



A Vision of Sustainable Freedom of Movement

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About this document

Today's transport sector is facing major changes, driven by the desire for more sustainable solutions, technological developments, new business models and changing customer expectations. Ruter needs to adapt to these changes if we want to continue to offer good and stable public transport in the Oslo region. We need to understand the implications of significant development trends, both in society in general and in the transport sector specifically. The purpose of this document is to describe those developments and their implications, with the aim to establish a common understanding of how the transport system of the Oslo region needs to be developed in order to suit our inhabitants' needs and meet our vision of sustainable freedom of movement.

This strategy is based on the goals and expectations set by the Municipality of Oslo and the County Municipality of Viken for good and sustainable development of mobility services in the region. It expands on the objective and perspectives laid out in Ruter's previous Strategy Plan M2016.¹ The core message of M2016 was for us to lift our focus from traditional public transport to mobility solutions, in order to develop increasingly more attractive services for the region's inhabitants.

In this strategy we go a step further, from discussing mobility to presenting our ultimate vision – Sustainable Freedom of Movement. Striving towards this vision, we need to focus more on our customers' needs and desires – specifically on the importance of understanding and acting on key trends in society such as sustainability and a data-driven economy.

This document describes key strategic arguments (why something needs to be done) and the long-term ideals (where we want to be). As an organisation, Ruter is transitioning from our previous routine of establishing a new strategic plan every four years towards continuous strategy development. Ruter believes the ever-increasing pace of change in society and increasing complexity of decision-making will require continuous strategic clarifications and evaluations, not merely a long-term activity plan. Specific measures and activities must be weighed against the long-term strategic direction described in this document. This will be a continuous task, where we will need to base every decision on the best information and insights available at that given time.

¹ <https://ruter.no/om-ruter/strategier-og-handlingsplaner/M2016/>

This document is divided into five chapters, with the following structure and purpose:

	Structure	Purpose
Part I	<ol style="list-style-type: none">1. Introduction2. Development trends informing our target state3. Consequences of social developments	Establish common understanding of developments and their implications
Part II	<ol style="list-style-type: none">4. Ruter's strategic direction5. Regulation and scope of action	<p>Describe key elements of Ruter's strategic direction</p> <p>Discuss possible implications for our owners and regulatory authorities</p>

Figure 1: Structure of the document



Summary

Sustainable mobility is about quality of life, equal opportunities and the responsible development of our region and cities – within the boundaries of what our planet can tolerate.

Society is changing rapidly; sustainable development is no longer a choice but a necessity. Our economies are more data-driven than ever and technologies are advancing at great speed. Ruter's previous strategy document (M2016) took the step from focusing on public transport to focusing on mobility. This document takes the next leap forward, taking into account that our mobility solutions must be sustainable with regards to the environment, our communities and the people of the Oslo region – sustainable freedom of movement. Sustainable solutions take environmental, social and economic factors into consideration. Mobility means the freedom to live your life as you want and have the opportunity to travel where you want and when you want, regardless of conditions affecting your individual life. Simply knowing that you are able to move freely around is enough, whether or not you in fact choose to do so. This is why the sheer number of trips being made in our region is no accurate measurement of the population's freedom of movement or the sustainability of our solutions.

The geographical area covered by Ruter's services varies greatly. This strategy applies to all areas covered by Ruter's public transport services. In other words, the strategy is valid for the entire region, while actual mobility solutions may necessarily differ from place to place.

Norway is committed to contributing towards a sustainable future for our planet. The United

Nations' Sustainable Development Goals provide a comprehensive international framework for sustainability and thus strongly influence our efforts. Transport systems greatly affect many aspects of society; health, climate, equality and working conditions, among others. Public transport takes up considerable physical space and requires extensive infrastructure. This reinforces the need for comprehensive transport solutions that take all sectors of society into account.

The emergence of a data-driven economy powered by artificial intelligence (AI) and machine-learning is changing our society in a number of ways. New business models are emerging, value chains across industries are being reshaped and many existing industries have changed significantly as they adapt to these developments. Customer expectations are changing as well, with large international tech companies setting the standards for what consumers expect. In the emerging digital economy, data is the fuel. The customer generates the most important data of all, leaving companies competing for direct access to that data. At the same time, developments within this new data-driven economy are providing us with new tools and means to solve the biggest societal challenges of our time – though not without facing dilemmas.

Rapid developments in technology are heavily influencing the transport sector. The electrification of vehicles is lowering pollution levels. More and more vehicles are becoming self-driving,

with vast implications for traffic safety, costs and infrastructure. Communication between vehicles, and between vehicles and road infrastructure, is providing new opportunities to improve road safety and increase traffic management efficiency.

New solutions for shared mobility are being introduced continuously. The range of travel options is expanding and the need to own a private car is for many people being reduced. In sparsely populated areas where spatial constraints are less of an issue, electric cars may constitute a sustainable solution.

The ongoing developments present a wealth of opportunities. On the one hand, reconciling each individual's need for personal mobility with the demand for sustainable cities and societies is becoming a more achievable goal than ever before. New technologies may help us provide better and more cost-efficient solutions for our customers. They are also presenting us with new ways to involve and communicate with the population of the Oslo region, helping us ensure that our sector is developed in a democratic way. On the other hand, developments are also providing opportunities for the world's largest tech companies to take new positions within the mobility sector. Solutions offered by private companies are not necessarily founded on principles of sustainability, personal privacy or democratic participation. It will be up to regulatory authorities to determine how we can safeguard important societal principles amidst these ongoing developments. Handing over our population's mobility data to private companies weakens our own ability to influence the development of the transport sector.

