Statens vegvesen

Skatteetaten

Road Usage Tax and Tolls

Concept Selection Study Step 1– version 1.0

15th November 2022 (Translated to English May 2023)

Definition of terms

AutoPASS provider
A network for electronic payment of i. tolls on the public road network and ii. ferry tickets on public ferry connections in Norway.

Toll project
Development that is (partly) financed through toll charges.

Toll company
A county council-owned stock-based company that has entered into an agreement with the ministry to provide funding for development under Section 27 of the Road Act in exchange for the right to collect toll charges and is part of the AutoPASS Cooperative.

Toll ring
Toll stations placed around an urban area in such a way that it is not possible to pass through the ring without paying. Toll rings can also consist of multiple rings, such as inner and outer rings, with different rates.

Urban packages
Term used for a toll package in an urban area.

CO2 tax
A collective term for Co2-taxes on imports and domestic production of mineral oil, petrol, natural gas/LPG, in addition to Co2 taxes on emission in petroleum activities. Co2-taxes are er special tax that must be paid to the state treasury.

Polluter pays principle
The principle entails that the party responsible for emissions should bear the costs that the emissions impose on society.

GNSS
Global Navigation Satellite System, which is a collective term for various satellite-based positioning applications such as GPS, Galileo and others.

Vehicles with combustion engines
Vehicles that utilize internal combustion engines for propulsion, such as traditional diesel and petrol vehicles, as well as hybrid vehicles with such engines.

Traffic congestion
Reduced mobility and/or delays resulting from traffic volume approaching or exceeding the capacity of the road.

Congestion pricing
A measure that involves differentiated charges based on location variable charges based on time, and/or dynamic charges based on actual traffic conditions, where the cost of driving is higher during times of heavy traffic – typically during peak hours (rush hour fee).

Zero-emission vehicles
Vehicles without an internal combustion engine.

The zero-growth target
The goal for urban areas is to reduce greenhouse gas emissions, congestion, air pollution, and noise through efficient land use and by shifting the growth of personal transportation to public transport, cycling and walking. This is referred to as the zero-growth target.

The utility principle
The utility principle means that those who pay tolls should benefit from the use of revenues. In recent years, the utility principle has been given a broader interpretation, where toll revenues can be used to finance other measures beyond the specific road project where the collection takes place, such as public transportation and infrastructure for cycling and walking.

OBU (On-Board Unit)
An OBU (on-board unit) is an electronic device installed in a vehicle that records traffic and driving data and can be connected to roadside and satellite navigation systems. It can record road usage tax and tolls on average or per stretches of road and can communicate with the core of a road pricing system.

Operator
The party that has the collection rights in the AutoPASS Cooperative. This can be a toll company or a ferry operator.

Discount
In the context of toll fees, this refers to a reduced toll charge compared to the nominal rates. All discounts require the use of a valid user agreement and toll tag.

Discounts: Tag Agreement
A 20 percent discount is provided for vehicles in tariff group 1 when using a tag with a valid agreement.

Discounts: Zero-emission vehicles
A 50 to 100 percent discount is provided for zero-emission vehicles in each tariff group for the specific toll project, depending on the local political decisions.

Discounts: Maximum price / toll cap
A toll cap is a provision that sets a limit on the number of toll crossings per vehicle that need to be paid within a calendar moth. A toll cap serves as a high-usage discount to ensure that certain road users do not face an unreasonably high financial burden. It can apply to both tariff groups in toll rings. It can only be implemented for vehicles in tariff group 1 in other toll collection. The toll cap should normally not be set lower than 60 crossings per month, but only in specific circumstances can it be set lower than 40 crossings per month.

Discounts: Hour rule
The hour rule mainly applies to roll rings and entails charging for only one passage per vehicle within a one-hour period. The hour rule can apply to both tariff group 1 and 2.

Time-differentiated rates
A traffic management measure that can be used in toll collection in urban areas, according to Section 27, second paragraph, of the Road traffic Act. The measure involves setting different rates for different times of the day to accommodate the need to control traffic flows.

Thick client
A thick client for road pricing records driving rotes, calculates prices, and stores all personal information locally in the vehicle (on an OBU). Only aggregated price information is transmitted.

Thin client
A thin client for road pricing transfers all GNSS-positions to the cloud where all personal information is store (with a third party).

Issuer
A company or other legal entity that, upon approval according to the Issuer Regulations, enters into agreements with operators and users to offer services for payment of tolls and ferry transport through AutoPASS Cooperative.

Road usage tax on fuel
A specific tax that is paid to the state treasury upon import and domestic production of the following fuels: petrol, mineral oil for motor vehicle propulsion (auto diesel), bioethanol, biodiesel, natural gas and LPG.

Road pricing
Road pricing can be defined as payment for the use of roads, with or without traffic-regulating elements. The definition can encompass multiple purposes, including payment for infrastructure use (investment and operational costs), pricing that internalizes external costs (emissions, particulate matter, accidents), congestion costs and/or pricing to regulate the composition of traffic over time or between areas/road sections.

Revenue
In this study, revenue refers to the income generated through taxes, fees and tolls. Unless otherwise stated, the term revenue refers to cross income, meaning that the costs associated with collection are treated separately where relevant.

The study recommends a step by step implementation

There is a need to change the current system of road usage tax on fuel with a more sustainable and precise system for pricing the road use. The following study has examined the usage-related taxes in connection with tolls. The study proposes a step by step implementation of road usage pricing with a distance-based fee for light Norwegian zero-emission vehicles as a step 1, followed by a distance-based road usage tax with two zones (urban and rural areas) for heavy vehicles. The first two steps do not entail major changes to the tolling system, but it is assumed that the discount scheme for zero-emission vehicles will be phased out over time.

The road usage tax is currently paid on sales of petrol and diesel. The purpose of the tax is to provide revenue for the government and to price external costs associated with road usage. However, the tax is currently not very accurate in terms of correctly pricing external costs, and revenue are decreasing due to an increasing share of zero-emission vehicles. As a result of the green shift, there is a need to look at how the road usage tax can be designed for the future in order to fulfil these purposes. At the same time, the current discount scheme for the zero-emission vehicles in toll projects entails challenges with the toll scheme as a local tool for financing and regulating traffic. Overall, the current arrangements for pricing road usage encourage more car use at the expense of public transport, cycling and walking. There is therefore a need to see these issues in context. The study will recommend a concept that will ensures accurate and sustainable pricing of road usage and financing of transport projects. Road usage tax and tolls shall continue to exist as two separate means.

A gradual introduction of fees is proposed to facilitate more accurate pricing of the external costs. In step 1 « Light Norwegian-registered zero-emission vehicles, which are currently not subject to road usage tax, will be charged a tax based on distance travelled over a period (year/half year). The price is differentiated by vehicle type (weight etc.), and the project's calculation assume a fee around 30 cents NOK per kilometre for a normal electric car. Fuel tax will continue for vehicles with combustion engine. Charges for hybrid vehicles are being considered. The measure is expected to stabilize the state's revenue from road usage tax, as well as provide a traffic-reducing effect that reduces external costs (noise, dust, wear and tear). The measure will provide a more equitable design of the road usage tax by including all light vehicles that contribute to negative societal costs in the form of noise, dust and wear and tear on the road network. The introduction of the measure should be considered in connection with other vehicle taxes designed as incentives for renewing the vehicle fleet.

Step 2 includes road usage tax for heavy vehicles (Norwegian and foreign). The measure will provide a more accurate pricing of the external costs by allowing differentiation of the tax for each vehicle based on its emission class, amount of wear and tear on the road through weight and pressure distribution, and whether the driving occurs inside or outside of cities, in addition to the actual distance driven. A similar arrangement for light vehicles is not currently recommended due to privacy concerns. It is possible to introduce the tax for heavy vehicles on the entire public road network, or only on the main road network in Norway (TEN-T and motorways). The yearly weight fee can be considered removed. Stage 2 is based on technology that is already in use for heavy vehicles in several European countries. Denmark plans to put a similar solution into operation from 2025. Stage 2 will contribute to fairer competition between Norwegian and foreign carriers and could reduce revenue losses associated with refueling abroad. A step-by-step introduction will provide experience with the technology on a limited group of vehicles, reducing the risk of adopting the technology on a larger scale. The scheme can be developed over time by including additional vehicle groups if desired.

The introduction of the scheme should be seen in the context of a long-term restructuring of other car taxes to ensure the overall tax burden is taken into account.

The study is sent out to public consultation by the Norwegian Tax Administration.

Summary

In the fall of 2021, the Ministry of Finance and Ministry of Transport commissioned the Norwegian Tax Administration and the Norwegian Public Roads Administration to carry out a concept selection study of a future system for determining and collecting road usage tax and tolls.

The starting point for the concept study is that the government wishes to replace the current system for road usage tax and tolls with a more sustainable and precise car taxation system. In report. St. 1 (2020-2021) five principles are presented for a sustainable car taxation system. The principles state that the system should be sustainable in terms of revenue and the environment, in a situation where zero-emission vehicles dominate new sales, and where conventional cars are gradually phased out of the vehicle fleet. According to the report, external costs associated with vehicle use, excluding emissions of CO2, are currently either not priced or priced in an inaccurate manner. The assignment emphasizes on accurate pricing of external costs arising from the use of vehicles. A large proportion of motorists today are not faced with prices that reflect the societal costs linked to road wear, local emissions, traffic congestion and accidents.

The purpose of this study is to recommend a sustainable concept for future determination and collection of road usage tax and tolls.

The main problem is that motorists cover the social cost of using vehicles trough usage-dependent charges to an increasingly lesser extent. A large proportion of motorists today are not faced with prices that reflect the societal costs of road wear and tear, local emissions, traffic congestion, and accidents. One consequence of the problem is a shortfall in the state's revenue. The increasing share of zero-emission vehicles, which is not subject to usage tax, exacerbates the problem of declining revenues. By 2050, vehicles with combustion engines will only represent a small fraction of total traffic.

In cities, there may be partially overlapping purposes for tolls and road usage tax. In addition to providing revenue for the state, the road usage tax is intended to regulate traffic by requiring users to pay for the external costs associated with driving on the road. At the same time, tolls in urban areas can be used for traffic regulation by adjusting the rates based on the time of day and the vehicle's weight and environmental characteristics. A system of time- and environmentally differentiated toll rates has already been implemented in most of the largest urban areas.

The fact that the current arrangements are not effective enough for regulating car traffic in urban areas undermines the conditions for environmentally friendly transport alternatives (public transport, cycling and walking) and the possibility of achieving the zero-growth target. It is important to find more effective arrangements, otherwise the problems will worsen over time.

The overall needs that is emphasized in this report are divided into two parts and are considered equally important. One is the need for predictable revenue for toll projects and for the state. The other is the need for a system that regulates traffic according to the marginal external costs associated with driving, costs that are highest in urban areas.

A more sustainable car tax system that is capable of regulating traffic by influencing behavior through pricing, while also ensuring stable revenues, could help meet the needs.

The development trends in the vehicle fleet show that the proportion of zero-emission vehicles will increase significantly in the coming years and eventually become "the new normal". This means that there is a need for a shift that assumes that all vehicles using the road contribute to paying for the burden they impose on society (polluter pays principle). Similarly, the principle of user pays could be strengthened with an arrangement where zero-emission vehicles pay tolls on the same basis as other vehicles. This could help meet the need for legitimacy and trust in the future schemes. It is important to balance the need for revenue with other societal goals.

