement of especially vans and heavy vehicles with electric or biogas-powered vehicles must accelerate significantly, and the growth in commercial transport must be limited. Remaining emissions in 2030, if the roadmap is achieved, should come from through-traffic by heavy vehicles, while emissions from passenger cars, vans, and buses should be minimal.

Other mobile combustion (13% of Oslo's emissions)	125 000	63 000	47 000	1 000

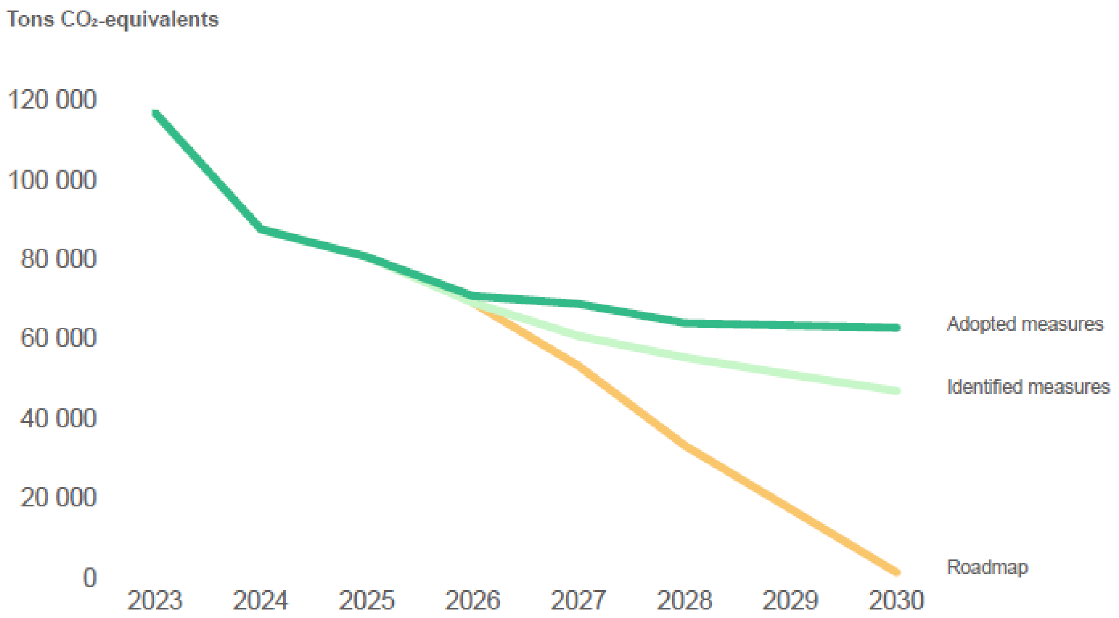

Figure 3: Roadmap for Other mobile combustion

Emission sources (2023): Construction (37%), transport-related services (47%), waste treatment (4%), and other industries (12%). The emissions include the use of off-road diesel in non-road mobile machinery, consisting of construction machinery, equipment used in industry, waste treatment, freight terminals, etc.

Roadmap: The construction sector is sensitive to economic cycles, which is reflected in the emissions sector, that have fluctuated significantly in recent years. If the identified measures, such as the new regulation on zero-emission construction sites, are implemented, remaining emissions in 2030 will come from various machines used at waste facilities, freight terminals, in industry, and other sectors. To achieve the roadmap goal, nearly all these machines must transition to zero-emission operation. These are machines for which technology and model availability are expected to be sufficiently mature to allow electrification by 2030. Emissions from these sources are likely overestimated, and improvements to the greenhouse gas emissions inventory towards 2030 may help reduce the gap to the roadmap goal.