Developmental trends are making it possible to change today's transport systems in fundamental ways. Evidence from other industries suggests that sweeping changes can and will happen quickly. Increasingly, future mobility solutions are going to be developed on the basis of customer data. Ownership of the industry's preferred customer interface will therefore be of crucial importance. The company finding itself in this highly coveted position will have the ability to influence customer behaviour by means of the options presented in the digital interface. Within the mobility sector, this can mean having a direct influence on how a customer chooses to get from one geographical location to another. With the societal and technological changes that are occurring, the following factors will be of great importance in the devising of future transport systems:

- solutions that are spatially efficient and equally beneficial to everyone
- citizen participation
- sustainability
- safeguarding privacy and handling data responsibly
- value creation from the use of data
- innovation and a competitive business sector

Ruter believes these aims are best achieved if a company owned by the citizens themselves plays an active and leading role in developing public mobility services. For the capital region, Ruter needs to develop and offer a wider selection of mobility options and more individualised services through greater involvement of the region's inhabitants. Solutions should be beneficial to everyone, inclusive toward everyone and affordable to everyone so that all have the possibility to participate in society on equal terms. To succeed in this, our company will need to:

- develop new solutions that are integrated into existing services and infrastructures
- build a digital infrastructure and develop expertise within data-driven service development
- leverage market forces, find new ways to collaborate and promote innovation across the entire value chain

Developments require expertise and new skills across the sector. New solutions will need to be developed at a faster pace, and decisions made under conditions of uncertainty. New ways to fund transport services will need to be explored, and increased collaboration between operating companies will be required. A solution where a publicly owned company functions in a coordinating role towards end users does not rule out the involvement of private companies and the dynamics of competition. Rather, competition to provide the most attractive solutions will be targeted towards the publicly owned company rather than directly at the customers.

By working towards our vision of Sustainable Freedom of Movement, we can simultaneously help propel Norway to the international forefront when it comes to developing sustainable mobility solutions. Towards the end of this document, we have highlighted what we believe the strategic direction described in this document will entail for our owners — the Municipality of Oslo and the County Municipality of Viken — and for the national authorities.

The Covid-19 pandemic hit Norway during the final stages of our work on this strategy document. The pandemic has had a great impact on society as a result of strict anti-contamination measures enacted by the authorities, affecting the daily lives of many. Following the pandemic outbreak, we felt obliged to investigate whether Covid-19 and its consequences might require a re-consideration our strategic direction. We have concluded that our strategy remains the same. If anything, the pandemic only reinforces the need for change.





1. Introduction

Public means pertaining to the community; the essence of public transport is travelling together. Sharing resources in this way is economically and societally beneficial.²

Economic benefits for society are achieved by reducing air pollution, increasing road safety, more efficient use of land and streets and effective utilisation of society's resources in terms of time, energy and money. Public transport is also a social utility, providing travel options to people with limited access to cars, to children who need to get to school and to the elderly who are unable or unwilling to drive a car themselves. The premises for public transport are, however, changing rapidly. To remain relevant in the market as a supplier of mobility services, public transport administrators must adapt to developments in society and technology. Ruter believes these developments will have great consequences for publicly owned transportation companies and the way they are run.

1.1 Collective solutions for a good life and sustainable development

The capital region consists of urban areas, medium-sized regional cities, small cities/towns and sparsely populated agricultural areas. Each type of area requires different solutions when it comes to public transport. Public transport enables and promotes social equality, sustainable cities, sound regional development and quality of life. Common transport solutions can provide the inhabitants of the capital region with quick, affordable, safe and convenient travel suited to their needs. Public transport should ensure efficient

mass transit, efficient utilisation of infrastructure and a means of travelling that is available to everyone. This is why public transport is run by the authorities and usually publicly funded.

Public transport in the Oslo region has continuously grown and improved since Ruter was established in 2007. The number of travellers and departures have increased, new routes have been added and our vehicle fleet is becoming more and more environmentally friendly. The figure on the next page shows developments in Oslo and Akershus from 2000 to 2019 in terms of population size, number of passengers, vehicle traffic and kilometres driven. The graph shows that the number of public transport trips has grown steadily compared to car travel. A strong focus on public transport from Ruter's owners and the national authorities has made this growth possible. Close cooperation between Ruter, Sporveien, contracted operating companies, collaborative partners and the authorities has been fundamentally important.

² <https://kollektivtrafikk.no/wp-content/uploads/2017/08/Kollektivtrafikkens-samfunnsbidrag-fakta-ark.pdf>

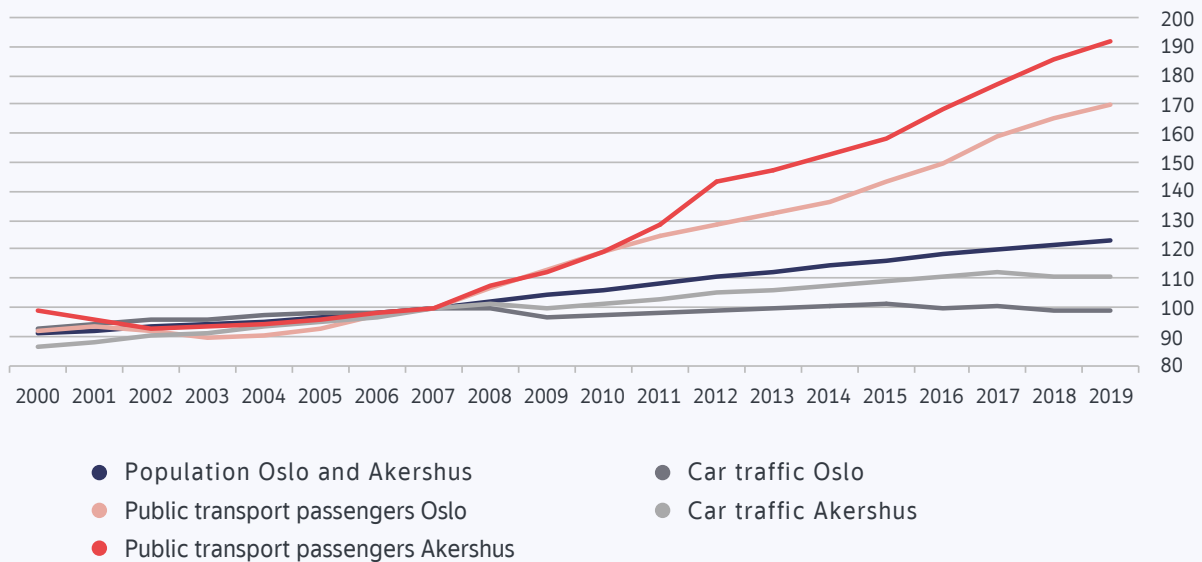


Figure 2: Overview of the growth in population, vehicle traffic and use of public transport. Indexed development. 2007 = 100