Several user needs have been identified. The private segment has expressed a need for a simple arrangement where you can experience a good correlation between what you pay for and what you get in return. Examples of needs in the transport industry include ensuring that competition conditions with foreign businesses and vehicles do not deteriorate, and that a future system provides predictability and a long planning horizon. For road authorities/owners, there is a need for sufficient funding of the road network and clarified responsibilities between levels of authority. The county municipalities/big city municipalities, including tolls/urban packages, need room for maneuver in order to implement measures to promote transport and the environment, such as the zero-growth target.

The study has also identified some operational needs that have been assessed as important in this study. A future solution must have functionality that contributes to greater accuracy in pricing the external costs that motorists impose on society. A future solution must also be national and have the capacity to capture transport data and handle foreign vehicles in an efficient manner. The technological developments in business and the pace of innovation in the transport sector provide many opportunities for a future road pricing system for tolls. The concept chosen should therefore be based on thorough assessments of how determination and collection can be done efficiently and function well for users and authorities.

The societal goal is that *The initiative will ensure a more accurate and sustainable pricing of road use and financing of transport projects.*

By accurate, we mean a system that presents road users with prices that make them consider the inconveniences that the use of vehicles imposes on others, in accordance with the polluter pays principle. The principle refers to all the external costs that the road tax is intended to impose on users: accidents, traffic congestion, noise, road wear and tear, and health and environmental harm caused by emissions. Furthermore, the system aims to make drivers pay in accordance with the principle of utility.

In this context, by sustainability, we mean two things:
Financial: Ensuring the possibility of locally anchored toll projects and stable revenue for the state. Environmental: Influencing behavior that promotes more sustainable mobility.

The goal is supported by three impact goals:

- E1 More accurate pricing for road use that takes into account the principle that users pay for the costs they impose on society.
- E2 More accurate payment of tolls in accordance with the principle of utility.
- E3 Ensuring the possibility of a stable revenue base and predictable revenues for the state and for toll projects.

The framework conditions, along with the impact goals, are criteria for evaluating which concepts will be subject to assessment in the socio-economic analysis. Relevant concepts must meet the requirements set by the framework conditions. For some of the requirements there may be degrees of fulfilment. The following framework conditions are assumed:

- R1: Road usage tax and tolls will be continued as two independent means with different purposes.
- R2: Tolls must have a local support.
- R3: The measures must comply with the polluter pays principle.
- R4: The measure must ensure that requirements for privacy, including transparency and access, are upheld throughout all processes, from data collection in vehicles, determination, collection to control.
- R5:The measure must uphold the principle of non-discrimination of foreign and domestic vehicles (both in terms of what they pay and opportunities for discounts). The principle prevents solutions that in various ways subsidize their own nation's transport or industry.
- R6: The measure must be in accordance with Norway's obligations under the EEA agreement and relevant framework in the EU.

- A feasibility study has been carried out with a broad approach to possible alternative solutions. More alternatives have been evaluated than those selected for socio-economic analysis. The range of possibilities has been divided into several dimensions, including pricing model, user groups, technology, and process and organization. Based on these dimensions, thorough assessments have been made of various possibilities for how to meet both the problem, needs, goals, and framework conditions seen in context. The project has also carried out an analysis of what other countries have done in the area to gather insight into status and experience. Kilometer-based fees for light vehicles in, for example, Australia and the US, and position-based kilometer fees for heavy vehicles in Europe have provided useful insight into relevant solutions.

We are left with four concepts that, in different ways and to varying degrees, could meet the societal goal of this initiative. The concepts have been evaluated against the current situation, the so-called zero alternative and the zero plus alternative, which allows for equal rates in the toll system for all light vehicles. The reason why the same tariff is used for light vehicles as a basis in the zero plus alternative is based on an assumption that the possibility of a discounts for zero-emission vehicles will be phased out and no longer be relevant at the time the concepts are ready for implementation.

Concept 1 – Road usage tax for zero-emission vehicles

A distance-based road usage tax is designed with the same price for the entire country and provides flexibility for both manual and automatic reporting of kilometres driven by the vehicle. The new road usage tax only applies to zero-emission vehicles. There is an equal rate for zero-emission vehicles and vehicles with combustion engines in the toll system. In this concept, there is no requirement to install additional equipment/boxes in the vehicles. The concept has flexibility and allows for a gradual transition from manual reporting to automatic reporting for a larger share of zero-emission vehicles.

Concept 2 - Zone

Road usage tax: Price varies between urban and rural areas

The problem description shows that the external costs are higher in urban areas than in rural areas. Based on this, the concept is based on a two-price model, where the price for driving one kilometre varies between urban and rural areas. The new road usage tax applies to all vehicles. There is an equal rate for zero-emission vehicles and vehicles with combustion engines in the toll system. In this concept, there is a need for data that registers the number of kilometres driven and connects it to the zone. Data can be obtained by equipping vehicles with an "on-board unit" (advanced chip) that communicates with today's roadside equipment using GNSS (satellite) or 4G/5G (telecom network).

Concept 3 - Position

Price varies depending on time, location and distance

Concept 3 will provide the opportunity for more accurate pricing of external effects that the individual road user imposes on society through several zones (rural, urban, metropolitan) and time of the day. The data foundation provides many opportunities for advanced pricing models that can more effectively influence behavior. Prices may vary depending on the type of road, geography, season, traffic conditions, traffic congestion, etc. The use of satellite data provides a more accurate indication of time, location and distance travelled. In this concept, there will be a common arrangement for road usage tax and tolls, but still separate revenue streams and different rates primarily to reflect external costs and financing of transportation projects.

Concept 4 – Step-by-step realization

Stage 1 Light Norwegian-registered zero-emission vehicles receive a distance-based vehicle tax. Basic reporting is established, which does not include foreign vehicles and heavy zero-emission vehicles (Norwegian or foreign registered). Fuel tax continues for vehicles with combustion engines.

Stage 2 – Concept 2 for Heavy vehicles aims to realize Concept 2 with different rates for road user tax for urban and rural areas. An on-board unit (advanced chip) must be installed in vehicles over 7.5 tons that do not already have this, or an app or integrated vehicle platform can be used. The introduction for heavy vehicles could coincide with similar implementation in Sweden and Denmark. The solution can be introduced geographically on certain road sections (TEN-T and motorways). A transitional arrangement from fuel-based road usage fees to distance-based fees for heavy vehicles will be explored in upcoming phases. The weight-based annual fee can be considered removed. Further steps may be considered later based on technological developments and risk assessments, among other things.

Transport model calculations conducted by The Institute of Transport Economics (TØI)

TØI has conducted transport analyses for both passenger and goods transport, which have been used as a basis for calculating of the socio-economic effects of various concepts. All concepts lead to a reduction in traffic volume with passenger cars, and the largest relative reduction for zero-emission cars, which have no road usage tax today. Concepts with a flat road usage tax across the entire country reduce traffic volume in both urban and rural areas for both goods and passenger transport. Concepts that differentiate prices between urban and rural areas lead to a large reduction in traffic volume in urban areas, while vehicles with combustion engines end up increasing their transport volume in rural areas. Truck transportation also increases in rural areas under these concepts. Road users end up with reduced utility as a result of increased road usage tax, but this loss of utility is offset by increased revenue for the public sector and saved external costs (emissions, accidents, noise, wear and tear and traffic congestion).

According to the Ministry of Finance's circular R-109/21, an overall assessment of the sosio-economic profitability of the various alternatives shall be made based on estimated net present value, non-priced effects and uncertainty. The assessment shall be followed by a ranking of the various measures. The table on the next page summarizes our overall assessment of the socio-economic profitability of the concepts, along with the corresponding ranking of the concepts.

Overall assessment of socio-economic profitability	Concept 1	Concept 2	Concept 3	Concept 4
Priced effects				
Investment cost	- 302	- 1 220	- 1 918	- 468
Administration, operation and maintenance of systems	- 286	- 1 185	- 1 171	- 381
Organizational changes	- 798	- 2 067	- 2 071	- 966
Vehicle owner's time spent on reporting and invoice	- 274	- 298	- 439	- 282
Road user benefit	-58 804	-58 193	-53 342	-58 970
Health benefit	2 703	6 829	7 172	2 703
Reduced external costs	8 595	17 038	19 031	8 172
Public revenue	61 774	55 710	53 610	62 045
Tax financing cost	12 078	10 248	9 690	12 046
Total of priced effects	**24 686**	**26 862**	**30 562**	**23 897**
Non-priced effects				
Secondary use of data	0	++	++	0
Privacy	0	- - - -	- - - -	0
Vehicle owner's time spent on inspection and complaint	-	- -	- -	-
Possibilities for more accurate collection of tolls	0	0	+ +	0
Possibilites for more accurate pricing of road use	++	+++	++++	++
Reduced revenue loss from foreign vehicles	0	+++	+++	++
Fairer competition conditions for road freight transport	0	+	+	+
Real option value (value of postponing decisions)	little	moderate	moderate	little
Overall ranking by socio-economic profitability	2	4	3	1

An assessment of both priced and non-priced effects ranks Concept 4 Step-by-step realization as the socio-economically best alternative.

All concepts provide very high net benefits ranging from about 24 billion NOK to 30 billion NOK over a lifetime up to and including 2037. As we can see from the table, Concept 3 is ranked as the best concept if we only look at priced effects. Concept 2 is the second-best alternative based on the priced effects.

Regarding non-priced effects, Concept 2 and Concept 3 are considered to result in a significant deterioration compared to the current situation in terms of privacy.

Non-priced effects related to opportunities for more accurate road pricing, reduced revenue loss, and fairer competition conditions for freight transport make us rank Concept 4 ahead of Concept 1.

Concept 2 and 3 have significantly greater uncertainty regarding both costs and the potential for realizing benefits.

The conditions described in the chapter on real options and flexibility indicate that it will not be appropriate to make a final decision to realize these concepts right away.

We consider Concept 4 as the socio-economically best alternative. The concept will be able to realize significant benefits from early on.

Risk assessment The study has further examined six different risk areas:
1) Project size and complexity: Concept 2 and Concept 3 are large programs with a long duration (5-6 years) with comprehensive technology investments. Concept 1, with a duration of about 3 years, is moderate, while Concept 4 is somewhat larger, especially if steps 1 and 2 is done in parallel.

2) Challenging regulations: The regulations for road use and tolls are comprehensive both in Norway and in the EEA area. None of the concepts are straight forward, but Concept 4 is considered somewhat better than others because heavy vehicles with GNSS are an established standard in the EU. Furthermore, it is limited to light Norwegian zero-emission vehicles.

3) Privacy challenges: Concept 3 has a high inherent privacy risk and is likely to be the most difficult to reconcile with the right to privacy under ECHR art 8 and the data protection and privacy legislation. Corrective measures can be taken by keeping detailed data in the vehicle and only sending an extract to central databases. The challenges are that the industry is going in the opposite direction with little logic and data in vehicles and a lot of centralized cloud storage. Concept 2 has slightly less detailed movement information, depending on whether the vehicle is driven in the city or in a sparsely populated area, but the technology we have based on still involves tracking the vehicle's movements. Concept 1 and Concept 4 step 1 are acceptable in terms of privacy. Concept 4 step 2 (heavy vehicles) is less vulnerable since it is largely for goods transport.

4) Social change when introducing a new system: Concept 2 and Concept 3 involve a total change and affect all vehicles, which is manageable but challenging. Concept 1 and Concept 4 target a smaller group and incorporate learning gradually.