Waste and wastewater (5% of Oslo's emissions)	50 000	30 000	30 000	8 000

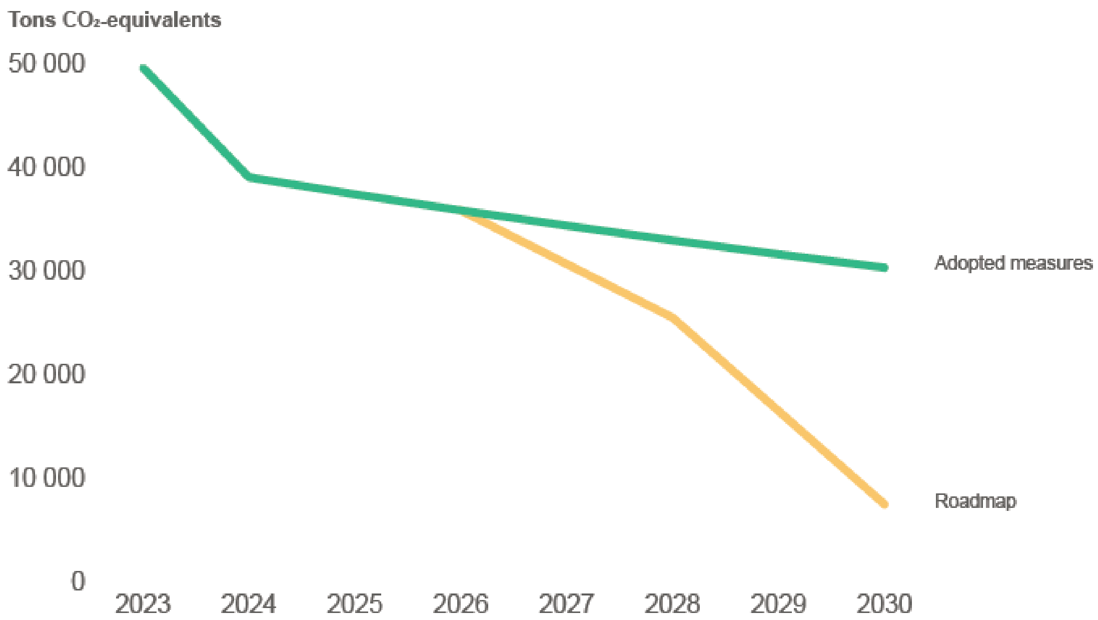

Figure 4: Roadmap for Waste and wastewater

Emission sources (2023): Landfill gas from closed landfills (80%), nitrous oxide and methane emissions from the wastewater treatment process (9%), and methane from composting of waste (11%).

Roadmap: Emissions from the sector are decreasing due to declining emissions from waste landfills. The amount of biodegradable organic material in the landfills decreases over time, resulting in progressively less methane and other greenhouse gases being formed. So far, no measures have been quantified that can reduce emissions beyond the baseline scenario, but the Agency for Real Estate and Urban Renewal are currently conducting a project to measure emissions from the Rommen landfill and intends to carry out measurements at the other landfills as well. This work may provide information on potential measures to reduce landfill emissions, such as repairing leaking gas wells and sealing the top cover where gas is escaping. To achieve the roadmap goal, emissions from waste landfills must be significantly reduced. Remaining emissions in 2030, if the roadmap is achieved, are estimated at around 30,000 tons of CO_2e.

Maritime transport (4% of Oslo's emissions)	35 000	19 000	11 000	4 000

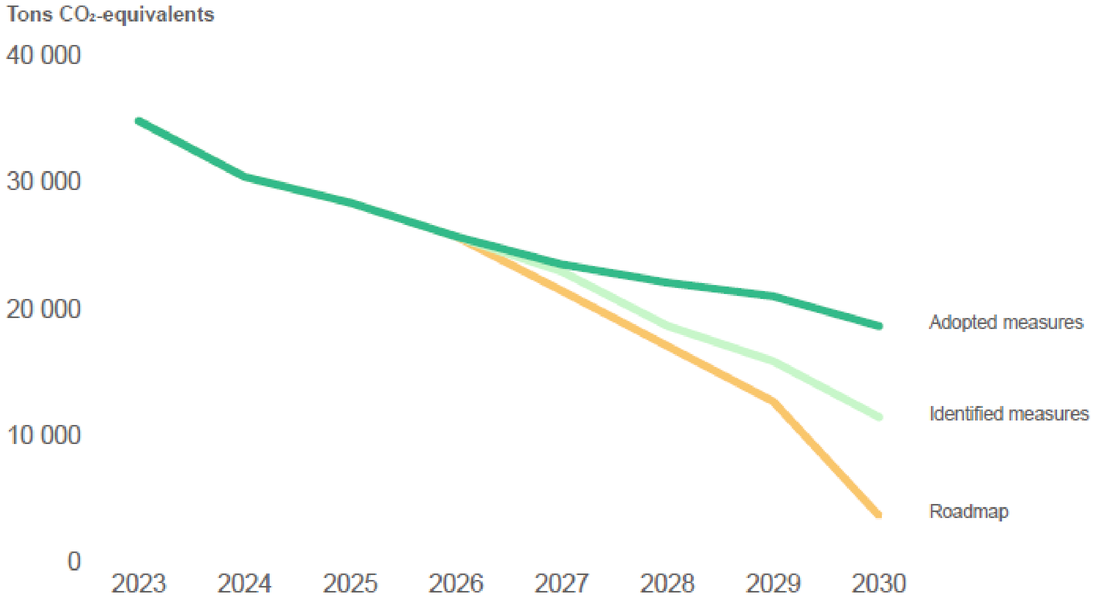

Figure 5: Roadmap for Maritime transport

Emission sources (2023): The largest emission sources are cruise ships (34%), passenger ships (24%), container ships (15%), and chemical and product tankers (14%).