The transport sector is dependent on sprawling physical infrastructure that occupies vast areas of land. A basic principle of public transport is having many travellers share the same bus, tram, train or subway system because this constitutes efficient use of land and infrastructure. Houses, commercial buildings, parks and green areas, social infrastructure, roads and railways compete for available land, which is a particularly scarce resource in urban areas. Streets, buses, trams and subways get congested when many people travel at the same time. Congestion means it will take longer to get where you want to go, with the trip itself also likely to be less comfortable. Private cars are a useful means of transportation in sparsely populated areas where there is plenty of space available, but car traffic presents a challenge in cities where there is much competition for space. Electric cars emit less pollution and make less noise than cars that run on fossil fuel, yet they still take up the same amount of physical space on the road. The figure below shows the land use of various means of transportation.³

To ensure good utilisation of space, Oslo and Viken County have established common guidelines describing how towns and transport hubs should be developed. This makes it easier to achieve efficient transport solutions and helps make public transport a tool for achieving desired land development goals. Good comprehensive planning is important in our effort to ensure

mobility for the region's inhabitants. We need to work systematically to ensure that the people in our region find it easy to move about from place to place, and the solutions have to benefit everyone on equal terms. Public transport needs to be developed within the framework of sustainability. To achieve this, we need to make it easier and more attractive to travel via sustainable solutions that are beneficial to everyone.

Public transport has to keep developing and improving in order to remain as viable and valuable to society as it has been for many decades so far. To retain its role and help solve the societal challenges of the future, public transport solutions need to develop alongside and in cooperation with the region's residents, continuously adjusting to meet their needs. For public transport administrators, this requires close proximity to the customers themselves and a focus on user-driven innovation. New technologies and data-fuelled development can help us meet the individual's needs while simultaneously working towards our common goal of sustainable mobility.

³ <https://www.zukunft-mobilitaet.net/78246/analyse/flaechenbedarf-pkw-fahrrad-bus-strassenbahn-stadtbahn-fussgaenger-metro-bremsverzoegerung-vergleich/>

Space use by types of transportation per 50 people

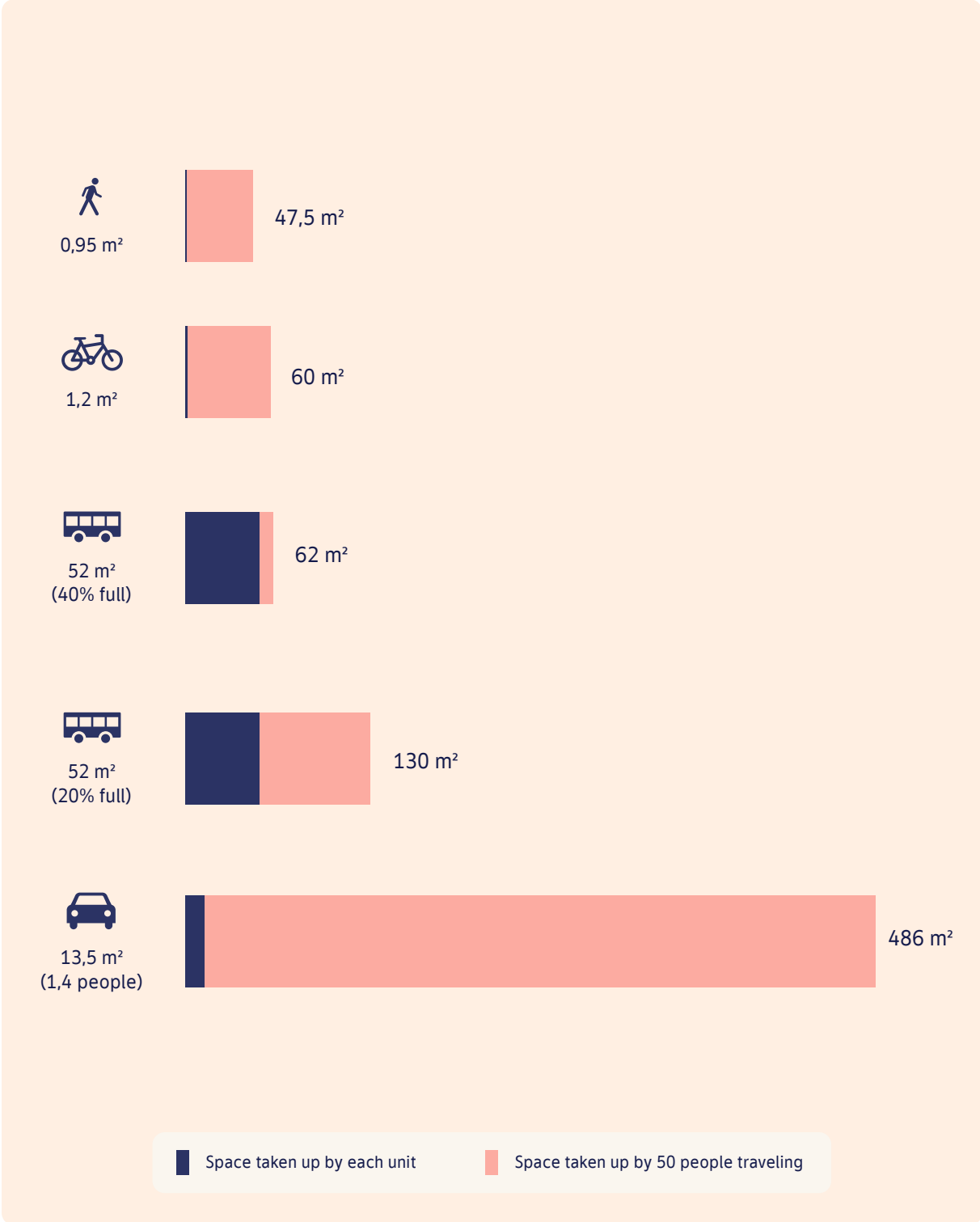


Figure 3: Land use for different modes of travel. Land use will be affected by the speed at which the mode moves.

1.2 A vision of sustainable freedom of movement

The Municipality of Oslo and the County Municipality of Viken set the goals and expectations for good and sustainable mobility in the region. Our strategy assumes that the inhabitants of the region want a future where they are free to move around as they please, and that they have access to efficient mobility solutions that cater to their needs. At the same time, developments also have to be sustainable and attend to the various needs of the community as a whole.

