



Skatteetaten



Statens vegvesen

Road User Charges and Tolls

The Norwegian Governments Concept Selection Study and
How Kapsch and Aventi's solution fits

ITS Norway webinar JuztDrive
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Background

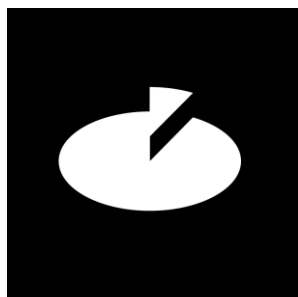


Finansdepartementet

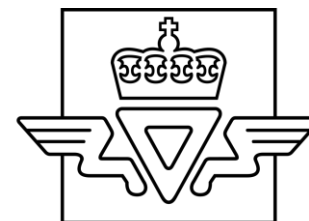


Samferdselsdepartementet

The Ministry of Finance and the Department of Transportation have commissioned the Norwegian Tax Administration and the Norwegian Public Roads Administration to carry out a “**concept selection study**” regarding the principles on determining and collecting road user charges and tolls.



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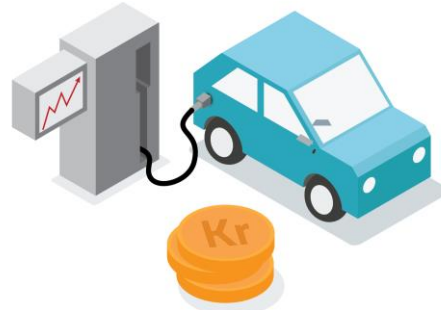


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Current solution for road user charges and tolls

Road user charges

Fossil fuel cars



- Fossil fuel cars **pay road use tax** when they fill up with petrol or diesel.

Zero-emission cars

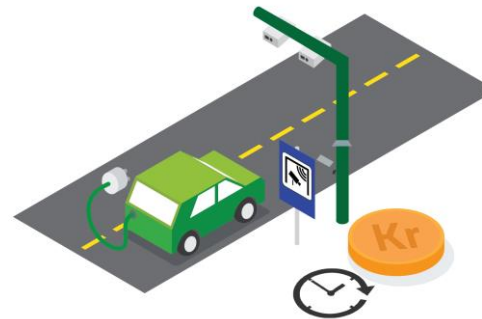


- Zero-emission cars **do not pay road use tax** to the state.

Tolls



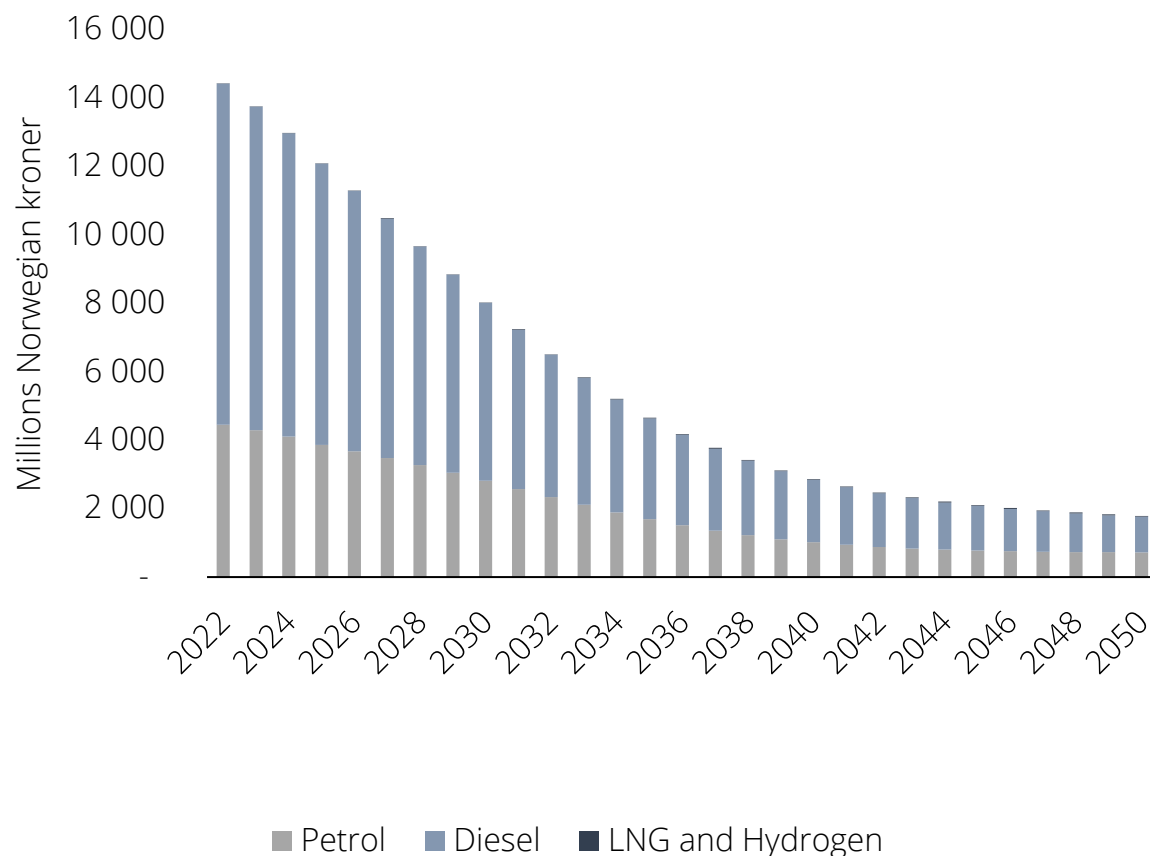
- Fossil fuel cars pay the normal rate in toll rings and toll projects.



- Electric cars pay a lower rate in toll rings and toll projects.

Reduced income from the road use tax

- The purpose of the road tax is, in addition to providing revenue for the state, to price the external costs that the use of vehicles imposes on society.
- These are external costs linked to accidents, queues, noise, road wear and health and environmentally harmful emissions.