Roadmap: Emissions have remained relatively stable in recent years. Increases in emissions from cruise traffic have been offset by declines from other passenger ships and container ships. Even if all identified measures are implemented, further reductions are still needed to reach the roadmap goal. To achieve the roadmap, more cargo ships must adopt renewable energy for propulsion, and cruise traffic must be reduced. Remaining emissions, if the roadmap is achieved, will primarily come from ships at berth where shore power cannot fully replace emissions, as well as from inbound and outbound sailing, including cargo ships calls at the Port of Oslo occasionally.

Heating (4% of Oslo's emissions)	38 000	19 000	10 000	3 000

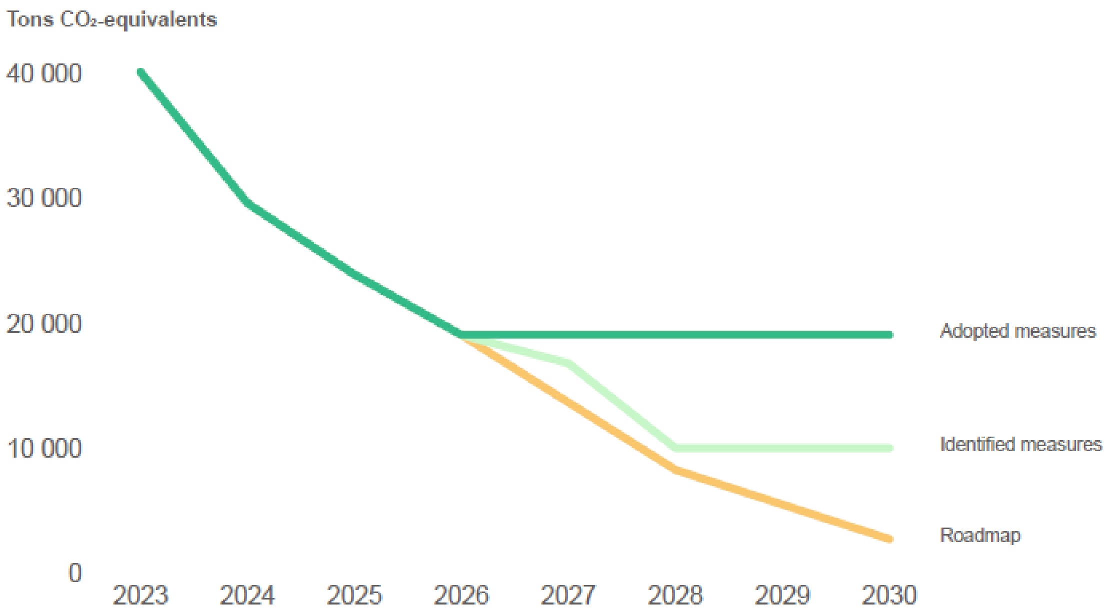

Figure 6: Roadmap for Heating

Emission sources (2023): Fossil oil (4%), LPG (66%), wood burning (21%), and other sources (9%).

Roadmap: Emissions have decreased significantly since 2009 but have risen in recent years due to increased use of fossil gas. Toward 2030, emissions are expected to decline due to the ban on the use of heating oil for agricultural heating and other uses not previously covered by the ban, as well as the ban on fossil gas for temporary heating during construction, which came into effect on 1 July 2025. To achieve the roadmap goal, the remaining fossil-based heating must be eliminated, so that by 2030 the only remaining emissions come from biogenic sources such as wood burning.

3 Circular Economy and Indirect Emissions

Initiatives for a more circular economy affect all of Oslo's climate goals. The material footprint is often used as an indicator of circularity. For a large urban economy such as Oslo, which produces very few of the goods it consumes, the city's material footprint and climate footprint largely overlap. The largest share of Oslo's climate footprint comes from indirect emissions, emissions resulting from the consumption of goods and services that originate outside Oslo. Measures aimed at achieving a more circular economy therefore also tend to reduce Oslo's indirect emissions. For this reason, circular economy and indirect emissions are addressed together in the Climate Budget.

In the Climate Budget 2026, measures for circular economy and indirect emissions are grouped into sectors of *construction*, *consumption and retail*, and *travel and mobility*. Going forward, additional categories may be included in this work, such as waste management and investments. These areas are not currently covered by the Climate Budget but are important in the work on circular economy and indirect emissions.