5) Unwillingness to use the pricing model results in reduced profit: Concept 3 is an advanced tool with a pricing model that partly creates conflicts of interest between the state and the local authorities, especially in urban packages, which can be challenging. Benefits are reduced if prices are not differentiated between urban and rural areas. The report indicates a kilometer rate of about 10 cents on rural roads and more than 170 cents in large cities, and even higher during rush hour. The project group considers this difficult to establish.

6) Risk of being the first mover. The risk is associated with making wrong investments in a future arrangement, both technically and organizationally, according to Norway being a pioneer. Technically and research-wise we are among the leading countries in the world, but Concept 2 and Concept 3 will require us to make some choices as the first country in the world for light vehicles. Therefor, Concept 1 and Concept 4 are considered safer, and the challenges are more limited regarding reporting of mileage. Overall, concept 1 and concept 4 are assessed to have an acceptable risk profile.

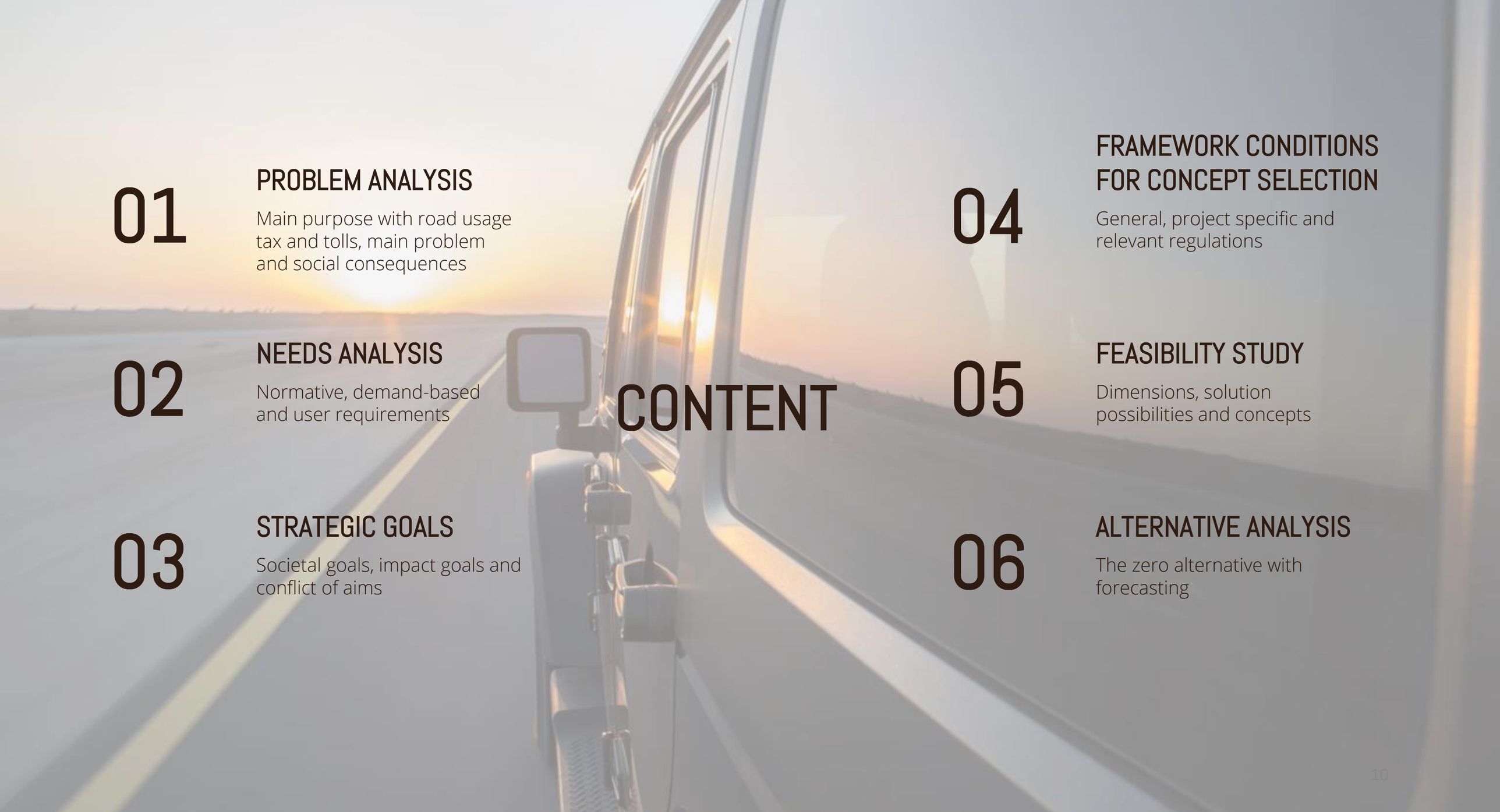
Overall assessment and recommendation
Based on socio-economic analysis, risk assessment and goal achievement, a comprehensive evaluation of the different concepts has been made. The evaluation provides a ranking of the different measures. The project has compared four concepts against a so-called zero-plus concept, which is a continuation of the current situation, including the removal of all discounts for zero–emission vehicles in toll projects.

Based on the overall assessment, the project group and the steering committee have the following ranking of the concepts:

1. Concept 4: Stepwise implementation with two steps (light Norwegian zero-emission vehicles and heavy vehicles) is recommended for further investigation.
2. Concept 1: Distance-based road usage tax for zero-emission vehicles.
3. Concept 3: Position-based road pricing for all vehicles.
4. Concept 2: Zone-based road usage tax city and countryside.

The recommended concept will, in step 1, contribute to a more accurate collection of the road usage tax from light vehicles by covering all vehicles, and ensure stable revenue for the state. Furthermore, step 2 will provide a more accurate position-based system for collecting road usage tax from heavy vehicles while ensuring fair competition conditions for goods transport. Step 2 provides data for accurate pricing in line with the costs for society. The measure will bring Norway in line with the rest of Europe, where several countries have already introduced the scheme, and it will be introduced in Denmark in a few years. At the same time, more vehicle groups may eventually be included in the scheme for a more precise pricing of road use. Such a step-by-step introduction will provide experience with the technology on a limited vehicle group that can form the basis for expansion to more vehicle groups in the future, if desired. Developing the scheme over time ensures experience and reduces the risk of being the first mover.

The recommendation has received support from the management of both the Norwegian Tax Administration and the Norwegian Public Roads Administration. The concept selection study undergoes external quality assurance (QA1) commissioned by the Ministry of Finance and the Ministry of Transport. The concept selection study is sent out for public consultation under the auspices of the Norwegian Tax Administration. After the consultation and QA1, a document will be prepared for the government's processing of concept selection. The second stage of the study will define guidelines for the preliminary project, further examine the recommended concept, and work on roles and responsibilities for the implementation of a future preliminary and main project. Furthermore, frameworks for roles and responsibilities in managing the scheme will be addressed.



CONTENT

1. Problem analysis

Main purpose with road usage tax and tolls, main problem and social consequences

1 Problemanalyse

1.1 The main purposes with road usage tax and tolls

1.2 Introduction to the main problem

1.3 Social consequences

The starting point for any project is that there is a problem that needs to be solved. The problem description should explain what unresolved problems are being addressed and what justifies the implementation of government action in that area. The description should indicate the scope of the problem, its severity, and who is or will be affected, without going into detail about how the problem can be solved. The problem description must include both current problems and expected future developments. An assessment should be made of what causes the problems to have arisen.

This chapter deals with the main problem with current arrangements and describes what the problem consists of, how it manifests today and will develop over time, as well as its effects on society.

1.1 The main purposes of road usage tax and tolls

The main purpose of the road usage tax is to generate revenue for the government and make the road user face the external costs associated with driving[1]. The external costs that the road usage tax aims to price include accidents, traffic congestion, noise, road wear and tear, and health and environmentally harmful emissions[2]. The road usage tax is currently based on the sale of fuel and does not include vehicles with new technologies such as electricity and hydrogen.

The main objective of the toll system is to finance infrastructure projects regardless of their nature. In principle, tolls can be used to finance any projects authorized by the Road Act, such as planning, construction, maintenance, and operation of public and private roads, as stated in Veglova § 1 a. In practice, however, the scope of tolls is limited to planning and construction of roads. In order to avoid commitments beyond the toll period, permission to use tolls for maintenance and operation of public roads is generally not granted.

In urban areas, toll rates can be designed as traffic regulating measures to address local challenges. Rates can be set, among other things, to influence choice of mode of transport and control traffic flows by varying according to time of day. Furthermore, the rates may vary based on the different vehicles' environmental characteristics or so, as stated in Veglova § 27 2nd paragraph. The use of tolls requires local approval, whether the purpose is financing or traffic regulation. However, the link between payment and benefit may be less direct in urban areas where toll rates are set locally to regulate traffic.

Until 2017, it has been common for zero-emission vehicles not to pay tolls. Within the regular toll system, a discount is given for zero-emission vehicles. In 2017, it opened for zero-emission vehicles (defines as electric and hydrogen) to be charged tolls between 0-50% of the full rate. In the budget proposal for 2023, the Ministry of Transport has now proposed the possibility for local authorities to increase the toll rate for light electric vehicles to 70%.

[1] NOU 2015:15 s. s. 73
[2] Prop. 1 LS (2021-2022) s. 179

1.2 Introduction to the main problem

The main problem is that drivers are covering an increasingly smaller proportion of the societal costs associated with using vehicles through usage-dependent fees and so on. A large proportion of drivers are not faced with prices that reflect the societal costs associated with road wear and tear, local emissions, time loss due to traffic congestion, and accidents.

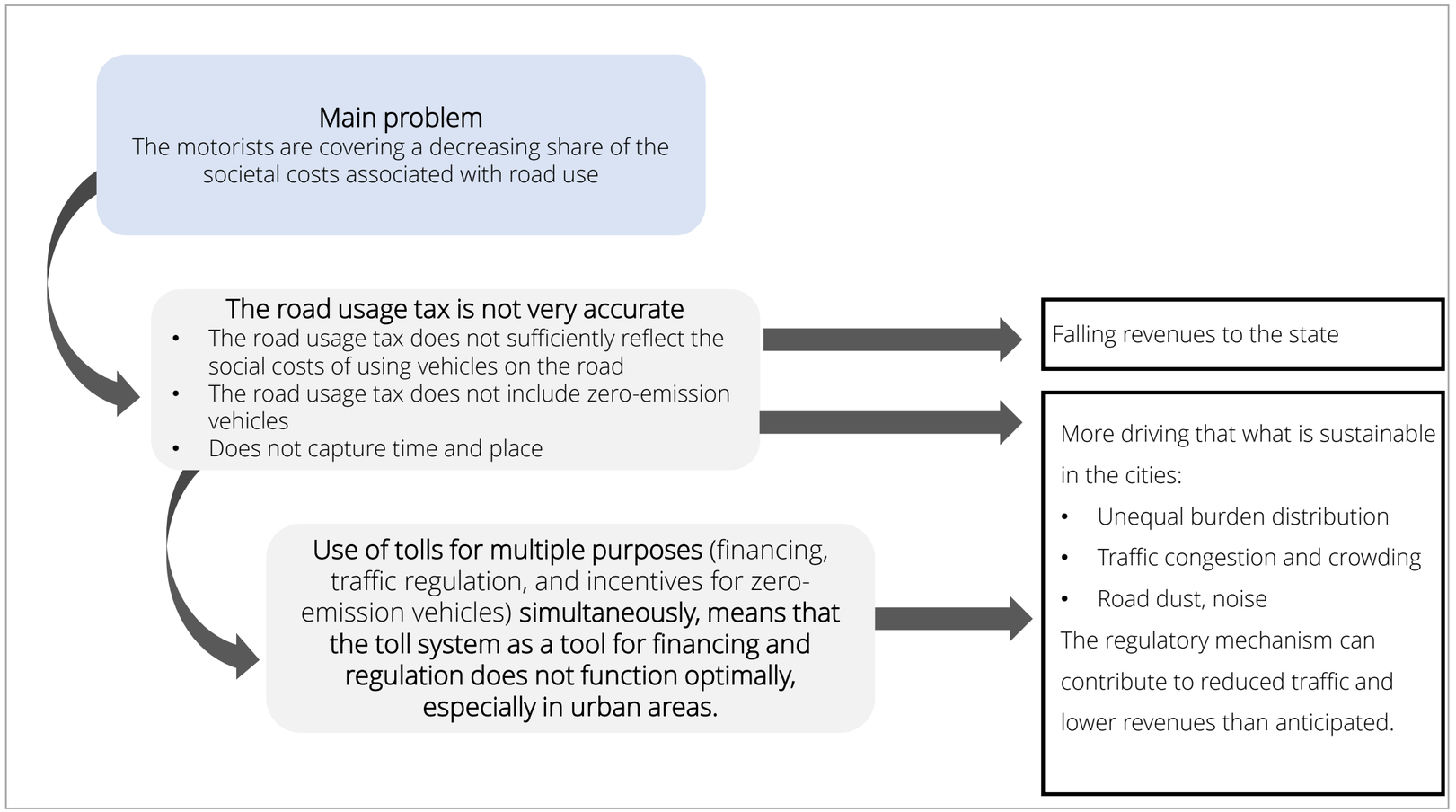
The effect of the problem is decline in state revenue. The increasing share of vehicles using non-taxed fuel technologies exacerbates the problem of declining revenue.