Sustainable freedom of movement:

Sustainable solutions must be eco-friendly and take social and economic factors into account.

Freedom of movement – the perceived freedom of citizens to move around with ease and comfort – to where they want, when they want – regardless of income, physical ability and other factors influencing their individual lives.

Sustainable development means attending to the needs of people who are alive today without compromising the needs of future generations. In 2015 193 member states of the United Nations adopted the 17 Sustainable Development Goals. These goals address Earth's development within the context of the environment, economy and social conditions. The Sustainable Development Goals apply to all countries and function as a road map describing what we need to do to ensure a sustainable future for the entire world. Development of the transport sector must happen within the framework of the UN's Sustainable Development Goals.

The inhabitants of the Oslo region have various needs and different economic, social and physical starting points that determine how they experience mobility. Some live in the middle of a bustling city; others live in the quiet countryside. Some ride bicycles all year round; others depend on being picked up by car at their front door. Some are on their way to football practice; others on their way to a café. Attractive and customer-tailored mobility will give everyone in the region the opportunity to move around freely regardless of income, physical ability, age or place of residence.

Figure 4: Ruter's vision

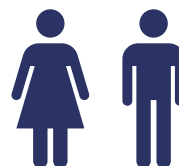
Vision

Sustainable freedom of movement

Sustainability
Society as a whole



Individual needs and behavior
Each individual inhabitant



Mobility is about being able to move around where you want, when you want, regardless of factors influencing your individual life.

Sustainable Freedom of Movement does not simply mean increasing the number of transport options. Rather, it is about feeling free to move around as one pleases. Simply knowing that you are able to go where you want when you want is enough, whether or not you choose to actually do so. We want our customers to feel more mobile and have access to more transport systems, regardless of how often they choose to use them. When viewed this way, reducing the need to travel can be a good thing – for example by allowing people to work from home during rush hours and in heavily congested areas, and by viewing personal transportation and goods transportation as parts of a whole.

The illustration on the previous page shows how our vision of Sustainable Freedom of Movement needs to take the individual's needs and behaviours into account while at the same time protecting the environment by working towards sustainable societies as a whole.

1.3 Goals and plans adopted by our owners

Norway recently implemented an extensive regional reform programme to redistribute the counties. The former Akershus County Municipality has merged with Buskerud and Østfold to become a single county municipality called Viken. The regional plans and strategies of Akershus County Municipality will continue to apply to Ruter's work until new plans are adopted by the Viken County Council. The Municipality of Oslo and the County Municipality of Viken have ambitious goals for sustainable development in the region.

The Municipality of Oslo and the County Municipality of Akershus had already adopted a joint regional plan for land use and transport development before the County Municipality of Viken was formed⁴ (RPAT). The plan is a strategic platform for the Municipality of Oslo, the County Municipality of Akershus, the municipalities in Akershus, the Norwegian state and other parties who influence how land use and transportation can be coordinated in the region. The plan lays out the framework for a concentrated development pattern with increased urbanisation around public transport hubs and a greater emphasis on walking, cycling and common transport solutions. The purpose of the plan is to manage the region's population growth in a conscious and balanced way, in order to ensure sustainable development in the region.

The Municipal Master Plan for Oslo 2018⁵ presents long-term development goals for the capital. The municipality's vision is that Oslo should be greener, friendlier, more creative and have room for everyone. The plan states that Oslo is to become a zero-emission city and stimulate more housing and business development. The plan also aims to reduce social inequality and strengthen public health. The municipality emphasises the fact that Oslo's inhabitants should have the freedom to choose the means of transport that best suits their needs. Inhabitants should be able to live without owning a car, while at the same time experiencing a greater sense of mobility than ever.

Oslo's Climate Strategy for 2030⁶ sets ambitious goals for transitioning Oslo into a climate-friendly, zero-emission city. One goal for the transport sector is to reduce car traffic in Oslo by one-third before 2030 (including goods transport) compared to 2015. Walking, cycling and public transport will have first priority in Oslo. Public transport is to be emission-free by the end of 2028. These goals are guiding principles for future priorities and investments made within public transport.

The Municipality of Oslo and the County Municipality of Viken have set a goal of zero deaths and zero serious injuries caused by traffic, and assume that all parties across the transport sector contribute towards this goal by working systematically to improve road safety.

The Transport Plan for Akershus County Municipality 2016-2025⁷ sets the framework for the county municipality's priorities for the transport sector leading up to 2025. The plan is based on guidelines set out in RPAT, including the development of comprehensive transport solutions in priority areas of growth that emphasise walking and cycling, public transport and quality of life in the city. Mobility solutions should be available to everyone and road safety given the highest priority in all parts of the transport system.

⁴ Regional Plan for Land Use and Transport Development for Oslo and Akershus, 2015: <https://www.akershus.no/ansvarsomrader/samferdsel/samferdselsplanlegging/regional-plan-for-areal-og-transport-i-oslo-og-akershus/>

⁵ Our City, Our Future. Municipal Plan for Oslo 2018: <https://www.oslo.kommune.no/politikk/kommuneplan/kommuneplan-2018/>

⁶ Professional foundation for Oslo's climate strategy for 2030: <https://www.klimaoslo.no/wp-content/uploads/sites/88/2018/12/Horningsutkast-Faggrunnlag-Strategi2030.pdf>

⁷ Transport Plan for Akershus County Municipality 2016-2025: <https://www.akershus.no/ansvarsomrader/samferdsel/samferdselsplanlegging/samferdselsplan-for-akershus/>



In addition to the goals and guidelines for land use and transport development, The Regional Plan for Climate and Energy for Akershus⁸ has a goal of reducing direct greenhouse gas emissions in the county by 55 percent by 2030 (and 85-90 percent by 2050) compared with 1991 emission levels. The plan assumes growth in passenger transport will be absorbed by public transport, cycling and walking, and that public transport will be fossil-free by the end of 2020.

The goals for mobility in Viken were adopted by the Joint Political Committee for Viken.⁹ Our strategy contains eleven principles for mobility development in the new county municipality. These are built on the United Nations Sustainable Development Goals and emphasise continued focus on public transport, technological and digital opportunities for user interfaces, increasing coordinated transport, facilitating innovation in the public sector and cooperation with commercial operators.