3.1 Estimates for Material Flow and Indirect Emissions

There is currently no greenhouse gas emissions inventory for indirect emissions. However, over the past two years, the Norwegian Environment Agency has published national estimates of consumption-based emissions for Norway (XIO Sustainability Analytics A/S, 2024). These figures include both direct and indirect emissions from Norwegian consumption and show that Norwegian's consumption-based emissions are among the highest in the world, with a footprint of 14 tons CO_2 equivalents per person in 2021. According to the Norwegian Environment Agency's estimates, *transport*, *construction*, and *food* are the largest sources of Norway's consumption-based emissions.

Public services (state and municipalities) are estimated to be the fourth largest source of consumption-based emissions in Norway, according to the Norwegian Environment Agency's estimates. For the City of Oslo's own operations, this includes emissions from the procurement of goods and services amounting to more than NOK 30 billion annually. The City of Oslo is working to reduce indirect emissions from its own operations through improved efficiency and by leveraging its significant purchasing power across several product categories.

To gain better oversight of its own emissions, the municipality has acquired a calculation tool that estimates emissions based on invoice data. Over time, this may enable the quantification of the effects of adopted measures aimed at reducing indirect emissions from procurement. Data quality varies considerably across different product groups and sectors, but systematic efforts are under way to improve this, particularly for the categories *food*, *ICT*, and *furniture and furnishings*. Greater use of joint procurement agreements and more centralised purchasing may also contribute to improved data quality.

The tool indicates that indirect emissions from the municipality's procurement of *food*, *ICT*, and *furniture and furnishings* increased in the period 2018-2024, although there is substantial uncertainty associated with these estimates.

The *Circularity Gap Report Norway 2025* provides an overview of material flows in the Norwegian economy, showing the rate at which virgin materials are extracted, imported, consumed, and exported. According to the report, Norway's economy is only 2% circular (Circle Economy and Circular Norway, 2025). Materials and goods are rarely kept in circulation through reuse, repair, redesign, or recycling.

3.2 Climate Budget Analysis for Circular Economy and Indirect Emissions

Calculating indirect emissions is associated with significantly greater uncertainty than calculating direct emissions, due to limited available information on, for example, the production and transport methods for the goods we purchase. This also makes it challenging to assess whether Oslo is on track to achieve the goal of substantially reducing indirect emissions by 2030. The City of Oslo therefore focuses primarily on reducing indirect emissions in the sectors that contribute the most and where the municipality itself has the ability to adopt policies and influence emission trends.

For Oslo, the use of materials in construction is assumed to be the largest source of indirect emissions. The City of Oslo has set a goal to reduce greenhouse gas emissions from materials by 30% annually. Data from Oslobygg shows that in 2024, material-related emissions were reduced by approximately 13% through material choices and reuse of construction materials, compared with FutureBuilt's baseline scenario. FutureBuilt has produced an estimate of how emissions from material use in municipal construction projects in Oslo are expected to develop towards 2050 in the absence of new measures. Preliminary greenhouse gas accounting for Oslobygg's projects up to 2029 indicate that the 30% reduction goal will not be achieved (see Oslo's Climate Barometer). One of the reasons is that decisions made at an early project stage, such as choosing new construction rather than rehabilitation, make achieving the goal more difficult. Oslobygg has worked extensively to improve its greenhouse gas budgets and accounts enabling emissions data to be compared over time and across projects within its portfolio. Experience from this work may provide a basis for achieving a better overview of indirect emissions from the rest of Oslo municipality's construction portfolio.

3.2.1 Calculations of Climate Impact and Cost Savings of Measures

In Climate Budget 2026, the estimated climate effect of one measure and the potential cost savings of two measures are presented. See the table below for a description of how these have been calculated and a discussion of the uncertainty in the calculations. These estimates are subject to considerable uncertainty, as elaborated below.