The difference between user costs and the society's costs on transport are made up of the damage costs. Social costs come in the form of traffic congestion, air pollution, accidents, noise and road wear and tear. When the user does not take into account the damage costs, they are referred to as external costs.

Where there is a gap between the user's and society's costs, a fee that is proportional to the marginal damage costs can be introduced. Then it is no longer an external costs since the transport user takes the damage cost into account through the tax. The damage costs are then internalized.

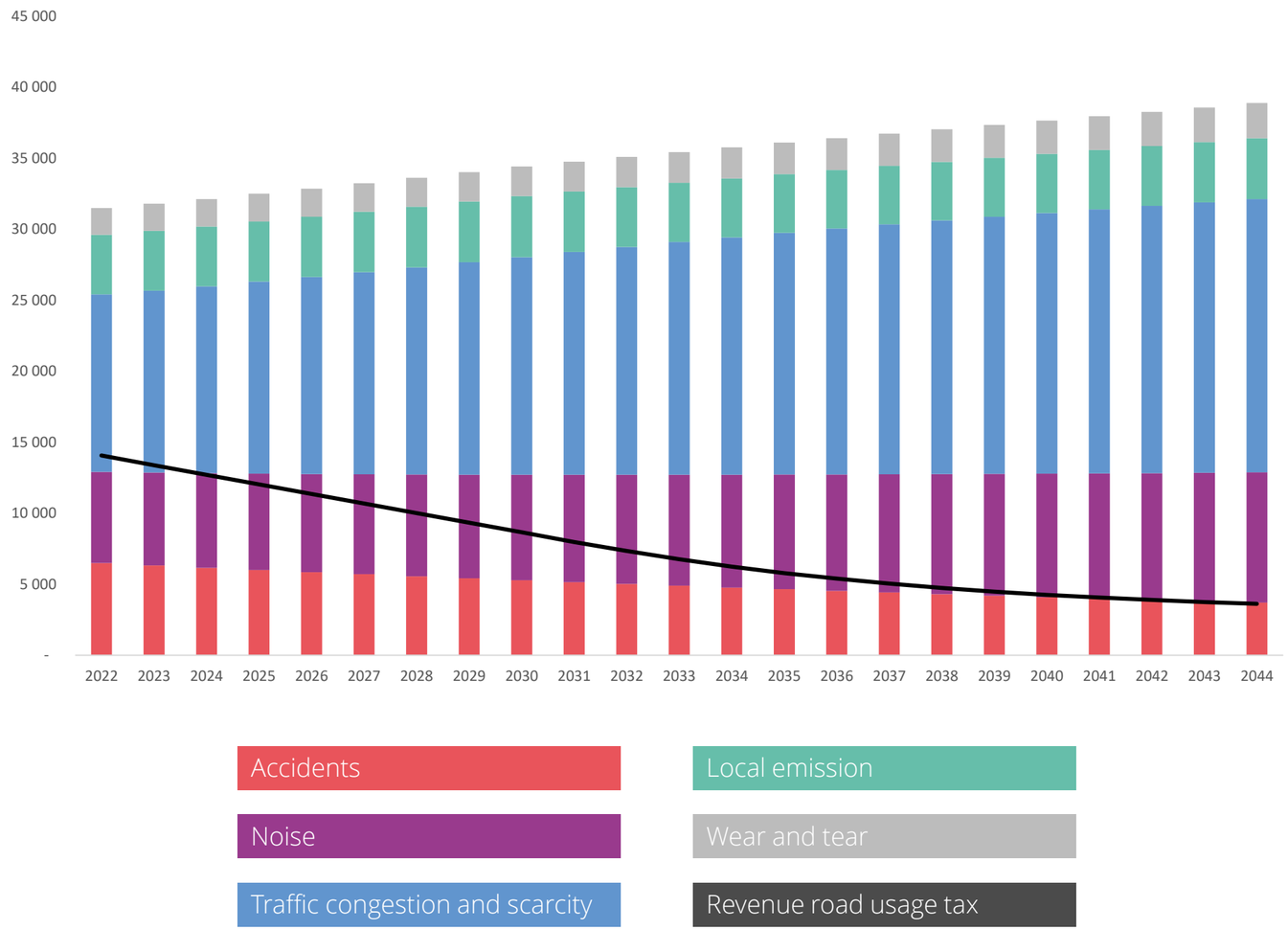
In cities, the purpose of tolls and road usage tax may partly overlap. In addition to generating revenue for the state, the road usage tax aims to regulate traffic by making the user aware of the external costs associated with driving on the road. At the same time, tolls in urban areas can be used for traffic regulation by adjusting the rates based on the time of the day and the vehicle's weight and environmental characteristics. A system of time- and environmentally differentiated toll rates has already been implemented in the big cities in Norway.

The fact that the current arrangements are not reliable enough for regulating car traffic in urban areas also weakens the basis for environmentally friendly transportation (public transport, cycling, and walking). At the same time, it makes it economically challenging to establish a competitive offer of environmentally friendly transportation solutions as an alternative to cars, which in turn weakens the achievement of the zero-growth target.



1.3 Social consequences

As mentioned in the introduction, the road usage tax is meant to cover external costs, in addition to generating revenue for the state. External costs are costs imposed on society by accidents on the road, noise, traffic, local emissions, and wear and tear from driving. As you can see from the table below, there is a line running across the graph that starts at 14 billion and is decreasing; that is the revenue from the road usage tax to the state. The bars show what these costs actually amount to, which is much higher than the state's revenue.



2. Needs analysis

Political guidelines, societal development, stakeholder-based needs, and operational needs

2 Needs analysis

2.1 Political guidelines

2.2 Societal development

2.3 Assessment of the strength and importance of the overall needs

2.4 Stakeholder-based needs (User needs)

2.5 Operational needs – summary and assessment

The needs analysis is based on the problem description but focuses more on the performance required by users and other stakeholders to solve or mitigate the current problem.

The need analysis should:

- Describe the breadth of relevant, specific needs related to the problem description
- Provide an overview of the most important affected groups with a summary of their key needs (stakeholder analysis)
- Explain the connection between identified needs and the causes and consequences of the problem
- Evaluate the strength of the various identified needs and highlight which needs are of greatest importance to trigger desired effects
- Highlight and balance conflicting needs and/or any conflicts of interest

2.1 Political guidelines

Political guidelines are normative needs that are derived from requirements in regulations and national political requirements and guidelines. In this chapter, the following needs are highlighted:

- Need for a sustainable car taxation system that regulates traffic and ensures stable revenue for the state and transportation projects/infrastructure
- Need for a system that is predictable, user-friendly and efficient
- Need to maintain legitimacy and trust in the future system
- Need for a system that supports climate goals and zero-growth target

The political guidelines will be included in an assessment of the most important overall needs.

2.2 Societal development

The development in society influences future needs and thus the possibilities related to road usage tax and tolls. Report no. 20 (2020-2021) to the Parliament on the National Transport Plan 2022-2033, Chapter 2 on global and national development trends, point to how new technology provides greater business opportunities. Population growth, settlement, economic growth, and business and trade patterns are important drivers for transportation. Knowledge about climate change and environmental challenges will lead to changed needs in the transport sector.

This report highlights *traffic growth and technological development* as the most important drivers for future needs related to road usage tax and tolls.

These so-called demand-based needs will be included in an assessment of the most important overall and operational needs.

2.3 Assessment of the strength and importance of the overall needs

In the assessment of overall needs, political guidelines and development trends in society forms the most important basis.

The need to reduce the gap between external costs and fees (road usage tax and tolls)

The needs that are given the most importance in this report are two-fold and both are given equal importance. One is the need for predictable revenue for toll projects and for the state. The second is the need for a system that regulates traffic, especially in urban areas.

A more sustainable car tax system that is capable of regulating traffic by influencing behavior through pricing, while also ensuring stable revenue, can help address these needs.

Decreasing revenue from the road use tax, at a given expenditure level, would require revenue to be obtained from other taxes and fees, which could have negative effects on consumption or production in the economy. Excise taxes intended to correct for external costs will not cause such negative effects and will therefore be preferred from a socio-economic point of view.

There is a need for a system that is better able than today to compensate for the burden that traffic imposes on society, including regulating traffic in urban areas. To address the challenge posed by traffic growth, there is now and in the future a need for a good mechanism for regulating congestion/queues during rush hour.

The need to regulate traffic, especially congestion in cities, is partly addressed through toll rings in cities where rush hour fees can be used, and for example, increase the number of toll stations to regulate traffic more accurately.

The needs related to the zero-growth target can be partly addressed through the current toll system if there is an opportunity to increase tariffs and review discounts and exemptions for zero-emission vehicles. However, higher prices may lead to too much traffic rejection and lower revenue, so this represents a potential conflict of interest.

The trends in the vehicle fleet show that zero-emission vehicles will increase significantly in the coming years and eventually become "the new normal." This means that there is a need for a shift that assumes that all vehicles using the road contribute and pay for the burden they impose on society (polluter pays principle). Similarly, the utility principle could be strengthened with a system where zero-emission vehicles pay tolls more in line with other vehicles. This could contribute to meeting the need for legitimacy and trust in future systems.

The need for revenue must be balanced against other societal goals.

2.4 Stakeholder-based needs (User needs)

In this section, needs derived from user insights from this study are presented. To identify user needs, a number of in-depth interviews with users have been conducted, as well as meetings and input conferences with a range of stakeholders.