Community goals

The initiative will ensure 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 vehicles causes others, in line with the polluter pays principle.
- The principle refers to all the external costs that the road tax intends to expose the user to: accidents, congestion, noise, road wear and health and environmentally harmful emissions
- Faces road users with payment in accordance with the utility principle



Sustainable:

- Financial: Ensures the possibility of locally rooted toll projects and stable income for the state
- Environmental: Influences behavior that promotes more sustainable mobility

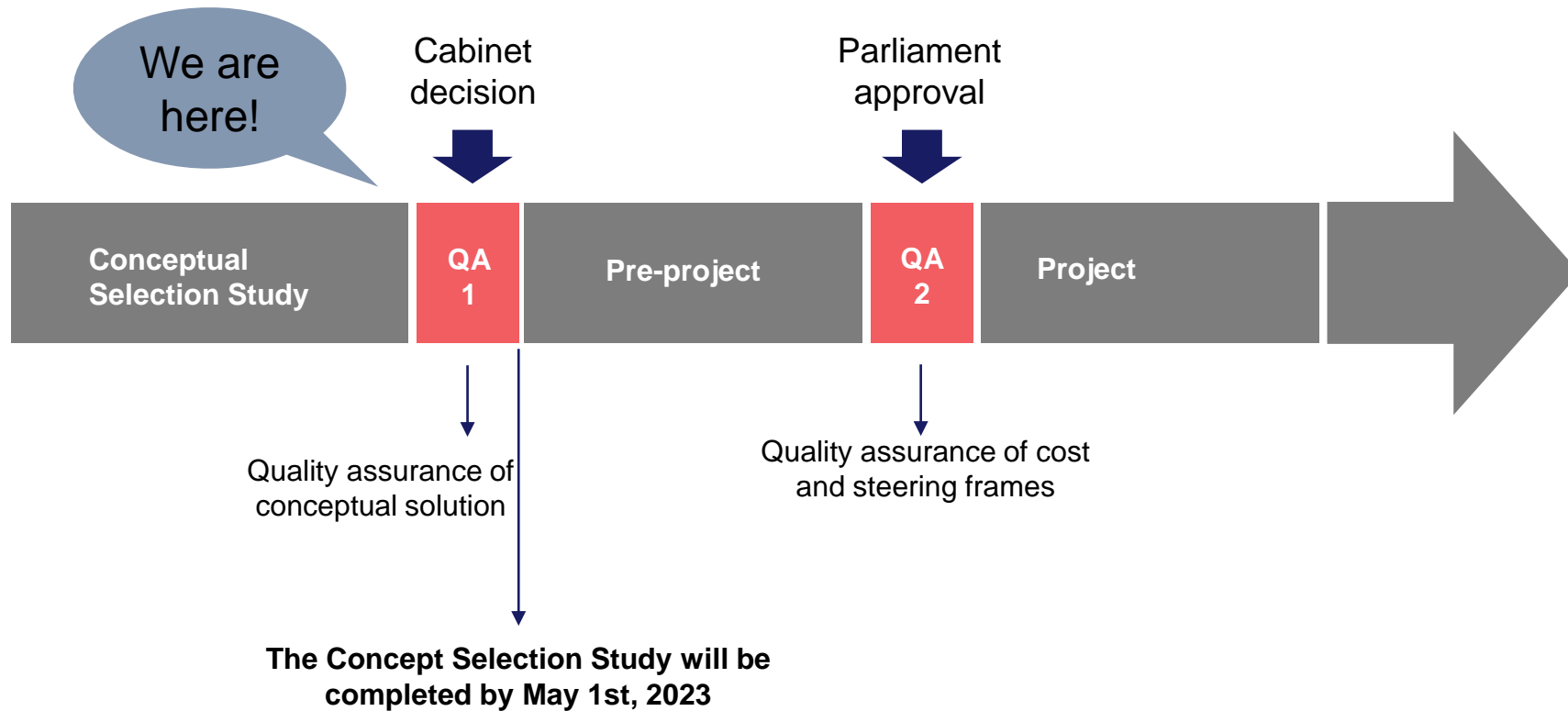


Skatteetaten

The Conceptual Selection Study will follow the steps of the Quality Assurance Scheme, also referred to as the State Project Model



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The Quality Assurance scheme introduced in year 2000/2005 applies to major public projects (> 300 mill. NOK for IT projects)

Concept 1 – Distance based RUC for Electric vehicles

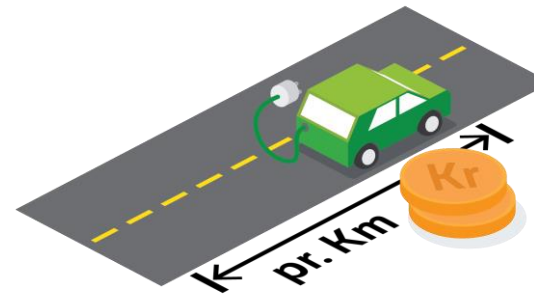
- The new road user charges only applies to zero-emission cars
- Fossil cars pay road user charges as they do today
- Newer zero-emission cars report mileage automatically
- Manual reporting for zero-emission vehicles that do not have an integrated option for automatic reporting
- The concept can establish good solutions for registration of mileage and payment
- The concept has flexibility and allows for a gradual transition from manual reporting to automatic reporting for a larger part of the zero-emission cars



Fossil cars pay road user charges when they fill up with petrol or diesel.



Fossil cars and zero-emission cars basically pay the same rate at toll stations. Rush hour fee through tolls.



Zero-emission cars pay road user charges to the state depending on how many kilometres they drive in a period.