Table 5: Calculations of adopted measures for circular economy and indirect measures

No	Measures	Effect (tons CO_2e)	Annual cost savings (NOK)
11	Centralise ownership and management of the municipality's ICT equipment	1 700	45,5 mill.
	Calculation: The calculation is based on estimates for the average usage time of mobile phones (3 years) and PCs (3.5 years) in use in Oslo municipality, and an assumption that the usage time is extended to 5 years with the measure. This results in 40% fewer mobile phone purchases and 30% fewer PCs. For the calculation of climate impact, the emission factor for the production of an iPhone 14 has been used: 55.25 kg CO_2 equivalents per phone, while for PCs, the emission factor for the production of a Lenovo Thinkpad L14 (the standard model		

	used by the municipality) has been used: 260.6 kg CO_2 equivalents (Apple, 2022) (Lenovo, 2020). The reference year for the calculation is 2022. **Uncertainty:** The effects have not been adjusted for the costs and emissions related to centralizing ownership and management, such as service management and maintenance of IT integrations. It is estimated that this could reduce the benefit from extended PC lifetime by 4%. There is uncertainty in the calculation due to the use of only one emission factor for mobile phones and one for PCs. Emissions will vary between different models. Samsung had not published emission factors for its models at the time the analysis was conducted, and therefore only the emission factor for iPhone has been used.		
12	Increase the circulation of goods on the municipality's reuse platform and promote greater use of the municipality's joint procurement agreements for repair, redesign, and second-hand purchases		120 mill.
	Calculation: The Agency for Improvement and Development has estimated that Oslo municipality discards furniture and fixtures worth NOK 122 million annually. The calculation is based on surveys in which respondents estimated how many of various products had been discarded and the condition they were in. Prices have been set based on the average prices of equivalent new products under joint procurement agreements. The prices have been slightly reduced to reflect the shorter expected lifespan of used items compared to new ones. No climate impact has been calculated, as there are currently no robust methods for estimating emissions for used and redesigned furniture. Work is ongoing to develop such methods. **Uncertainty:** There is a high level of uncertainty associated with self-reported data from a survey.		

4 Energy

Oslo's work on energy focuses on ensuring that the city has an energy system suited to a zero-emission city. Oslo's energy efforts cover all energy use in the city and include measures for energy efficiency and energy flexibility, which help reduce peak demand and limit the need for further expansion of the electricity grid, as well as measures that increase local energy production. More than 75% of the city's energy consumption is used in buildings, making this sector the area with the greatest potential for measures that can contribute to achieving the climate goals.

4.1 Power Demand in Oslo

Despite the ongoing electrification of the vehicle fleet, construction sites, and parts of Oslo's port operations, electricity consumption has declined slightly in recent years (Elvia, 2025). This is partly due to increased use of district heating for space heating, the transformation of commercial areas into residential neighborhoods, and building regulations with strict energy requirements. Although energy and power demand in Oslo has remained stable, there is a need to develop measures that ensure the city's energy system is prepared for the climate transition. The underlying conditions for the energy system are changing significantly as sectors such as construction, port operations, and heavy transport undergo electrification, in addition to the establishment of the carbon capture facility at Klemetsrud.

The Climate Agency has estimated the power demand from the electrification of the construction sector, heavy transport, port operations, and the carbon capture facility at Klemetsrud to be between 110 and 170 MW. The carbon capture facility has already been allocated the necessary capacity. The power demand for port operations is geographically concentrated and will arise in the specific areas where such activities take place. The Port of Oslo is working on measures to reduce power demand at its sites.

It is estimated that electrification of all construction in Oslo will result in a total power demand of between 80 and 110 MW by 2030, distributed across the city. The estimate is based on historical levels of construction activity, assuming that by 2030 there will be around 300 construction projects underway in Oslo at any given time. The City of Oslo's own construction is assumed to account for about 30% of the total and is already nearly zero-emission. Further assumptions have been made regarding power demand and the number of construction, road, and water and wastewater projects in Oslo. The assumed peak hour (when power demand is highest) is set to 3–4 PM in winter, based on experiences from zero-emission construction sites. The simultaneity factor (the proportion of machines charging at the same time during the peak hour from 3 to 4 PM) is estimated at around 70%.

For heavy transport, it is assumed that approximately 20% of the vehicle fleet requiring fast charging is already electrified today. Fast charging to support the transition of the remaining trucks over 12 tons, as well as buses that are not currently zero-emission, are expected to require around 30 MW. This assumes that 65% of heavy transport will be electric, while the remaining 35% will run on biogas or hydrogen in a zero-emission Oslo. It is further assumed that around 70% of the peak load for charging heavy transport will occur simultaneously with the peak load at construction sites, during the 3–4 PM time window. This results in a total future capacity need for a zero-emission Oslo of approximately 100 MW.

With targeted efforts to optimise the operation of construction sites and make vehicle and machinery charging more flexible, the power demand could be reduced. By working to free up capacity equivalent to 100 MW through measures that promote more flexible consumption and more efficient energy use, it may be possible over time to limit the need for grid expansion and new energy production.

4.2 Calculations of Adopted Measures

The table below shows how the measures with specified power, energy savings, or energy production in the table *Adopted measures for energy* have been calculated. All figures apply to 2030. The calculations only include effects within the municipality's boundaries.