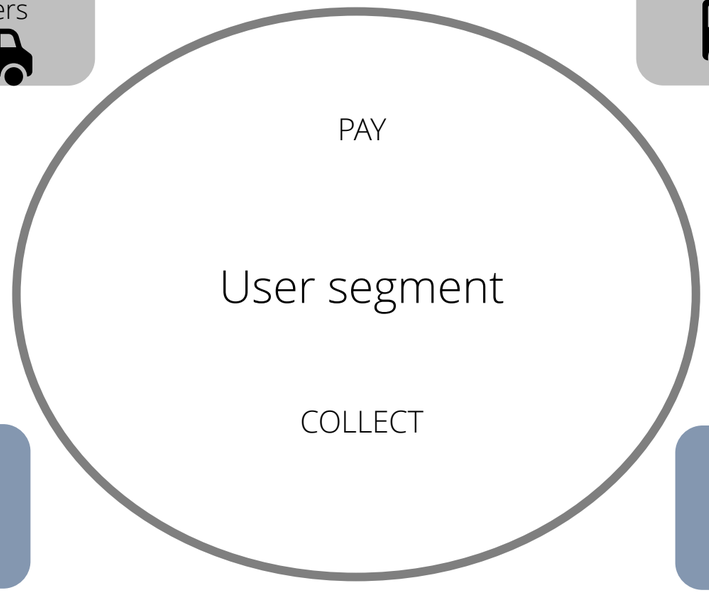
Road usage tax and tolls have many stakeholders. In addition to the authorities and project owners, the project has identified 140+ stakeholders. In the work with the user insights, the stakeholders were sorted into groups based on their relation to road usage tax and tolls. Groups with overlapping interests were grouped together, see the figure on the next page for the user segments.

The purpose of segmentation is to more easily identify the needs of each group. The division has been made based on who are respectively payers and collectors.

These nine user segments have been mapped with respect to stakeholder-based needs:

Interest- and trade organization	Public services	Operators
Transport companies and providers	Road managers	Business/private sector
Private users	Issuers	Authorities(state, county and municipality)

The user segments shows groups with overlapping interests and roles



Private users

- Owner and/or user of (mainly light) vehicles in Norway
- All relevant powertrains
- Private users in metropolitan, urban and rural areas

Transport companies and providers

- Owns or makes vehicles available for those who use the road network
- Light and heavy vehicles
- Small, medium and large transport companies

Public services

- Public transportation services
- Road-based public transportation providers
- Ferry companies

Interest- and trade org.

- Interest organization
- Business/private- and trade organizations

Road managers

- Developer
- Planning, financing, constructing, operating, and maintaining the road network

Government authorities

- Fee owners, control of determination and collection responsibility
- County authority and municipalities
- Other public authorities

Providers

- Collects from users w/agreement
- 7 EETS providers approved as AutoPASS-providers

Businesses/private sector

- Possible providers for determination and collection, technology companies
- Drivkraft Norge and energy stations

Operators

- 5 regional toll road operators (RBPS)

- Actors that pay road usage tax and/or tolls
- Interest- and trade organizations represents both perspectives,- both collection and payment
- Actors with a role in determination and collection of road usage tax and/or tolls

	Private users	Government services	Companies and providers	Road managers	Interest- and trade org.	Business/private sector	Authorities	Issuers	Operators
Need for a simple system	X	X*	X*	X*	X*		X*	X*	X*
Need to understand the connection between what one pays and what one receives in return	X	X*	X*		X*	X*	X*		
Need for a fair distribution of costs among those who use the road	X	X*	X*	X*	X*	X*	X*	X*	X*
Need for predictability and long-term planning	X*	X	X	X*	X*	X*	X*	X	X
Need for incentives to promote green vehicle alternatives	X	X	X	X*	X	X*	X*		
Need for a level playing field for all competitors in the same market		X	X		X	X*	X*	X*	X*
Need to ensure that the level of fees for road users is not too high	X	X	X	X	X*	X	X	X*	X*
Need for incentives to promote alternatives to cars	X	X	X	X*	X	X*	X		
Need for sufficient funding for road infrastructure		X*		X	X*		X	X*	X*
Need to present road users with prices that make them consider the burden the use of vehicles impose on others		X*		X*	X		X		
Need for diverse local measures		X		X		X *	X		
Need for revenue for cities and to reach the zero-growth target		X			X	X*	X		X*

* indicates assumed shared needs of user segments

2.5 Operational needs – summary and assessment

Operational needs

In order to identify relevant concepts in the feasibility study, the needs analysis must clarify the operational needs that future solutions must meet in order to address or reduce the problems and achieve the desired effects. Operational needs address the performance requirements necessary to solve or reduce the problems.

The operational needs are derived from stakeholder-based needs, with a clear connection to problem analysis and development trends in society.

Assessment of need strength and importance

A concise assessment is provided regarding the most important needs and the extent to which they can be addressed.

2.5 Summarized assessment of operational needs

A future solution for road usage tax and tolls must address several operational needs. These can be divided into the following needs:

Need for functionality to achieve accurate pricing

Given the problem of lack of accuracy in existing road usage tax and toll arrangements, a future solution must possess functionality that contributes to a greater precision in pricing the external costs imposed by motorists on society. A future solution must also have resilience to changes occurring in technological advancements, regulatory developments, and the need to manage revenue level. The future concept must be a useful tool.

Need for capacity to capture transport data

The data must be able to indicate the time and location of the journey and link it to relevant vehicle information. The solution must be national and have the capacity to handle foreign vehicles efficiently. The need to take care of privacy concerns also requires data processing in several areas. The technological development in the business sector and the pace of innovation in the transportation sector provide many opportunities for a future road pricing and toll system to fulfil this need.

Need for efficient determination and collection

There is a need for the public sector to ensure efficiency and "more value for money" by exploring the potential for collaboration and shared processes. Therefore, the chosen concept should be based on thorough assessments of how determination and collection can work effectively for both users and authorities.

Need for a user-friendly system

For motorists to make decisions based on pricing regarding whether to use private vehicles or other transportation options, they will require a solution that is easy to use and understand. There is a potential conflict of interest between having a highly detailed pricing system that requires motorists to make frequent choices and having a simple model that is easy to comprehend and utilize. A future solution must strike the right balance and consider the consequences.

In summary, the assessment is that the operational needs can be adequately addressed by several of the alternative solutions.

3. Strategic goals

Societal goals and impact goals

3 Strategic goals

3.1 Societal goals

3.2 Impact goals

Strategic goals should, based on the problem description and needs analysis, define societal goals and impact goals for the effects of the measure.

The societal goal should describe the positive condition or development that the project should support. It is related to the effects of the measure on society and should provide the overall justification for the measure. The realization of the societal goal should, to some extent, be attributable to the project.

The initiative will ensure a more accurate and sustainable pricing of road use and financing of transport projects

Accurate:

- Road users are faced with prices that make them take into account the inconvenience that the use of vehicle is causing others, in line with the polluter pays principle. The principle refers to all the external costs that the road tax intends to impose on the user: accidents, congestion, noise, road wear and tear, and health and environmentally harmful emissions
- Road users are faced with payment according to the utility principle.

Economic and environmental sustainability:

- Economic: Ensures the possibility to locally anchored toll projects and stable revenue to the state
- Environmental: Influences behaviour that promotes more sustainable mobility

3.2 Impact goals

E1
More accurate pricing for road use that upholds the principle that road users pay for the cost they impose on society

E2
More accurate payment of tolls in accordance with the utility principle

E3
Ensure the possibility of a stable revenue base and predictable revenue for the state on the one hand, and for toll projects on the other.

Based on the problem description and the societal goal, three impact goals have been defined. For each of the impact goals, it is indicated how they can be verified. The impacts can mainly be calculated and quantified. However, the effects of impact goal 3 need to be partially assessed qualitatively.

E1 involves a technology-neutral solution where all road users must pay for road usage. The ambition can be verified by measuring the external costs: congestion, air pollution, accidents, noise and road wear and tear.

E2 entails greater alignment between utility and payment. The ambition can be verified trough traffic analysis. For example, the percentage of paying passages in relation to total traffic and revenue.

E3 entails that the revenue base for the state is independent of vehicle technology. Additionally, this impact goal will contribute to toll companies meeting their financing obligations. It will also promote a harmonious coexistence between road usage fees and toll systems. The ambition can be verified by ensuring that the state's revenue correspond to the societal costs of traffic, that toll company revenue, especially in urban areas, align with expectations, and that the overall cost remains within an acceptable level for users.

*The impact goals E1 and E3 are given the highest priority.

4. Framework conditions for concept selection

Guidelines for choice of concept

4 Framework conditions for concept selection

4.1 Guidelines for choice of concept

Framework conditions must be fulfilled for the selection of a conceptual solution and future operation:

- Framework conditions derived from societal and impact goals
- Framework conditions related to other non-project-specific goals and fundamental questions.

This chapter will focus on effects and functions at a high level. The number of conditions must be limited to those that are particularly relevant for exploring the range of possibilities and the framework conditions necessary for the project's success. The framework conditions should not unnecessarily restrict the range of possibilities.

The table on the next page describes the overarching framework conditions for the initiative. Together with the impact goals, the framework conditions will serve as criteria for evaluating which concepts will be subject to assessment in the socio-economic analysis. Relevant concepts must meet the requirements set by the framework conditions.

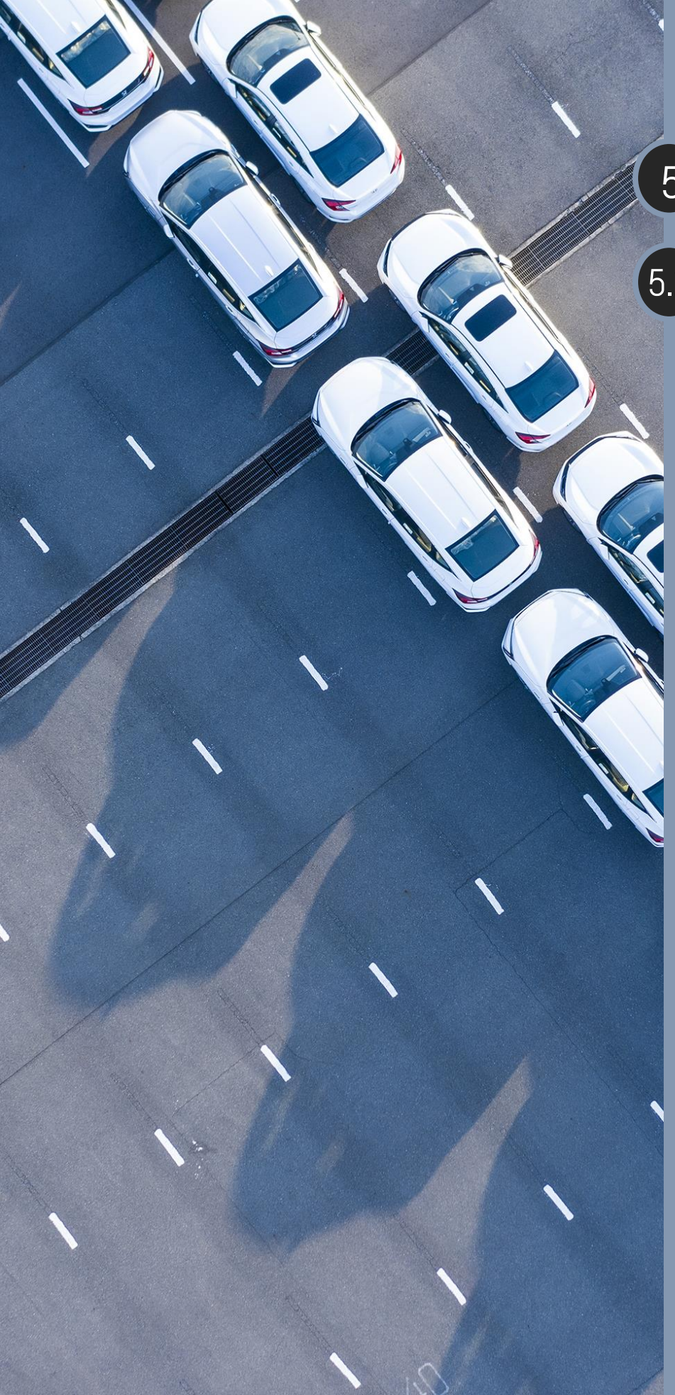
4.1 Guidelines for choice of concept

	Guidelines
R1 Purpose	Road usage tax and tolls will continue as two independent instruments with different purposes.
R2 Establishment	Toll collection must have local endorsement.
R3 Polluter pays	The measure must adhere to the principle of the polluter pays.
R4 Privacy	The measure must ensure that privacy requirements, including transparency and access, are met throughout all processes, from data collection in vehicles to determination, collection, and control.
R5 Non-discrimination	The measure must uphold the principle of non-discrimination towards foreign and domestic vehicles (both in terms of what they pay and opportunities for discounts). The principle prevents solutions that subsidize the nation's own transportation or industry.
R6 EU/EAA regulations	The measure must be in accordance with Norway's obligations under the EEA Agreement and relevant frameworks in the EU.