⁸ Regional Plan for Climate and Energy for Akershus, 2018: https://viken.no/_f/p1/id8d8f217-08fe-4c28-bc34-98c2981850f2/regional-plan-for-klima-og-energi-i-akershus-2018-2050.pdf

⁹ Joint Political Committee for Viken, PS 12/2019 Our Vision of Mobility: <https://sruviken.bfk.no/api/utvalg/2/moter/84/dokumenter/1>



2. Key trends relevant for our strategic direction

2.1 Changing surroundings

Society is developing. The mobility sector is facing significant changes as a result of that development. Global trends such as urbanisation, digitalisation, individualisation and sustainability laid the foundation for Ruter's previous strategy document (M2016). These still apply¹⁰ and are still considered to be some of the most important trends affecting communities and mobility across our region. Inhabitants demand a higher degree of individualised solutions from faster, simpler and more dynamic services. Society in general (especially the younger generations) demand sustainable development. Today's youth want to actively influence developments, but do not feel sufficiently able to.¹¹

This chapter presents the biggest drivers of change within the future of mobility. The main topics explored here are 1) the need for sustainable development, 2) data as fuel for the new digital economy and 3) the power of artificial intelligence. These topics must be understood in light of customer expectations and the need for democratic governance of developments in the field of mobility. This will be our starting point for analysing the opportunities and challenges of future transportation solutions.

2.1.1 The customer's needs and expectations

We live in a consumer society where we can buy what we want, when we want. Freedom to choose means power to the consumers, higher expectations towards suppliers and the opportunity for each individual to assume greater control of their lives and consumption patterns. Many people feel bound by time constraints in their daily lives, seeking to simplify their schedule and free up time for the things they enjoy. People want goods and

services that offer freedom and entertainment and enhanced personal relationships. Customer expectations change, technology continues to develop at a rapid pace, and standards are set by innovative global tech companies.

Our expectations as consumers are not only reflected in what we choose; they also play a major role in changes to our behaviour in several areas. Market access is simplified as we move retail trades from traditional brick-and-mortar outlets to digital interfaces, allowing consumers to buy when it suits them. Digitalisation increases customer access to the latest information.¹² Many of the social needs of youth are covered by digital solutions. Employers are increasingly permitting their employees to work from home. In many professions, digital solutions are challenging the need for face-to-face meetings, though not necessarily replacing them completely. Edward Glaeser¹³ describes how electronic communication may in fact increase the need for face-to-face meetings rather than eliminating it. Innovation tends to take place where people and businesses physically congregate. In other words, where people meet to discuss and develop ideas. It was predicted about a hundred years ago that telephones would make cities obsolete. Similar developments were predicted to follow the

¹⁰ <https://www.sll.se/globalassets/5.-politik/politiska-organ/trafiknamnden/2019/17-dec/14-tf-omvarldsanalys-2019.pdf>

¹¹ A population study on empowerment conducted in January 2020 shows that young adults believe services are better when residents have a real influence, even though many do not feel they have a real impact on the development of their communities. <https://doga.no/globalassets/innsikt-og-effekt/rapporter/rapport-om-medbestemmelse-2020.pdf>

¹² <https://www.ssb.no/priser-og-prisindekser/artikler-og-publikasjoner/tast-og-kjop-hva-hvor-og-nar-som-helst>

¹³ Edward Glaeser, 2011, The Triumph of the City.

introduction of the fax machine, e-mail and video conference. But time has proved us wrong; people still need to be together and learn from each other, and this works best when we meet face to face. The ongoing trend of increased urbanisation supports this notion.

Consumers have developed a greater awareness of sustainability while also looking for more individualised and effective services. The region's inhabitants are increasingly more explicit about their expectations when it comes to public and private operators. Services to meet the Sustainable Development Goals must comply with low emissions standards, be produced in an ethically responsible way, contribute to reducing social inequality and protect democratic principles.

The region's inhabitants have different needs that change over time. Insight about inhabitants tell us about behaviour, preferences, desires and needs – on individual and group levels. Understanding individual needs is important. Lisa lives in the city centre and wants the metro to depart frequently. John wants a reliable bus route to and from his house in the suburbs. Adam (90) needs door-to-door transport while Julia (14) is more concerned about the best scooter paths to school and football practice. Ahmed was born in the early 70s and is a member of Generation X. He prioritises his family and wants a good car-sharing solution. Greta, however, was born at the end of the 90s and belongs to Generation Z – the first digital generation. She is pragmatic, knowledgeable and

ethically conscious, always choosing the most eco-friendly means of transport.^{14,15} Ichika was born in 2012 and is part of Generation Alpha; her school offers digital home-schooling, so she does not depend on public transport every day in order to get her education.¹⁶

Customers have different needs for mobility depending on various factors such as place of residence, age and generation. Ruter serves a vast geographical area where people work, live and play. There are big differences between Grünerløkka and Son, Eidsvoll and Aker Brygge, Sandvika and Bjørkelangen. The region has many cities, towns and villages, all with their unique characteristics and their own identity. Oslo is the centre of the capital region. The Oslo region is growing, towns are becoming cities and the need for new functions and public transport is changing. Growth must be coordinated so the cities and surrounding areas remain attractive places to live where it is easy to meet friends, go shopping, live and learn.

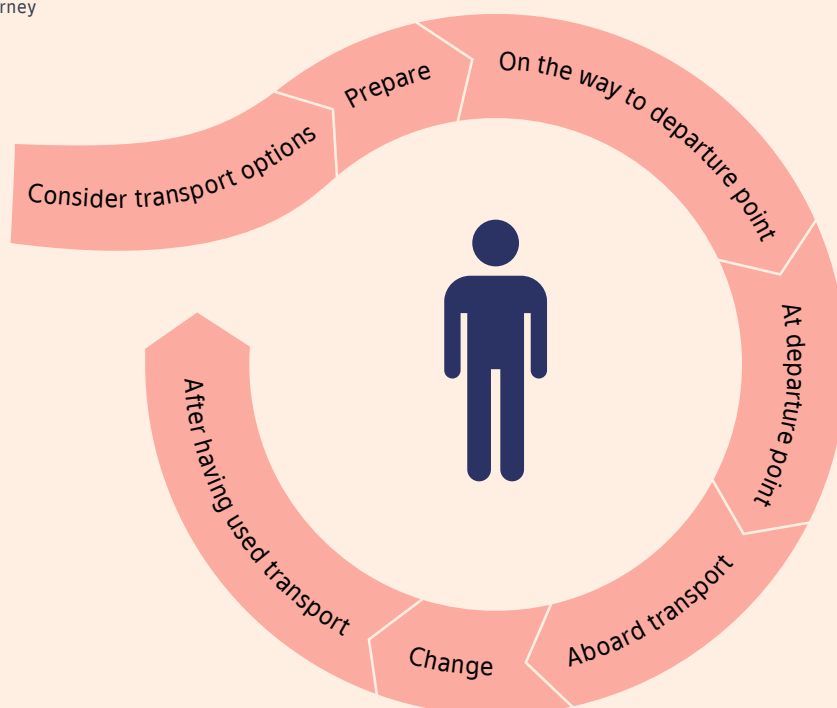
Inhabitants are individuals. Ruter continuously conducts surveys to gain insight into what choices our travelers are making today and what choices they will likely be making in the future.