It is estimated that around 3 MW of winter power demand can be freed up through energy upgrades and smarter energy management of the municipality's own buildings and facilities, 1.5 MW through the municipality's participation in flexibility markets, and around 6.8 MW through grants that mobilise private capital for energy measures in buildings, consumer flexibility, and participation in flexibility markets.

Uncertainty in the calculations is described for each measure. The level of uncertainty is assessed as high, medium, or low. These are discretionary assessments made by the Climate Agency based on available data sources and the uncertainty of the data. The potential impact of the uncertainty on goal achievement is also considered. If the uncertainty in the calculation is assessed to exceed 1,000 MWh or 1 MW, the impact is considered high. Uncertainty in the range of 500–1,000 MWh / 0.1–1 MW is considered medium, while uncertainty below 500 MWh / 0.1 MW is considered low.

Table 6: Calculations of adopted measures for energy

No	Measures	Annual energy savings/production	Potential for freed-up winter power demand
Energy efficiency			
3	Manage grants for energy efficiency in buildings	3 800 MWh	1,8 MW
	Calculation: It is assumed that a support rate of 15–20% for additional insulation and replacement of older windows will trigger the insulation of 50,000 sqm of exterior walls and the replacement of approximately 20,000 sqm of windows with more energy-efficient ones. This is based on experience figures from attached offers in existing grant schemes for the cost of insulation and replacement of windows and doors. Furthermore, the energy savings are based on switching from TEK69 to TEK17-standard windows. **Uncertainty and impact:** The uncertainty in the calculation is assessed as medium and depends on the standard of the windows being replaced, as well as the popularity of the grant scheme. The impact of this uncertainty on goal achievement is considered high.		
6	Implement energy efficiency measures in municipal buildings	1 900 MWh	0,6 MW
	Calculation: The calculation assumes that NOK 20 million will be used annually from existing budgets for the measure. Based on cost estimates, it is assumed that approximately 4,800 sqm of walls will be additionally insulated, resulting in an annual energy saving of 1,900 MWh. The energy savings are calculated based on upgrading buildings from TEK69 standard to TEK17 requirements. **Uncertainty:** The uncertainty in the calculation is considered high and depends on how much of the budget various entities allocate to energy measures. The impact of this uncertainty on goal achievement is considered high.		
8	Increase energy efficiency and reduce energy use in water and wastewater facilities	900 MWh	0,1 MW
	Calculation: Two new fans will be installed, with an estimated energy saving of 40 kWh per hour for each fan, resulting in a total saving of 700 MWh. In addition, coatings will be installed on pumps at the Disen pumping station, providing an estimated energy saving of 20%, equivalent to approximately 200 MWh. **Uncertainty:** The uncertainty and its potential impact on goal achievement are considered low.		

9	Reduce energy use for lighting in streets, parks, the port, and urban spaces:	700 MWh	1,3 MW
	Calculation: The calculation assumes that 3,000–4,000 lightings are replaced annually in street and park areas and public spaces, based on information from the Agency for Urban Environment. This will reduce energy consumption by approximately 400 MWh per year. In addition, improved control of these lightings is expected to further reduce energy consumption by about 200 MWh. The replacement of lighting at the Port of Oslo is estimated to reduce energy use by 100 MWh annually. **Uncertainty:** The calculation is based on the assumed number of lighting replacements, which is somewhat uncertain. The impact of this uncertainty on goal achievement is considered low for energy savings and medium for power reduction.		
10	“Catch the Energy Thief” campaign in buildings operated by Oslo municipality	400 MWh	
	Calculation: The calculation is based on experience from previous reviews of energy systems and the identification of operational faults and energy waste in municipal buildings. In 2023, the “Catch the Energy Thief” campaign was carried out at four schools and two kindergartens, uncovering “energy thieves” amounting to approximately 550 MWh annually. In 2026, Oslobygg plans to implement “Catch the Energy Thief” campaign in at least ten buildings. **Uncertainty:** The uncertainty in the calculation is considered medium, and the impact on goal achievement is assessed as low.		
Increased energy flexibility			
12	Energy flexibility solutions in Oslo municipality		1,5 MW
	Calculation: The calculation is based on experiences from the 2025 project and projections for the number of buildings and loads expected to be ready to participate in the flexibility market in 2026. **Uncertainty:** The calculation carries medium uncertainty, as it is unclear what proportion of the loads offered through this pilot will remain available to the flexibility market over time. Oslo municipality aims to gain insights into the effects of, for example, temporarily switching off ventilation systems, and these experiences may influence the actual amount of capacity offered to the market over time. The impact of this uncertainty on goal achievement is considered medium.		
14	Smart control of public charging infrastructure and terminal chargers (excluding fast chargers)		1 MW
	Calculation: It is assumed that 35% of Oslo’s 2,500 on-street chargers will be equipped with controllable flexibility of 2 kW each. This results in total power flexibility of 1 MW. **Uncertainty:** There is high uncertainty regarding the number of on-street chargers that will have controllable flexibility by 2026. The impact of this uncertainty on goal achievement is considered medium.		
15	Manage grants for participation in flexibility markets		5 MW
	Calculation: Based on previous application rounds, it is assumed that each million NOK in allocated grants will trigger 1 MW of offered capacity in the flexibility market.		