The table above describes the overall framework conditions for the measure. The framework conditions, along with the impact goals, will be criteria for evaluating which concepts will be subject to assessment in the socio-economic analysis. Relevant concepts must meet the requirements set by the framework conditions. For some of the requirements this will be absolute, while for others, there may be varying degrees of fulfilment.

5. Feasibility study

Dimensions, solution possibilities and concepts



5 Mulighetsstudie

5.1 The concepts

The feasibility study should be a broad approach to exploring possible alternative solutions. The problem, needs, goals, and framework conditions, when considered together, define a range of possibilities. Various approaches, measures, and actions that can solve the problem at hand, either individually or in combination, should be assessed, regardless of which government authority is responsible for the measure. This forms the basis for defining different concepts as alternative solutions.

Within the feasibility study, it should be evaluated whether different conceptual solutions can achieve the goals and satisfy the specific framework conditions of the measures. After careful consideration we have landed four concepts that will be presented in the following chapters, after a description of how road usage tax and tolls are organized today.

5.1 The concepts

5.1.0 The zero alternative

Road usage tax is a tax where the revenue goes to the state without any reduction. Vehicles with combustion engine are charged a fuel tax, which is paid at gas stations. 50 oil companies/importers pay the tax to the Norwegian Tax Administration monthly, and the total revenue was 14 billion NOK per year (2021).

Zero-emission vehicles do not pay road usage tax to the state.

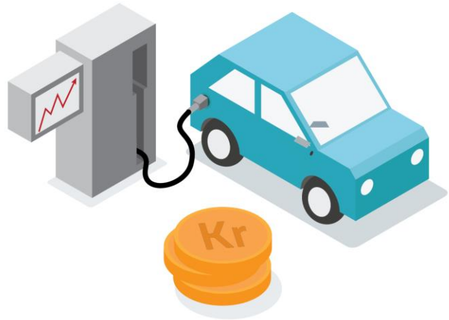
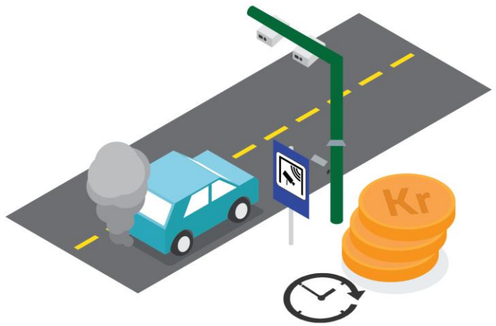
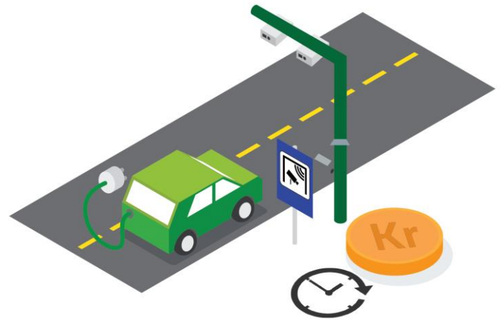
Vehicles with combustion engines are charged tolls, and there is a distinction between light and heavy vehicles. Most drivers have an agreement with AutoPASS issuer to whom they make regular payments, while those without an agreement are billed by the operator. Nationwide, toll fees generate approximately 11 billion NOK for various purposes. AutoPASS issuers receive 1,75 % of the revenue for the payment service they perform.

Zero-emission vehicles are exempt from tolls in many parts of the country and pay a maximum of 50% of the highest tariff. The discount size (minimum 50%) is determined by the Parliament.

In addition to the road usage tax on fossil fuels, there is a CO2 tax, which will be maintained in all concepts, and the tax rate will increase in accordance with the government's climate plan.

The Zero + -alternative allows for the same rate for all light vehicles

The road usage tax remains the same as in the null alternative. Regarding toll fees, local authorities will have the option to remove the current discount for zero-emission vehicles. This means that zero-emission vehicles can pay between 0 and 100 percent of what vehicles with internal combustion engines pay.

	Road usage tax	Tolls
Vehicles with combustion engine		
	• *Vehicles with combustion engine **pay road usage tax** when they fill up petrol or diesel.*	• *Vehicles with combustion engine pay normal rate in toll rings and toll projects.* • *Rush hour fee like today.*
Zero-emission vehicles		
	• *Zero-emission vehicles **do not pay road usage tax** to the state.*	• *Zero-emission vehicles pay a lower rate in the toll rings and toll projects.*

5.1.1 Concept 1 – Road usage tax for zero-emission vehicles

Road usage tax for vehicles with combustion engine continues as it is today, with payment per liter of fuel.

A road usage tax is introduced for zero-emission vehicles, both heavy and light vehicles.

- Equal treatment where road users, to a greater extent, pay a fee regardless of the vehicle's powertrain.
- The concept allows for flexibility and enables a gradual transition from manual reporting to automatic reporting for a larger portion of zero-emission vehicles.

Concept 1 is designed with a uniform price nationwide but with different rates based on vehicle characteristics, such as weight.

The vehicle owner is responsible for reporting the mileage, which can be done during registration or periodically during service/inspection or manually by the owner. It is important to register the mileage in case of a change of ownership to facilitate settlement. The concept does not require the installation of any additional equipment in the vehicle.

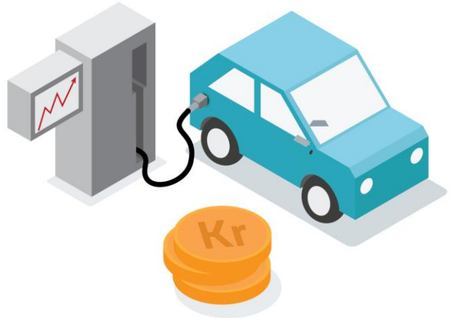
Driving abroad is not subject to road usage tax in Norway and can be deducted when reporting. Foreign zero-emission vehicles will be required to register for road usage tax. Simple solutions can be established to accommodate this. Plug-in hybrid vehicles continue with the current road usage tax based on fuel.

Today, certain types of vehicles can already perform automated reporting of kilometers driven from the vehicle's integrated system to a third party (authorities or business). Over the next few years, more vehicle types and a larger portion of the vehicle fleet will have this capability.

Initially, the toll system will be the same as in the null-plus alternative. It is up to local authorities whether to introduce time differentiation for toll fees/city packages, which would more effectively price external costs in urban areas.

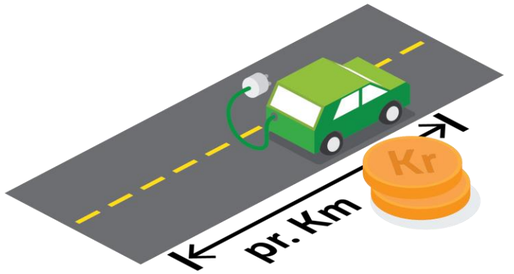
Road usage tax

Vehicle with combustion engine



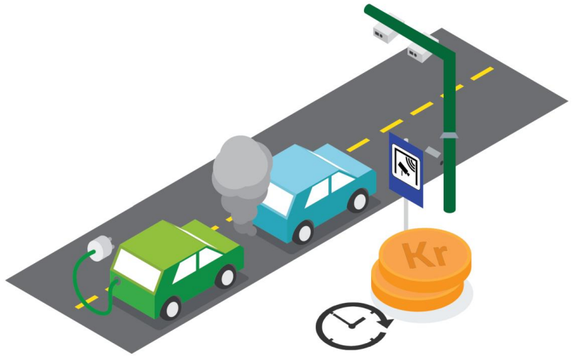
- *Vehicles with combustion engine **pay road usage tax** when they fill up with petrol or diesel.*

Zero-emission vehicles



- *Zero-emission vehicles pay road usage tax to the state depending on the number of kilometres driven.*

Tolls



- *Vehicles with combustion engine and zero-emission vehicles pay the same rate.*
- *Rush hour fee through tolls.*

5.1.2 Concept 2 - Zone
Road usage tax: Price vary between city and rural areas

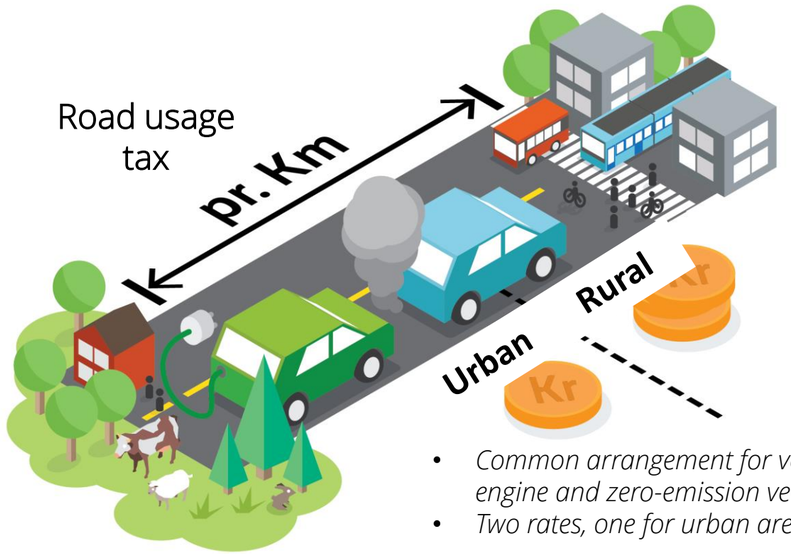
The problem description indicates that external costs are higher in cities than in rural areas. To reflect this, Concept 2 proposes a two-tier pricing model for the road usage tax, where the rate is higher in cities than in rural areas. The recorded distance driven is the basic information, as in Concept 1.

- The road usage tax with two zones will apply for all vehicles (both heavy and light, regardless of powertrain: zero-emission or fossil fuel).
- Data capture requirements are limited to the distance driven in the two zones. Data about location, road type and time are not stored.
- The solution involves automatic reporting of the distance driven. The solution can rely on alternative technologies: equipment/boxes for some vehicles and others with integrated equipment for data reporting.
- Driving abroad is automatically registered.