Concept 2 – Zone

Price for RUC varies between urban areas
(larger cities) and rural

- The new road user charges applies to all cars and can be introduced gradually for fossil cars. Over time, it will be unfortunate to have a two-price system that only applies to zero-emission cars and not to all types of cars.
- For this concept, there is a need for data that registers the number of kilometers driven and connects this to a certain zone. Hence, number of km driven in the city and number of km driven outside the city.
- There is no need to record detailed data about where the car has driven, or on which road it has driven.
- Data can be obtained by GNSS.
- Roadside equipment can in many cities be used for time-differentiated tariffs (rush hour fee) and can possibly be expanded in several cities where there are traffic problems.
- It will increase the socio-economic benefit if both toll collection and determination of road user charges have common data collection.
- Automatic reporting of distance traveled. Not all cars will have built-in equipment that is able to automatically report the necessary data. Until all vehicles have an integrated vehicle unit, it will be necessary to install extra equipment in the cars. There is a need to assess this in more detail in a pre-project phase.
- The concept can have flexibility and open for a gradual transition for fossil cars.



*Joint arrangement for fossil cars and zero-emission cars for
Road user fee - separate rates for cities and rural / urban areas.*



*Joint arrangement for fossil cars and zero-emission cars for
Tolls - Local toll rates continue.
Basically, the same rates for fossil and zero-emission cars
Rush hour fee through roadside equipment*

Concept 3 - Position based RUC and Tolling

Price varies between time, place and distance.

- The new road user charges will apply to all cars
- In principle, three geographical price zones are proposed in line with Statistics Norway Official:
 - Zone 1 (rural) = sparsely populated
 - Zone 2 (small city) = town <100,000
 - Zone 3 (urban major city) > 100,000
- Gradually, more cars will have integrated equipment to be able to report necessary data automatically. This will take time, and the oldest part of the car fleet must be allowed to install extra equipment in the cars.
- The concept can have flexibility and open for a gradual transition for fossil cars.



Common arrangement for road user charges and tolls (toll pricing) with different rates primarily to reflect the external costs and financing of transport projects.

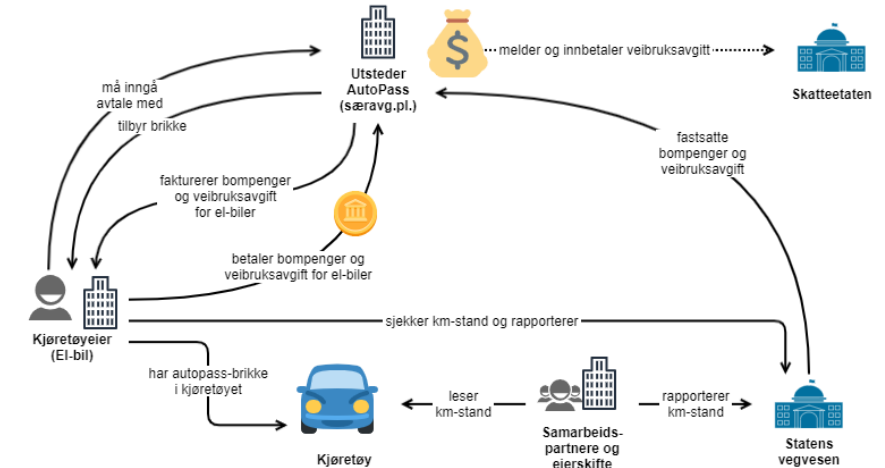
Price for road use can vary with where you drive, when you drive and the characteristics of the vehicle.

The concept selection study consists of several topics besides the technical solution.

- **Organization:** Ownership, roles and division of responsibilities between the actors. The concepts can have a different approach both public and private, as well as differences between the Norwegian Public Roads Administration and the Norwegian Tax Administration.
- **Regulations:** Relevant regulations the solution must operate within. Improvements to current regulations. Room for action related to privacy (GDPR) and the EEA law.
- **Pricing model:** Incentives. Payment that corrects for disadvantages of vehicles. Also includes data base.
- **User groups:** Alternative target group for the initiative.
- **Political considerations.**
- **Risk:** Should Norway be a first mover. The numbers of electrical vehicles may indicate so?

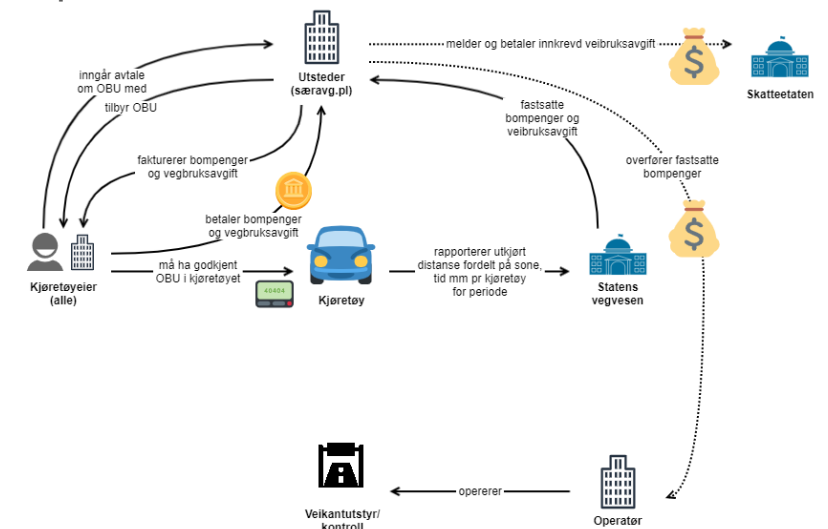
Concept 1 – Distance based RUC for Electric vehicles