	Uncertainty: There is high uncertainty regarding the total amount of grants that will be awarded through the scheme, as well as how much flexibility in MW per NOK applicants will request. The impact of this uncertainty on goal achievement is considered high.		
Increased local energy production			
17	Increase local energy production in municipal buildings and facilities	1 200 MWh (1,5 MWp)	
	Calculation: Solar energy systems with a total capacity of 1.5 MWp will be established. This corresponds to approximately 1.2 GWh of solar power in 2026. **Uncertainty:** The uncertainty in the calculations is low, and the impact of this uncertainty on goal achievement is considered low.		
18	Manage grants for the installation of solar energy systems	4 600 MWh (5,7 MWp)	
	Calculation: The calculation assumes that housing cooperatives and condominium associations can receive support covering 20% of the investment cost for solar panel systems. Based on cost assumptions of NOK 3.5 per Wp, the scheme is expected to have an effect of 5.7 MWp in 2026, producing 4.6 GWh of solar power in a normal year. **Uncertainty:** There is high uncertainty regarding the impact of the measure, as it is unclear whether the design of the solar energy grant scheme will remain the same in 2026 as in 2025. The impact of this uncertainty on goal achievement is considered medium.		

4.3 Calculations of Identified Measures

The Climate Agency has, for some of the identified measures presented in the Climate Budget 2026, carried out example calculations to indicate a possible order of magnitude of impact. These are presented in the table below. The measures are estimated to potentially reduce energy use by 1,350 MWh and increase local energy production by 42 MW / 46 MWh. These calculations are intended solely as examples of a possible effect and are therefore subject to high uncertainty.

Table 7: Calculations of identified measures for energy

Measures	Estimated winter power/energy
Overarching measures	
Require local energy production and shared energy solutions	33 MW/29,3 GWh in 2030

Calculation: The calculation assumes that a total of 360,000 sqm of new roof area will be developed by 2030 as a result of introducing requirements, with approximately 50% utilised for energy production from solar panels. This could trigger new renewable production of 33 MW and 29.3 GWh annually.	
Energy efficiency	
Set minimum energy rating requirements in the municipality's standard lease agreements for commercial premises. The design must take into account the municipality's goal of environmentally efficient property management based on greenhouse gas accounting and value-preserving maintenance.	1 350 MWh
Calculation: If the municipality includes requirements in 10 new lease agreements annually for premises with an average size of 1,325 sqm, and this leads to an energy improvement of 100 kWh/sqm (a total of 1,350 MWh annually), this will result in an accumulated energy saving of 6,750 MWh annually after five years. This corresponds to the energy consumption of 400 households.	
Increased local energy production	
Map the potential for solar energy production when selling municipal plots and consider requiring local energy production	19 MW/16,6 GWh
Calculation: If an area of 100,000 sqm is developed for solar energy, this could provide a capacity of 19 MW and an energy production of 16.6 GWh, based on 0.19 kW/sqm and an annual production of 166.3 kWh/sqm.	

5 Climate Adaptation and Natural Carbon Storage

Climate adaptation (Goal 2) and natural carbon storage (Goal 4) are two separate goals in the City of Oslo's Climate Strategy, but they are addressed jointly in the Climate Budget. Since last year's Climate Budget, climate adaptation and natural carbon storage have been given a new structure. As a result of climate change, Oslo is expected to experience more frequent intense cloudbursts, flooding, heatwaves, and periods of drought. The new structure of the Climate Budget table provides a holistic overview of the work being carried out to address these challenges.

In Climate Budget 2026, measures are grouped into the categories *flood and stormwater*, *heatwaves*, and *climate-resilient nature and carbon storage*. Going forward, additional categories, such as wildfire, storm surges and drought, may be included if the municipality adopts new measures to address these challenges.