¹⁴ <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/true-gen-generation-z-and-its-implications-for-companies>

¹⁵ <https://www.forbes.com/sites/markcperna/2019/12/27/gen-z-is-already-changing-the-world-just-ask-times-2019-person-of-the-year/>

¹⁶ Mark Mc Crindle, 2005, The ABC and XYZ, Understanding the Global Generations

Figure 5: Visual representation of customer journey



The following factors appear to be the most important for Ruter's customers today:

- Short overall travel time
- flexibility (travelling when it suits them)
- low price
- safety and security
- comfort (seatability)
- environment

Analysing travel patterns and the needs of our customers provides useful information. How does the customer make their decision about which transport option to use? What options are they considering while on their way to their departure point? How do they experience the journey itself? Ruter continuously works to gain increased insight into these and many more factors.

Different age groups have different needs, since each stage of life comes with its own choices (such as whether or not to own a car) and demands (such as being able to get to and from work while also making sure ones children get to and from kindergarten/school). It is especially important to monitor children and youth closely so we can influence their travel habits at a young age and make sure we meet their expectations as they get older. Ruter conducted an insight survey in 2019 among young people between the ages of 13 and 25.¹⁷ One of its main findings was that young people want convenience and the opportunity to relax during their journey. Young people also value the social aspect of travel. To them, a tram can be not only a means of getting where you want to go, but at the same time a place to spend time with friends.

2.1.2 Sustainable cities and communities

The 17 United Nations Sustainable Development Goals¹⁸ and the Paris Agreement¹⁹ set common international goals for sustainable development, and Norway is committed to contribute towards reaching them.²⁰ The European Union has launched a new climate strategy, Green New Deal, which sets ambitious climate goals.²¹

The Sustainable Development Goals see the environment in the context of economy and societal development. Norway, Iceland and the EU will cooperate on joint implementation of the climate goals for 2030. A new climate agreement was adopted by the EEA Joint Committee on 25 October 2019. It lays the foundation for Norway's climate policy for the next ten years.²²

Transport is a key theme in several of the sustainable development goals, directly and indirectly. Goal 11 can be understood as an overarching goal for the transport sector.

Goal 11 Sustainable cities and communities

By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention given to the needs of those in vulnerable situations.

While working to make our cities and communities sustainable, the transport sector can simultaneously contribute towards reaching five of the other goals:

Goal 3 Good health

Ensuring healthy lives and promoting well-being can be achieved by facilitating mobility solutions that increase physical activity, improve traffic safety and reduce motorised traffic that has a negative effect on our health.

Goal 8 Decent work and economic growth

Work provides income, counteracts exclusion and poverty, and creates a sense of belonging. One important objective for the transport system is, therefore, to bind city and countryside together, making the labour market accessible to all while employees throughout the supply chain have decent working conditions.

Goal 10 Reduced inequalities

Good mobility solutions bind people from different parts of a region together and help reduce inequality by providing everyone with convenient and economic opportunity to participate in the labour market and education, as well as leading more active lives.

¹⁷ Young people and mobility. Report by Ipsos for Ruter. December 2019. Ref. Ipsos 19076907

¹⁸ www.fn.no/Om-FN/FNs-baerekraftsmaal

¹⁹ <https://www.fn.no/Om-FN/Avtaler/Miljoe-og-klima/Parisavtalen>

²⁰ <https://www.regjeringen.no/no/sub/fns-barekraftsmaal/om-barekraftmal/id2598090/>

²¹ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

²² <https://www.regjeringen.no/no/aktuelt/norges-klimaavtale-med-eu-vedtatt/id2675266/>, og <https://www.regjeringen.no/no/tema/europapolitikk/aktuelt/aktuelt/nyheter/2019/klima/id2675437/>