Alt. 1 «Innkreving fra utsteder

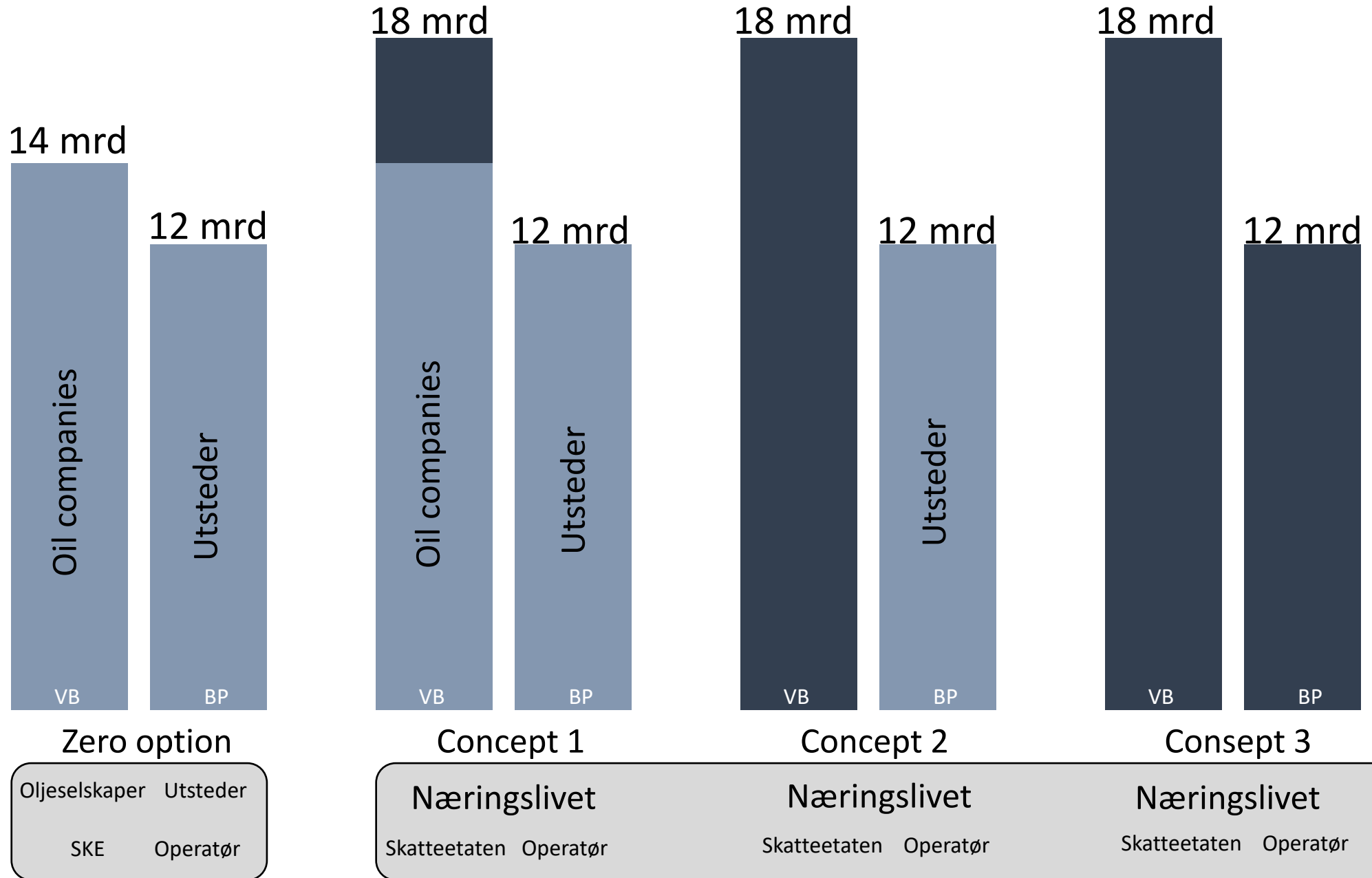


Concept 3 - Position based RUC and Tolling Price varies between time, place and distance.