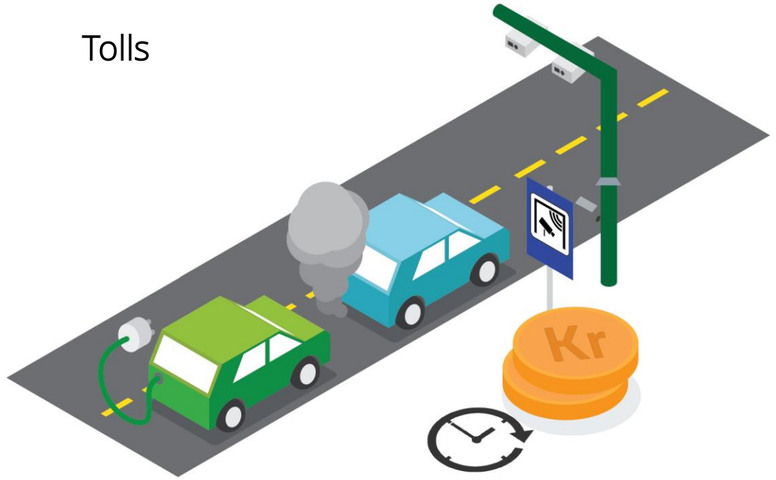
A solution for foreign vehicles is implemented, using an app/web for light vehicles and an On-Board Unit (OBU) for heavy vehicles. A solution for "non-digital" foreign light vehicles is also implemented.

The toll system
Initially, the toll system will be the same as in the zero plus alternative.
It is up to local authorities whether to introduce time differentiation for tolls/urban packages, which would more effectively price external costs in urban areas.

The concept can facilitate the common collection of tolls and road usage tax.



- *Common arrangement for vehicles with combustion engine and zero-emission vehicles.*
- *Two rates, one for urban areas and one for rural areas*



- *Equal pricing for vehicles with combustion engines and zero-emission vehicles*
- *Local rates for tolls will continue*
- *Rush hour fee through roadside equipment*

5.1.3 Concept 3 - Position

Price varies with time, location and distance

Concept 3 will allow for more accurate pricing of external effects that the individual road user impose on the society. The data base provides many possibilities for advanced pricing models to influence the behavior and driving patterns of traffic participants. Prices can vary between different types of roads, geography, season, traffic conditions, congestion, vehicle characteristics, etc.

- The new road usage tax will apply to **all vehicles.**
- Initially, three geographical pricing zones are proposed in line with Statistics Norway's structure:
  - Zone 1 = rural areas
  - Zone 2 = urban area < 100 000
  - Zone 3 = metropolitan > 100 000
- Gradually, more vehicles will have integrated equipment to report necessary data automatically. This will take time, and the oldest part of the vehicle fleet will have to install additional equipment/boxes in the vehicles.
- The concept has flexibility and allows for a gradual transition for vehicles with combustion engine from the current road usage tax. In a step-by-step introduction, zero-emission vehicles and hybrid vehicles will be early adopters. Heavy vehicles can early adopters, like Denmark and Sweden. A solution for foreign vehicles will be implemented, with an app/web for light vehicles and OBU for heavy vehicles. A solution for «non-digital» foreign light vehicles will be implemented.

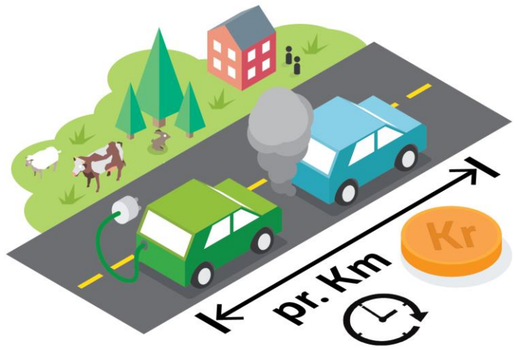
The concept involves an opportunity for the toll system to transition to distance-based pricing from point-based roadside equipment passage; our calculations are based on distance-based tolls. It is assumed that tolls and determination of road usage tax share data collection, determination and collection.

There may be a need to retain some of the equipment for control purposes. The toll system and road usage tax will still have their own purposes and pricing models.

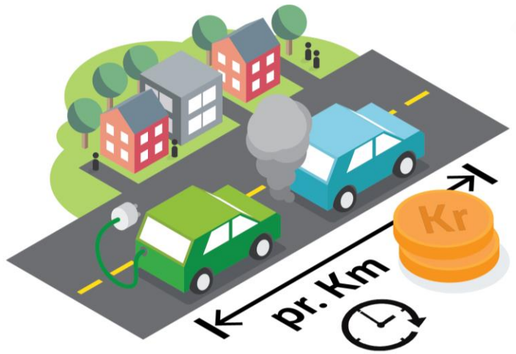
The concept assumes a common process for establishing customer relationships, data capture, determination, and collection of road usage tax and tolls.

The concept allows for the granulation of zones. Furthermore, with the help of position data, the concept can provide an accurate indication of the vehicle's movements in real-time. This provides opportunities for more accurate pricing of congestion.

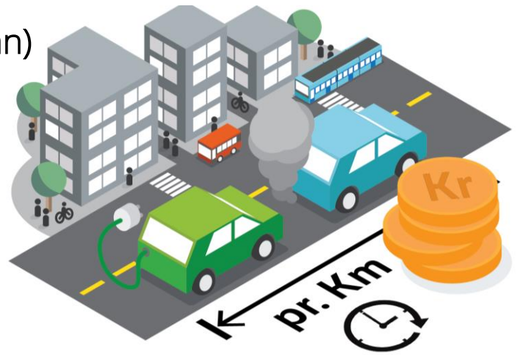
Zone 1
(Rural)



Zone 2
(Urban)



Zone 3
(Metropolitan)



- *Common scheme for Road Usage Tax and tolls (Road pricing) with different rates primarily to reflect external costs and financing of transport projects.*
- *The price for road use can vary depending on where you drive, when you drive and the characteristics of the vehicle.*

5.1.4 Concept 4 - Stepwise implementation towards road pricing

Step 1 Light Norwegian-registered zero-emission vehicles receive a distance-based vehicle fee. Basic reporting is established, excluding foreign vehicles. Fuel tax continues for vehicles with combustion engines.

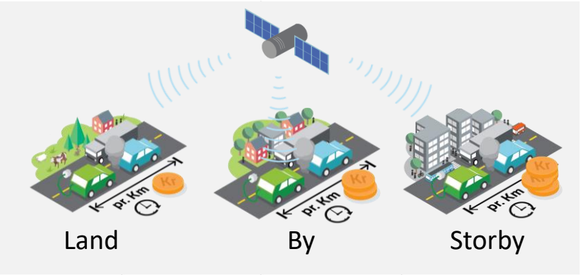
Step 2 Concept 2 for Heavy vehicles aims to implement Concept 2 with different rates for road usage tax in urban and rural areas. In this case, On-Board units (OBU)/transponders need to be installed in vehicles weighing over 7,5 tons, or alternatively, an app or integration with the vehicle platform. The introduction for heavy vehicles may align with similar implementation in Sweden and Denmark. It is possible to introduce the solution on specific road sections (TEN-T and highways). Transitional arrangements from fuel-based road usage tax to kilometre-based charges for heavy vehicles can be arranged with different payment solutions/deductions/adjusted rates for fuel tax rates for those with OBUs installed in their vehicles, or other variations. The weight-based annual tax can be considered for removal.

The concept has a long-term vision in line with the Concept 3, which can be realized when:

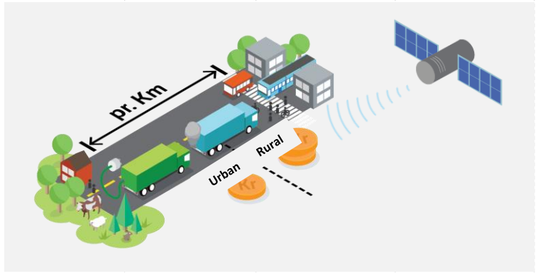
- Technological development has advanced to the point where an integrated vehicle platform is in place for the majority of the vehicle fleet, with a limited set of standards among car manufacturers.
- EU regulations have been further developed to apply to both light and heavy vehicles and have recognized that zero-emission vehicles are the new norm.
- Cloud solutions/thin clients ensure privacy in an acceptable manner.

When the time is more mature, there is a possibility for **Real option (Step 3),** which aims to implement Concept 3 with position-based road usage tax and tolls for all vehicles. In this phase, a third zone will be introduced, encompassing major cities, where all vehicles will be subject to road pricing. Toll schemes will have local anchoring, allowing individual city packages to decide whether to transition from a price model with toll station passage to a distance-based model.

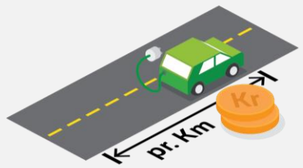
Real option: Steg 3
Road pricing, local decision on tolls



Step 2
Heavy vehicles (equiv. Concept 2)



Step 1
Light Norwegian zero-emission vehicles



2025 2026 2027 2028 2029

6 Alternative analysis

Overall assessment and recommendation

6 Alternative analysis

6.1 Overall assessment and recommendation

6.2 Risk assessment

Based on the previous chapters, an alternative analysis should be prepared, where the null alternative and at least two other conceptually different alternatives are assessed through a socio-economic analysis. The alternative analysis should address the most interesting and realistic conceptual solutions for the identified societal need within the realm of possibilities. The concepts should be detailed to the extent necessary (but not further) to assess the extent to which they achieve the predetermined goals and framework conditions, and to conduct a socio-economic analysis with both priced and non-priced effects. The need for detailing may vary across sectors and depend on whether one is evaluating a project or a program with multiple measures. The socio-economic analysis should be conducted in accordance with the requirements set out in the Ministry of Finance's circular R-109 Principles and Requirements for the Preparation of Socio-Economic Analyses, etc. The result of the alternative analysis should provide a ranking of the alternatives. The recommendation should include an assessment of whether to proceed with one or more alternatives, whether there is a basis for phased implementation or subdivision into sub-projects, and whether dependency on other projects or real options linked to technological development and more information suggests postponement. In addition to the cost information in the socio-economic analysis, there is a need for an estimate of the total investment cost that can be used for cost control and provide information on the estimated budgetary impact. Therefore, estimates for the total undiscounted investment cost, including value-added tax, should be prepared for all alternatives. The uncertainty of the estimate should be made visible by providing estimates for both P50 and P85.

6.1 Overall assessment and recommendation

Based on the calculated net present value, non-priced effects, and risk assessment, a comprehensive assessment of the socio-economic profitability of the different alternatives has been made. The assessment will be followed by a ranking of the various measures.

The project has compared four concepts against a zero plus concept, which entails continuing the current situation while removing all discounts or zero-emission vehicles in toll projects. The interagency project group and the steering group recommend the following ranking of the concepts:

1. Concept 4: Stepwise implementation with an initial two-step approach (light Norwegian zero-emission vehicles and heavy vehicles). Recommended for further investigation until May 1, 2023.
2. Concept 1: Distance-based road usage tax for zero-emission vehicles.
3. Concept 3: Position-based pricing for road usage for all vehicles.
4. Concept 2: Zone-based road usage tax for urban and rural areas.

The recommendation has received support from the management of both the Norwegian Tax Administration and the Norwegian Public Roads Administration.

Ranking 1: Concept 4 Stepwise implementation to a concept 3 target state.
Step 1 deals with Norwegian light zero-emission vehicles. Step 2 proposes a scheme for heavy vehicles based on EU/EEA regulations, similar to existing schemes for heavy vehicles in Germany, Belgium and others, and as proposed in Denmark and Sweden. The concept offers high flexibility because the choice of technology and implementation can occur at a later stage. This implies that there may be a real option value in a final Step 3 for light vehicles, which could be designed and decided upon after more learning from the initial steps as technology and standards for light vehicles, secure cloud solutions and embedded privacy progress further.