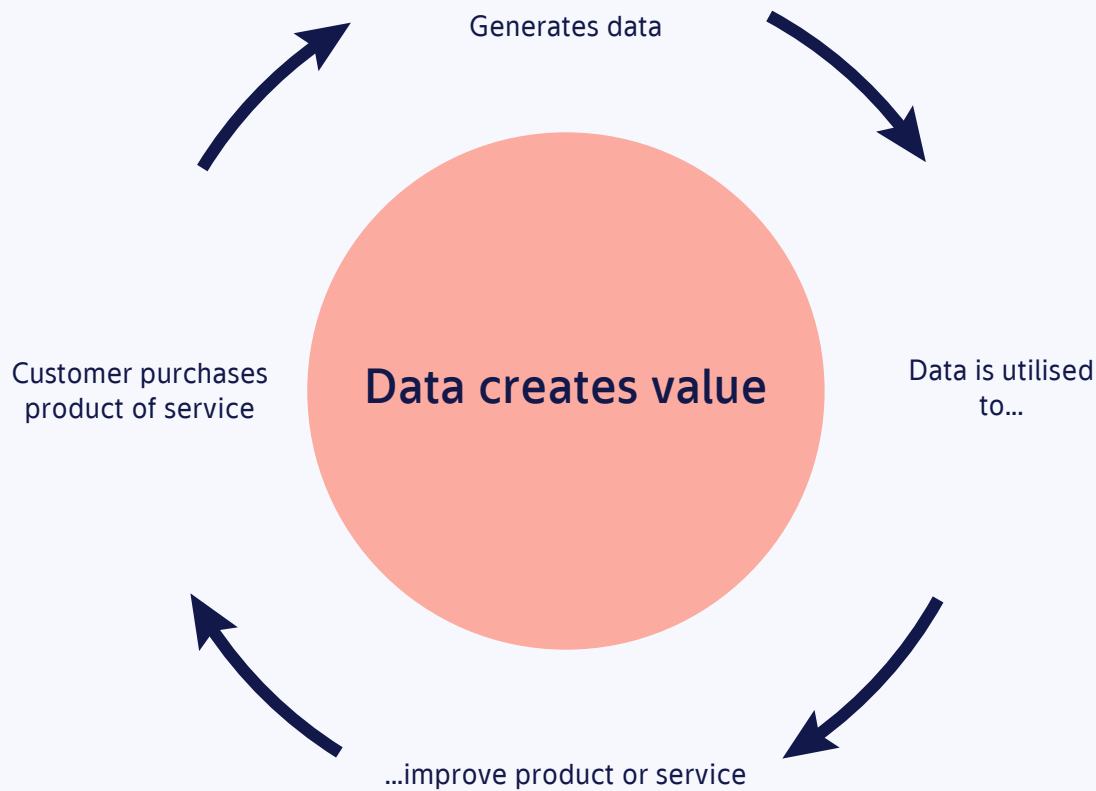


Figure 6: Access to customer data is key to the continuous development of better products and services

Goal 12 Responsible consumption and production

Solutions must be based on renewable resources, reuse and recycling. The effective use of resources can reduce greenhouse gas emissions and other types of environmental impact. For the transport sector, it is important to get more people to travel together to reduce the number of vehicles and emissions. It also entails extending the lifetime of batteries and use of recyclable materials in the vehicles.

Goal 13 Climate action

Common and emissions-free transportation solutions, more vehicle sharing, more cycling and more walking can reduce the need for private cars and lower greenhouse gas emissions (by reducing the number of fossil-fueled vehicles on the road).

Goal 9 – *Industry, innovation and infrastructure* and Goal 17 – *Partnerships for the goals* contain important principles that influence our efforts towards reaching the goals above. In short, a well-functioning and accessible transport system is essential for social, economic and sustainable development in society.

2.1.3 Data-driven economy and Artificial Intelligence

Digitalisation and ways to create value from data are changing society in a number of areas. New business models are emerging, value chains within industries are changing, and the rise of platform companies and the use of AI in particular are significantly changing many industries. Data is the fuel of the new digital economy.

Data is a resource in many types of value creation. It contributes to increased productivity, greater efficiency and higher quality across various sectors and industries.²³ Platform companies sell solutions by connecting users with suppliers on a common platform. Amazon, Alibaba, Airbnb and Uber have become well-known examples of such companies. Many platform companies have additionally started to produce their own content, like Netflix and Spotify.

Lessons already learned from data-driven economies show that customers generally prefer to deal with one or a limited number of such platform companies for their needs. Those who deliver good solutions will thus gain more customers, while the value of the services they provide keeps increasing as more data to base decisions on is acquired from the growing customer base. This is called the network effect.

For many data-driven companies, it is also true that it costs very little to offer the same service to one additional user; economics of scale. That is why companies like Uber and Airbnb have achieved tremendous growth and a strong market position in a short amount of time. The most successful operators can achieve near market monopoly; so-called digital monopoly.

In other words, a platform with many users not only provides prospective suppliers with access to a range of potential customers – it also uses a large amount of customer data to improve its services.

Artificial intelligence (AI) is one of the most significant emerging technologies of the decade. This stems from access to considerable amounts of data, powerful computing resources and, not least, advances in algorithms.²⁴ The government's National Strategy for Artificial Intelligence²⁵ states that AI will play a key role in tackling major societal challenges. Algorithms set conditions and let the machines find the best path to a given result. The solution, price and other aspects of a service being offered, or how a self-driving car must act in different situations, are good examples of this. Algorithms that control machines develop and improve by accessing large data sets, and AI can process huge amounts of data in a very short time. The companies that control the algorithms own the default solution and can thus influence the choices that are presented to consumers, as well as determine what kind of ethical considerations that underlie the choices made by the machines.

Individuals generate large amounts of data about themselves by using data-driven services. For example, Google Maps records and stores all the

movements a person with the app on their phone has made, even when the app is not in use (unless you actively disable this feature). Convenience stores provide apps that track each customer's purchase history and offer discounts to their most frequently bought items. Many people use fingerprint or facial recognition technology to unlock their devices. This results in storage of large amounts of personal data. The privacy policies of many services are complex, and in many cases we know little about what happens to stored data.

In the digital economy, many decisions are made using digital interfaces, such as apps on smartphones. The world's largest companies (and others) work hard to create features that allow us to make decisions using our voice, such as Amazon's Alexa or Google Home. Another way in which many companies are competing to provide the preferred customer interface is by developing smart glasses that register everything the wearer sees. This technology, however, has not caught on so far. Artificial intelligence processes data at an individual level and helps make every choice easier. It's all about gaining access to a customer's time, and thus ownership of the preferred customer interface becomes extremely important.

For example, one might purchase a grocery product via a voice device ("I need red chili

²³ <https://www.menon.no/publication/verdiskaping-data-norge-leve/>

²⁴ Norwegian Board of Technology 2018, Artificial Intelligence – Opportunities, Challenges and a Plan for Norway. <https://teknologiradet.no/wp-content/uploads/sites/105/2018/09/Rapport-Kunstig-intelligens-og-maskinlaering-til-nett.pdf>

²⁵ <https://www.regjeringen.no/contentassets/1febbbb2c4fd4b7d92c67ddd353b6ae8/no/pdfs/ki-strategi.pdf>