Alt. 1 - Felles prosess ved bruk av AutoPASS

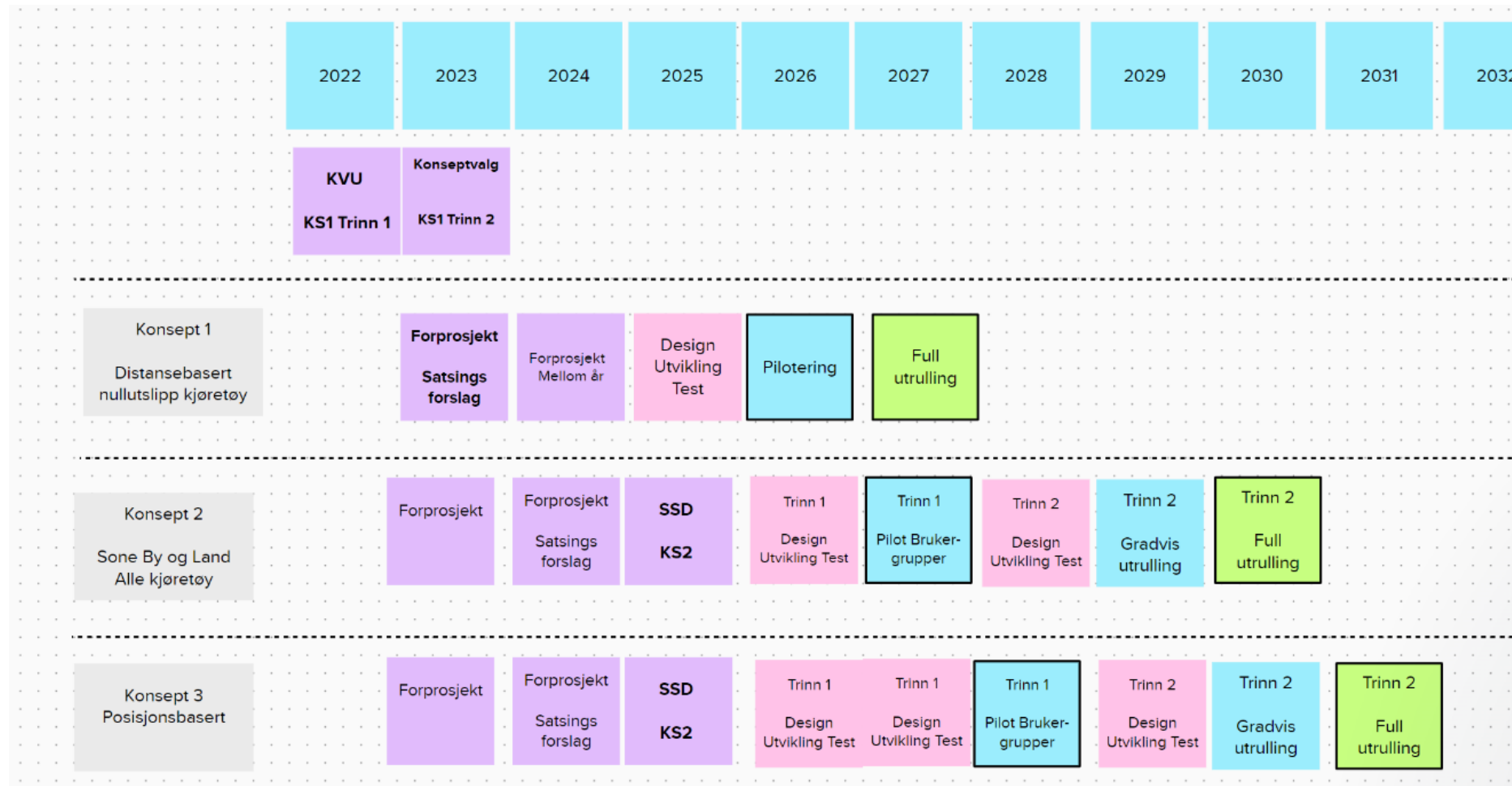


Road use tax and tolls, cash flows



Innkreving

"Optimistic schedule" for the discussed concepts



How Kapsch and
Aventi's solution fits



NPRA started with RUC studies before the concept selection study

The Norwegian Public Roads Administration has together with SINTEF and Q-Free initiated a research projects that are supported by the Norwegian Research Council. NPRA's role is to be a problem owner as well as contribute to concept building and assess the potential for implementation. We started in 2018.

Intentions with the research projects

- Clarify if the technology solutions are recommendable
- Provide knowledge about user experiences and attitudes to the concepts

The research projects have been forced and somewhat expanded to answer issues in joint KVV work between the Tax Administration and the Norwegian Public Roads Administration regarding position based road user charges and tolls.



Arbeiderpartileder Jonas Gahr Støre er klar for å rive bomstasjonene. Han har lagt fram en ny plan for veiprising i Norge. (Foto: Ole Martin Wold/NTB Scanpix)

BOMPENGER ELLER VEIPRISING?

Støre vil rive bomstasjonene og bytte ut bompenger med veiprising

There are many press releases about potential changes.

We need more knowledge and facts in the ongoing debate on position based road user charges and tolls.

GeoFlow - Road user charging and tolls by GNSS

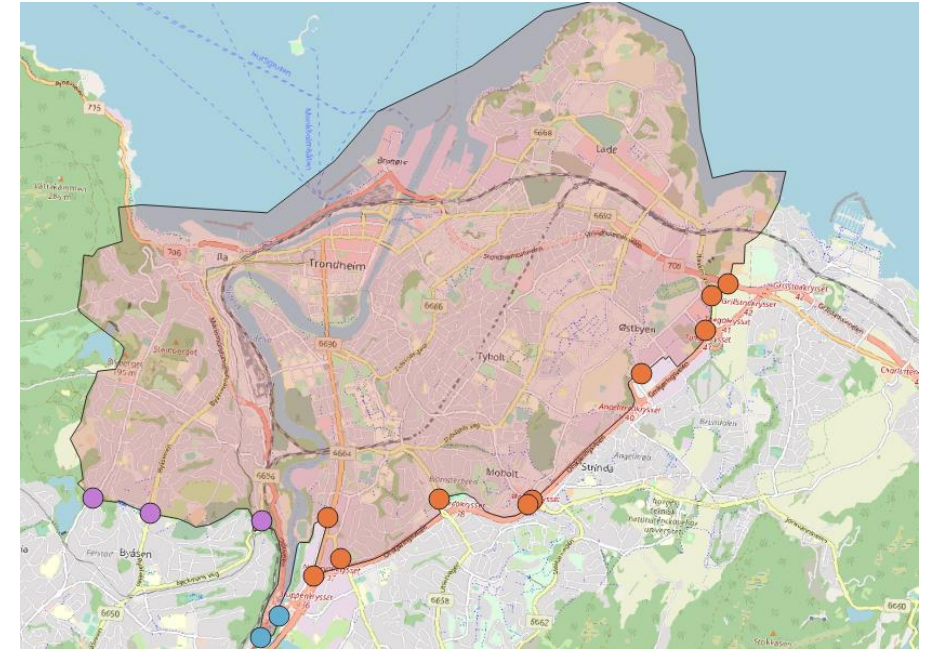
The intention of the Trondheim pilot with OBU's was to assess the maturity of road pricing technology. Focus on reliability, driver interaction, user acceptance, privacy and data processing.

Distance travelled were logged by GNSS movement and were not connected to the road network. Tunnels, bridges and ferry connections were specifically identified. Distance travelled together with geofence zones formed the basis for position-based road user charging.

Local data storage with only transfer of payment information

- Follows the Data Inspectorate's recommendation on GDPR
- Can reuse backend system and organization for tolls

The concept can differentiate between cash flows for tolls and road user fees.