The municipality is already working on drought and wildfires — for example, through the Agency for Water and Wastewater Services' work on establishing a backup water supply, and the Fire and Rescue Agency's emergency preparedness for forest fires — but this year's Climate Budget does not include new measures related to these themes.

The category *climate-resilient nature and carbon storage* focuses on strengthening nature's ability to adapt to climate change while continuing to provide essential ecosystem services such as flood mitigation, recreation, carbon storage, and temperature regulation. Rich biodiversity is also crucial for enhancing nature's resilience to climate change and for preserving its capacity for long-term carbon storage.

5.1 Climate Budget Analysis for Climate Adaptation and Natural Carbon Storage

Climate adaptation is a complex and multifaceted topic that cannot be quantified in the same way as greenhouse gas emissions. It is also challenging to develop indicators, as climate change affects the city in many ways, ranging from heatwaves and cloudbursts to sea level rise, and no single indicator can capture the full picture. At the same time, vulnerability and needs vary across locations, meaning that indicators relevant in one part of the city may be of limited value in another.

In addition, there is often a lack of robust data, and the effects of climate adaptation typically become apparent only over time, often as the absence of damage, which is inherently difficult to measure. This is a challenge faced by most cities and national authorities. Nevertheless, the Climate Agency is working to develop a set of indicators for the different categories in the Climate Budget, in order to better demonstrate how well the city is adapting to a changing climate.

Oslo's green space accounting does provide useful insight into how green areas are developing in the built-up zones of the city. Green areas contribute to temperature regulation, stormwater management, and carbon storage. For natural carbon storage, the Norwegian Environment Agency's Greenhouse gas Emissions and Uptake Inventory for Land-Use and Forestry provide an indication of developments over time.

5.1.1 Oslo's Green Space Accounting in the Built-Up Zone

Oslo's green space accounting shows how much green area the city has, how it is distributed, and how it changes over time (PBE, 2024). Vegetation cover is measured by comparing infrared orthophotos from different years, a type of aerial imagery that captures vegetation. The accounting is updated every four years and serves as an important knowledge base for the Municipal Master Plan.

The most recent accounting covers the period 2017-2021 and shows that green areas in Oslo are under pressure. Between 2017 and 2021, 9,062 decares of vegetation were developed, while 4,970 decares of new vegetation were established. This corresponds to a net reduction of 6% (4,091 decares). The accounting also shows that around half of the green areas in Oslo's built-up zone are not protected against future development. Approximately 47% of the built-up zone is covered by vegetation, while 27% is zoned for "green land-use purposes". This means that just over half of the green areas are protected from development.

The green space accounting also indicates a reduction in tree canopy cover of more than 1,500 decares between 2017 and 2021. However, these results are highly uncertain due to the poor condition of trees after the drought summer of 2018, which may have led to misclassification of canopy loss.

5.1.2 Greenhouse Gas Emissions and Uptake Inventory for Land-Use and Forestry

In 2024, the Norwegian Environment Agency published an updated Greenhouse Gas Emissions and Uptake Inventory for Land-Use and Forestry for the period 2016–2020 (Norwegian Environment Agency, 2024). This can be compared with the previous period, 2011–2015. The inventory has significant uncertainties but is most accurate when it comes to forest-related data. It shows the development of Oslo's natural carbon stocks but still has methodological limitations and does not adequately capture carbon storage in soil.

The inventory is divided into six main land-use categories: forest, cropland, pasture, wetlands and water, built-up land, and other natural land. For each category, emissions or removals are calculated based on the characteristics of the land and any changes during the period. For example, biomass is measured as one of several parameters to estimate carbon uptake in forests over time.

When land use changes from one category to another (land conversion), the emissions or removals are attributed to the new land-use category. For instance, greenhouse gas emissions from deforestation for a new residential area will appear under the built-up land category, while emissions from deforestation for new farmland are recorded under cropland.

Overall, Oslo's Greenhouse Gas Emissions and Uptake Inventory for Land-Use and Forestry show a slight net increase in carbon uptake from Oslo's areas. This is mainly due to reduced emissions from cropland and pasture, likely reflecting that less forest areas have been converted to agricultural land or grazing over the past decade.

At the same time, Oslo experienced annual emissions of around 7,000 tons of CO_2 equivalents from land development during the period 2016–2020, representing a slight increase compared with the previous period. The inventory also shows that Oslo's forests, which account for 85% of the municipality's natural land area, are absorbing slightly less CO_2 than before. One reason is increased logging. The forest is still affected by the 2018 drought summer, which has contributed to a rise in bark beetle infestations. These insects damage or kill spruce trees, leading to increased logging to prevent the spread and economic losses. This trend mirrors developments observed at the national level.

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