The users affected in Step 1 of Concept 4 are Norwegian zero-emission vehicles that will be subject to distance-based road usage tax. The concept addresses the impact targets by implementing more accurate pricing for both road usage tax and tolls, ensuring stability in the revenue base for both schemes. Step 2 targets approximately 80.000 heavy Norwegian vehicles and foreign vehicles weighing over 7,5 tons. The pricing model with two zones for heavy vehicles may result in some drivers experiencing higher costs in urban zones compared to the current situation, while driving outside urban areas could become cheaper than before. The benefits of Step 2 are closely tied to the chosen pricing model for heavy vehicles, and it is emphasized that the pricing model should be further investigated to determine if additional gains can be achieved. Foreign heavy vehicles that do not refuel in Norway will be charged a road usage tax for driving in Norway.

Risk: Norway has the highest penetration of zero-emission vehicles in the world and will be among the first to implement road usage tax for those vehicles. We follow European practice for heavy vehicles. There is a moderate regulatory risk, particularly related to EEA regulations, with somewhat lower risk for the stepwise implementation of Step 2 for heavy vehicles. The project is extensive if we implement both Step 1 and Step 2 simultaneously. This should be considered in the next phase of the investigation.
The total investment cost for both steps has an expected value, excluding VAT, of 573 million NOK, with a net present value of 24 billion NOK.

Ranking 2: Concept 1 Distance-based road usage tax for zero-emission vehicles.
This concept applies a distance-based rate to all zero-emission vehicles, varying depending on vehicle characteristics. It contributes effectively to «E1 More accurate road usage tax». E2 «Accurate tolls» will be the same as in the zero plus alternative, ensuring «E3 revenue base». Users with zero-emission vehicles will pay more compared to the zero plus alternative. Risk: The risk associated with Concept 1is that Norway would be among the first in the world to implement a distance-based road usage tax for zero-emission vehicles. There is a moderate regulatory risk, particularly related to the EEA regulations. The investment is moderate (expected value, excluding VAT, of 367 million NOK) but has a high net present value of 25 billion NOK..

Ranking 3: Concept 3 Position-based pricing for road usage.
This concept involves a road usage fee with different distance-based rates for metropolitan, urban areas and rural areas. It also distinguishes between rush hours and off-peak hours. Additionally, the concept introduces distance-based toll collection. The concept applies to all vehicles, both combustion engine vehicles and zero-emission vehicles (a total of 3 million vehicles). It strongly contributes to all three impact targets. Users driving in urban areas/metropolitan will be charged a higher road usage tax compared to the zero plus alternative and Concept 1, particularly because the concept includes higher fees during rush hours. Those who frequently drive within the current toll zones will experience a disadvantage compared to the current system. On the other hand, those who frequently pass a toll plaza may experience more benefits compared to the current system.

Risk: With this concept, Norway will be the first in the world to implement a satellite-based solution for light vehicles. There is a moderate regulatory risk, particularly related to EEA regulations. The concept presents significant privacy challenges that will require extensive risk reduction measures. Prior to implementing privacy risk reduction measures, the inherent privacy risk is assessed to be unacceptably high. The concept has the highest level of investment costs, with an expected cost excluding VAT) of 2,470 million NOK, but also the highest net present value of approximately 31 billion NOK.

Ranking 4: Concept 2 Zone-based road usage tax for urban and rural areas.
This concept includes all vehicles, both zero-emission vehicles and those with combustion engines, but it does not make any changes to the toll system beyond the zero plus alternative.
The concept contributes to better implementation of «E1 more accurate pricing for road usage» compared to Concept 1, as driving in urban areas is priced higher than outside urban areas but slightly lower than Concept 3. «E2 Accurate tolls» the same as in the zero plus alternative. It ensures «E3 revenue base» by making all vehicles pay the road usage tax.
Zero-emission vehicles pay more compared to the zero alternative, zero-emission vehicles with a lot of driving in urban areas come out worse than in Concept 1, while zero-emission vehicles that drive a lot on rural areas come out better than in Concept 1. Vehicles with an combustion engine must pay more for driving in urban areas than in concept 1, but slightly cheaper than the zero alternative outside of urban areas.

Risk: With this concept, Norway will be the first in the world to implement a satellite-based solution for light vehicles. There is a moderate regulatory risk, particularly related to EEA regulations. Implementation of this concept will be challenging. The concept has an investment cost of 1,541 million NOK excluding VAT), and the second-highest net present value of approximately 27 billion NOK.

6.5 Risk assessment

Risk area

1 – Project execution size, duration and compexity
- C2 and C3 establish a completely new solution with GNSS for light vehicles, big investments with installation in every vehicle.
- C4 is comprehensive if we do step 1 and step 2 in parallel

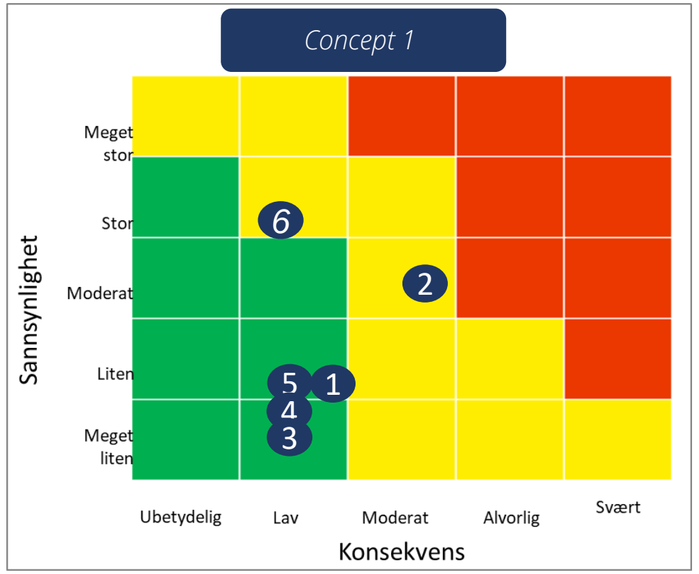
2 – General conditions – work with regulations
- C1 has challenges vs Eurovignette with differential treatment between fossil-fueled and zero emission, several zones etc.
- C4 is more adapted to the EU's regulations on heavy vehicles, lower risk than C3. Furthermore, it is limited to Norwegian vehicles in step 1.

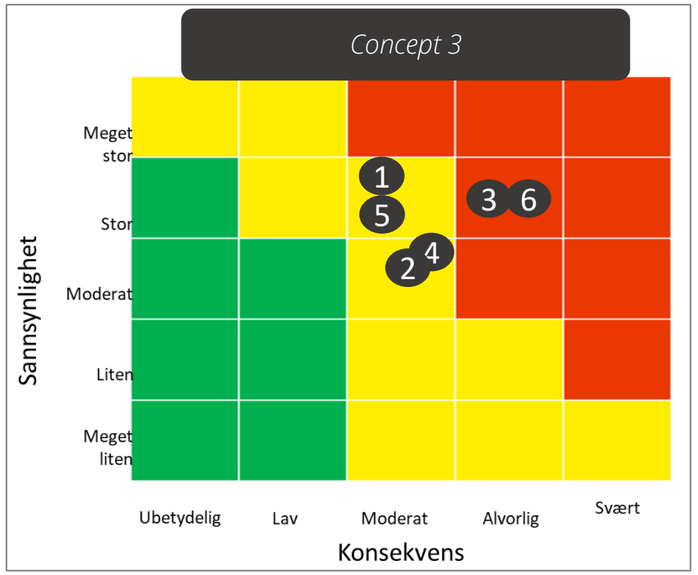
3 – General conditions – Privacy challenges
- C3 has a high inherent privacy risk, and is the concept that is likely to be the most difficult to reconcile with the right to privacy under EMK art 9 and the personal data protection regulations.
- C4: Overall, step 2 in concept 4 seems to represent a slightly moderate privacy risk. Adequate measures must be implemented. Step 2 still seems feasible when assuming that the technical solution is adapted to the privacy principles in a justifiable way.

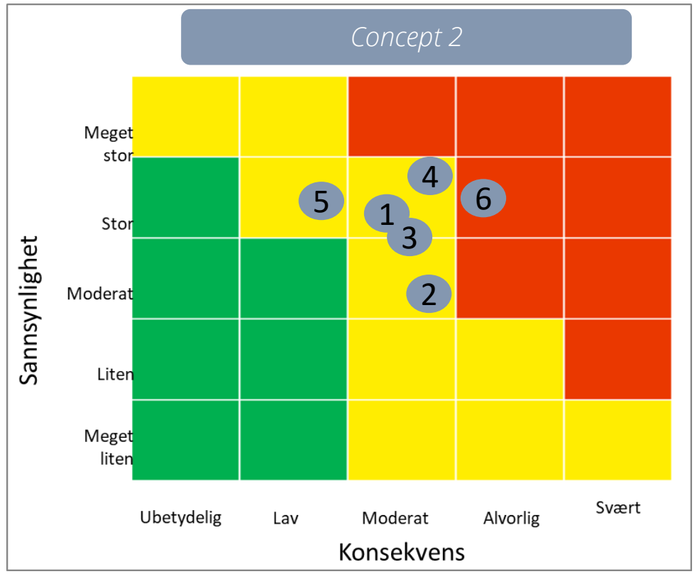
4 – Introduction and adjustment for road users.
- C2: has all vehicle owners as target group, there will be two arrangements, two systems will be challenging to communicate. Introduction and adjustment risk related to city packages if a sharing of responsibilty with toll ring is not clarified

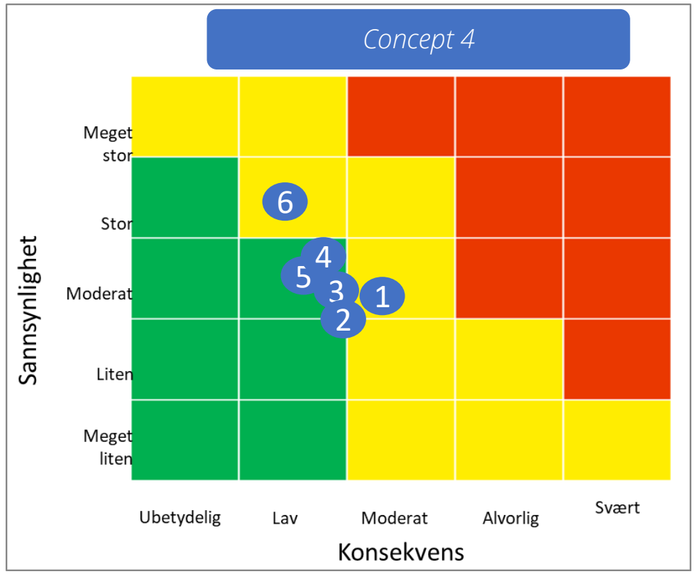
5 - Unwillingness to use the pricing model – reduced profit
- C3: An advanced tool with pricing model that partly entails conflicts of interest between the state authoritities and the local authorities, especially in urban packages can be challenging. The profits will be reduced if the prices are not differentiated between the city and the countryside.

6 – Risk of being early (Pioner)
- C2 og C3: Norway is first in the world with light vehicles, the probability and consequence of problems is high (technical, privacy, transformation, procurement etc.) and serious consequence (postponements)









The table and risk matrices shows an assessment carried out in November 2022. The risk of Concept 3 is assessed to be too high in terms of privacy to be able to recommend the concept for further investigation. For concepts 2 and 3, the risk is too high to be the first to use GNSS technology on the entire vehicle fleet. Concept 4 provides opportunities for gradual introduction and learning before major technology choices are made.