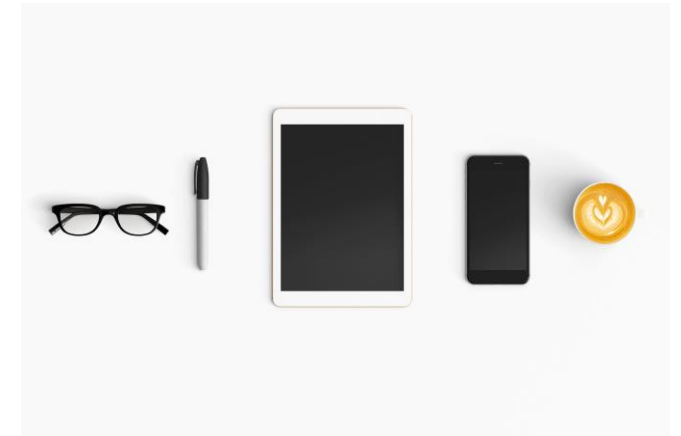


All vehicles in the GeoFlow test had AutoPASS tags that registered in the usual way.

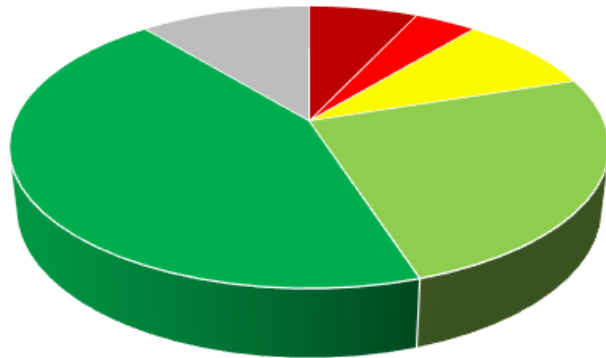
By registering driving within the inner city, a corresponding distance-based fee were calculated.

Questionnaire for participant in the survey

- After testing distance based tolling in Trondheim the participants are mainly positive to the concept

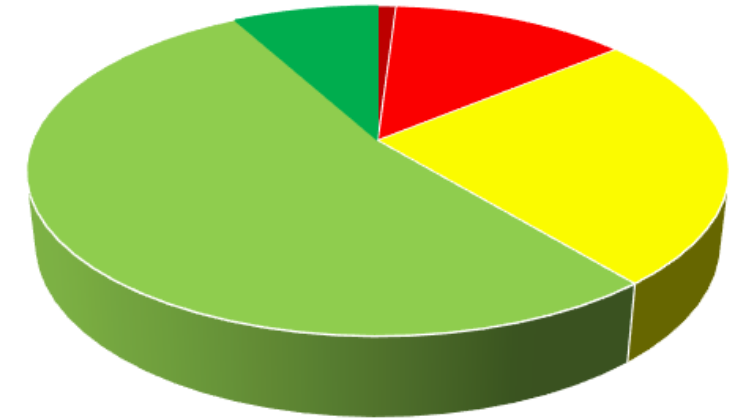


To what extent would you say that road pricing would be a fairer toll system than the current toll system



■ To no extent ■ To a small degree ■ Neither ■ To some degree ■ Largely ■ Unknown

I entrust a trusted third party to protect my privacy



■ To no extent ■ to a small degree ■ Neither ■ To some degree ■ Largely

GeoFlow – extensions with alternative driving platforms

Integrated in new vehicles

Together with Polestar and Q-Free, we have transferred thick and thin clients from GeoFlow to the infotainment system in Polestar. New vehicles can offer a driving platform equivalent to the functionality of the OBU in the GeoFlow project.

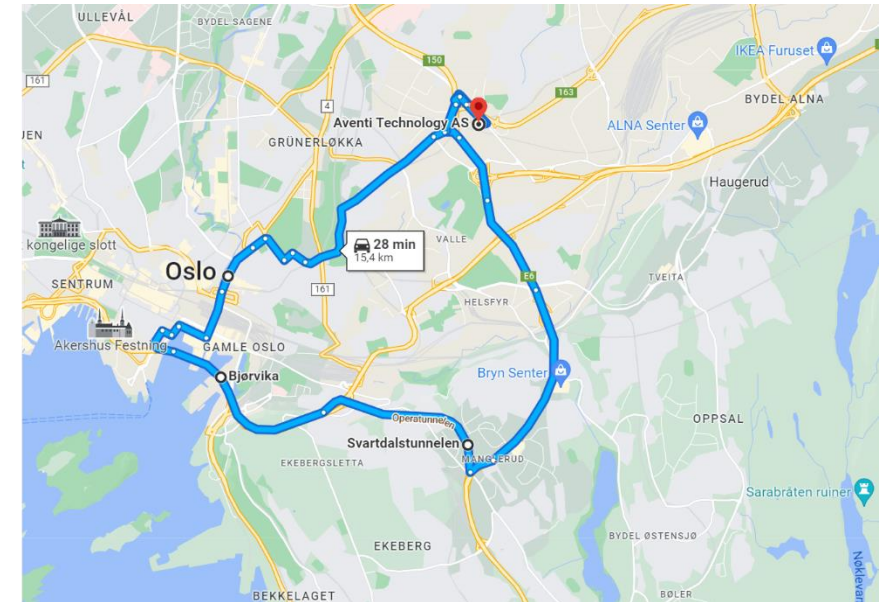


Statens vegvesen, Volvo og Polestar skal hente ut detaljert informasjon fra biler som er ute på veiene. Foto: Statens vegvesen.

**Datafangst fra bilene skal hjelpe
Vegvesenet**

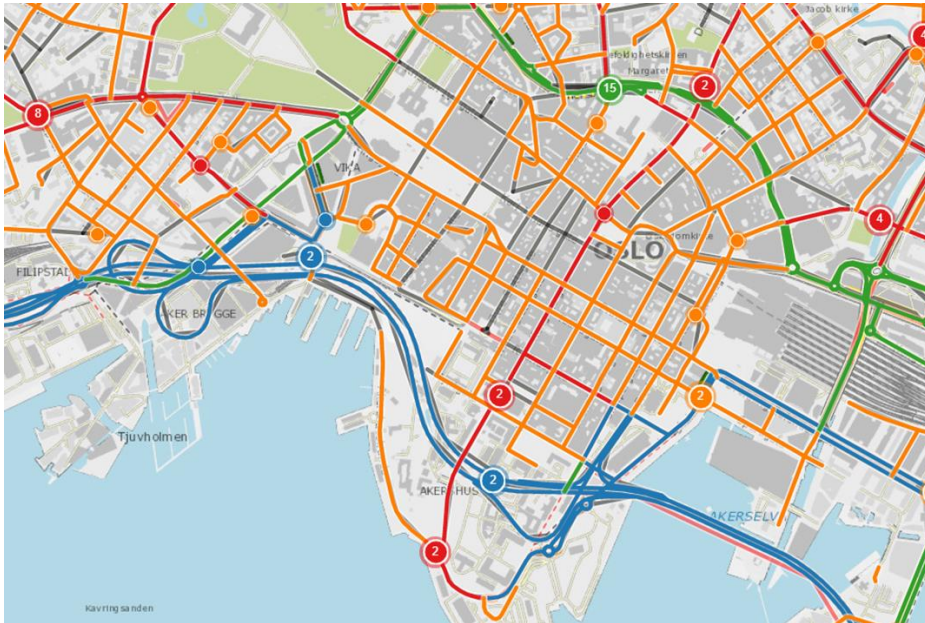
As an app in a smartphone

Together with TØI, Aventi and Kapsch have developed an app that automatically starts road pricing when you get into the car. The concept is set up as a thin client. NPRA follows the project.

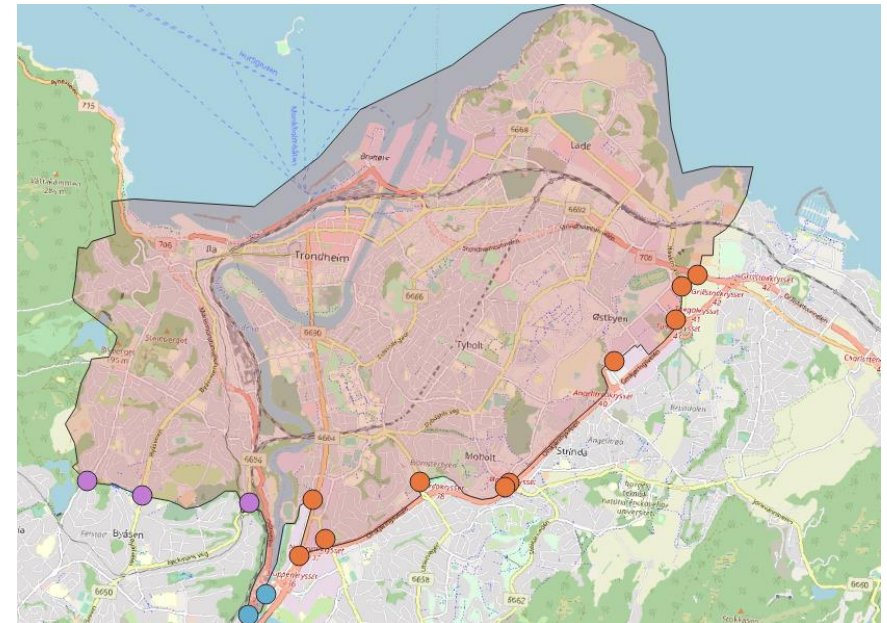


Thin and thick client

Experience with piloting road pricing shows that there may be some fundamental differences between a thin and a thick client when it comes to the method for calculating the distance driven.



A thin client transfers all GNSS positions to a central data solution where map-matching is used with updated maps. This means that you can also price different road types differently within one area



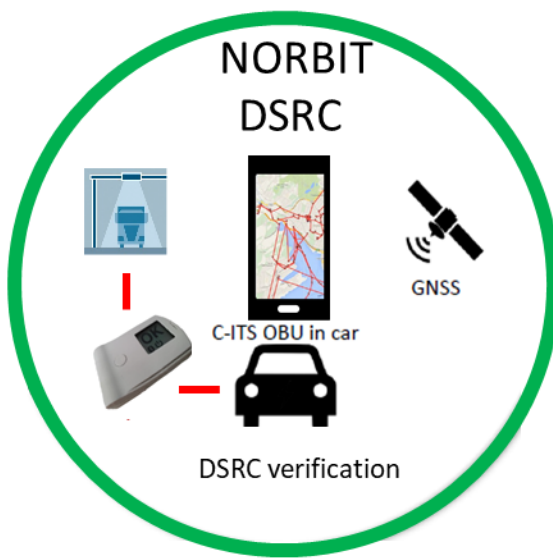
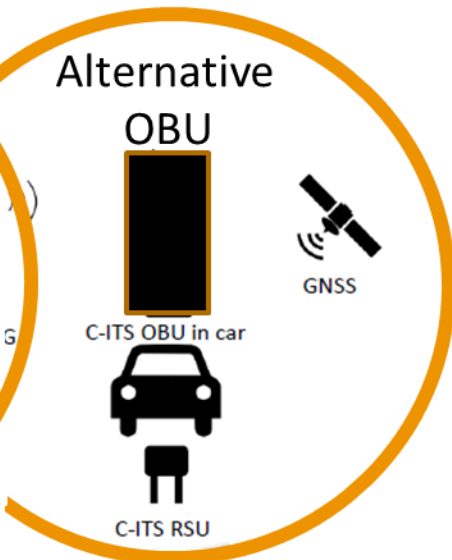
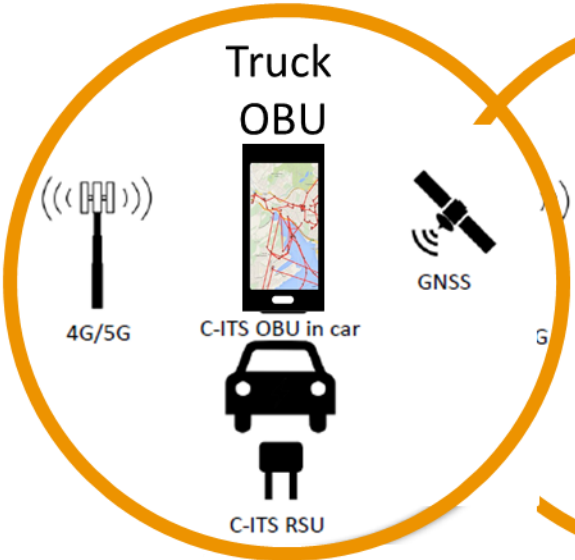
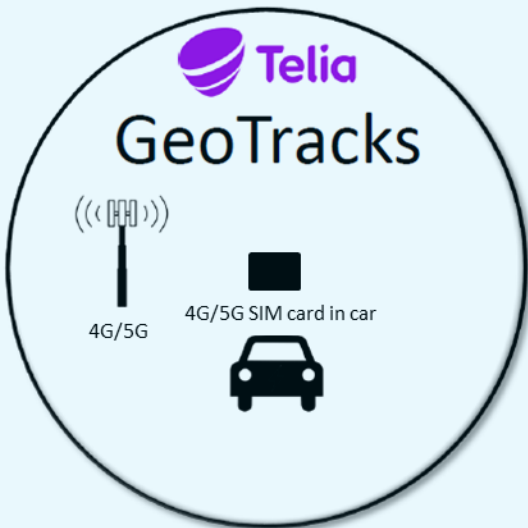
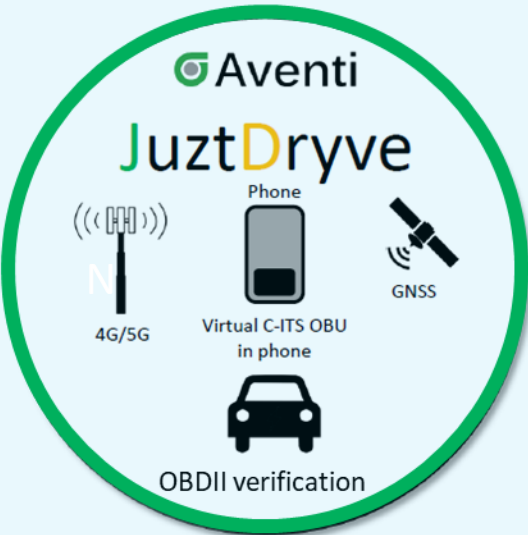
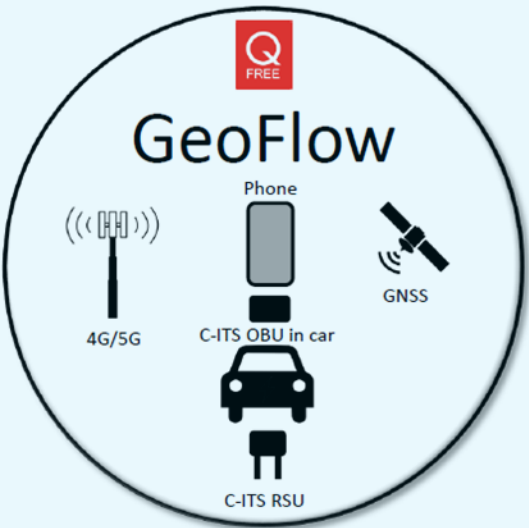
A thick client means that all data on distance traveled and calculation of pricing takes place locally in a unit in the vehicle. It is challenging to keep up-to-date maps and price matrices in all units. Then it is easier to use geofencing.

GNSS based OBU

GNSS based smart phone

4G/5G base stations

**NPRA
Involvement
and experience**



Road use tax in two zones from a technical perspective

Recommendation to KVVU from technical testing

- Offer a flexible setup where users can choose the technology that suits them. Recommended technologies:
 - OBU
 - Integrated solution in new cars
 - App in smartphone
- All the solutions are based on GNSS and require mobile data, but the latter two can use already existing solutions for data sharing.
- In the case of road use tax in two zones, little data is extracted from the tracking to cover the need for two-zone payment.



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RUC from a technical perspective

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 - OBU
 - Integrated solution in new cars
 - App in smartphone
- All the solutions are based on GNSS and require mobile data, but the latter two can use already existing solutions for data sharing.
- In the case of joint arrangements for road user charging and tolls (road pricing), more data from tracking is used to vary the pricing strategy in relation to external costs.
- Road user charging and tolls can still be calculated separately and kept separate from a technical perspective.



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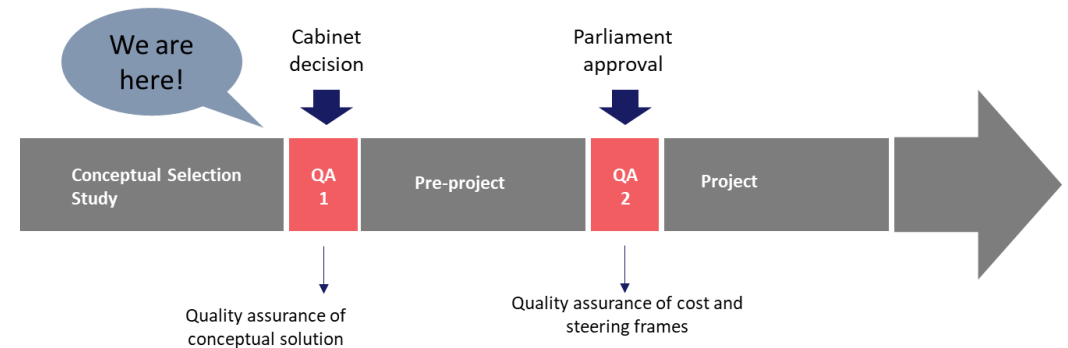
A possible next stage - Pre-project

For concept 2 and 3 we need a technical solution to implement the proposed strategies. Technical lessons learned within conceptual selection study must be utilized for a possible next stage.

- GNSS vulnerability
- Enforcement

Implementation strategy should be decided

- Thin/ thick client or optional?
- Do we need/want to include all three platforms briefly described here?





Thanks for the attention!

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