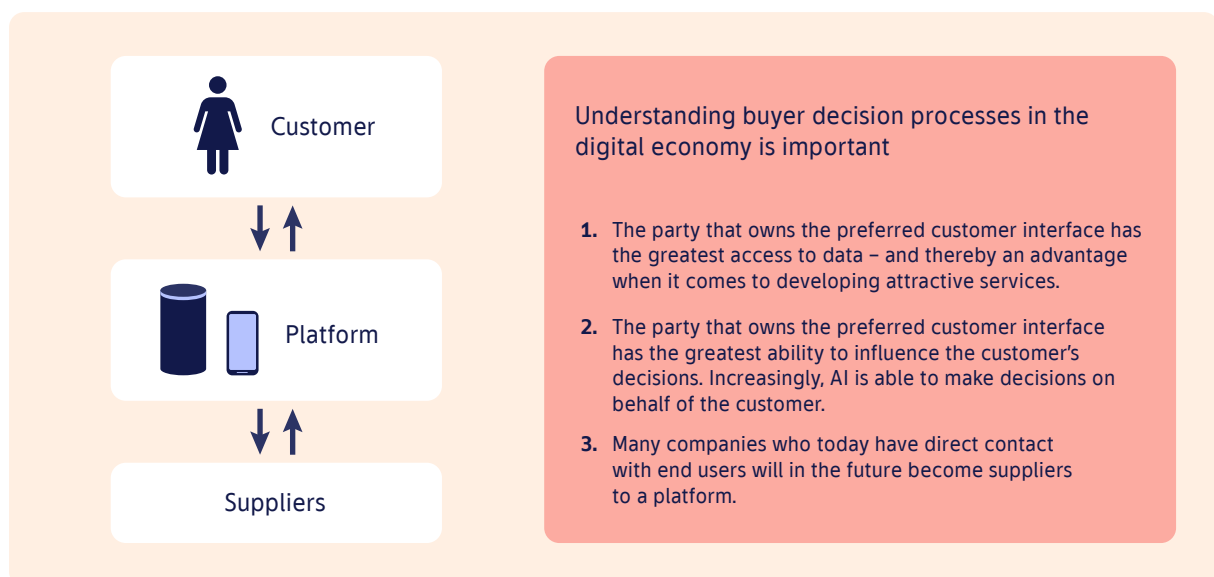


Figure 7: Ordering goods and services via digital services



peppers delivered to my door as soon as possible"). Increasingly, such devices are able to predict upcoming needs ("Good morning! You are out of milk and cheese and require the ingredients for one lasagne. Would you like the goods delivered to your home at 16:00?"). If this becomes an established pattern, we still do not know who is going to be carrying out the deliveries. In any case, the need for brick-and-mortar shops as we know them today will diminish; platform operators can buy food directly from food producers. This development is not necessarily limited to homogeneous commodities such as food products, electricity and so on; technology has already made this possible for more personalised products as well. A 3D scan of your body could for example enable AI to suggest clothing articles that complement your body shape. This would remove one link in the value chain – the retail store – and reduce costs in the value chain considerably. Buying decisions could become quicker and easier. Yet market mechanisms might indicate that this would lead to monopolies where a few retail outlets take over a huge share of the market.

Nothing suggests that this 'evolution' would stop there. With increased use of artificial intelligence connected to multiple data sources (including for example your fridge), one will no longer have to actively order that red chili at all. The chili will be automatically sent to you when you need it, along with any other groceries that the AI knows you have run out of. This not only eliminates tedious trips to the grocery store; it also opens the door to better coordinated and more sustainable logistics.

By the end of 2019, seven of the world's ten largest companies were technology companies.²⁶ In summary, the value of data in our society is already great²⁷, and it will only increase dramatically in the coming years.²⁸

²⁶ https://en.wikipedia.org/wiki/List_of_public_corporations_by_market_capitalization

²⁷ <https://www.menon.no/wp-content/uploads/2019-88-Verdskaping-med-data.pdf>

²⁸ <https://ec.europa.eu/digital-single-market/en/news/final-results-european-data-market-study-measuring-size-and-trends-eu-data-economy>

2.2 Transport systems are changing

What can developments in a data-driven economy, with new technologies and new business models, mean for the mobility sector? Major analysts around the world all agree: Mobility is facing big changes in the future. Consulting firm BCG discusses the combination of car sharing, car-pooling and self-driving cars as the century's most serious challenge to the automotive industry.²⁹ McKinsey compares current changes in mobility with the 'horse-to-car' shift, and estimates that 80 percent of trip distances in 2030 will be made by partial or fully self-driving vehicles.³⁰ As early as 2016, a report from the European Union reasoned that mobility should be considered an informational service with accompanying physical vehicles, rather than a transport product with additional services.³¹ Huge amounts of money are being invested in mobility, and it is believed that mobility will be the most important business area in the global economy by 2030.³²

The transport sector has seen the introduction of many ground-breaking technologies in the past, such as trains and cars. Both of these inventions led to major changes in cities and society. Today, the sector is again facing a technological shift that is propelled forward by developments in the digital economy.

A variety of reports and analyses describe the technology trends currently observable within the mobility sector. In 2018, the Norwegian government assembled an independent expert committee to identify and analyse what kind of implications the emergence of these new technologies will have for future transport infrastructure. This report³³ describes four main trends that will influence the transport sector in the future:

Electrification

We are seeing a distinct transition to renewable and sustainable energy. This points in the direction of a future with emission-free vehicles. Generous subsidies have contributed to the rapid introduction of electric vehicles in Norway. In 2019, 42 percent of all newly registered passenger cars were zero-emission vehicles.³⁴ Coinciding with this, electric cars amounted to 7 percent of the total number of cars on our roads.³⁵ Trams and metro lines are already powered by electricity, and electric buses and ferries are gaining momentum in the market. Rapid technological developments are reducing the cost of battery production, which today constitutes a major cost component in electric vehicles. Bloomberg New Energy estimates that battery costs per kWh have fallen by 87 percent from 2010 to 2019.³⁶ The investment bank ARK Invest estimates that

electric cars will be as affordable as fossil-free cars (without subsidies) by 2022.³⁷ Electric vehicles will be phased into various transportation segments in different ways. For example, long haul vehicles and delivery vans are still far from offering the range needed to deliver goods at competitive prices.

Self-driving transport – automation/autonomy

Transportation is becoming automated. Over time, these developments will influence demand, capacity needs, safety and operating costs in the sector. Automation implies several levels of developments, from simple automatisations to fully autonomous forms of transportation. Vehicles are often categorised in levels from 0 to 5 depending on their degree of automation, where 0 is none and 5 is full automation. This development is powered by artificial intelligence, machine learning and sensor technology, as well as an increasing emphasis on data within the transport sector. Advances within this field are happening very fast. Waymo, a company owned by Google's parent company Alphabet, is investing heavily in self-driving technology. Their autonomous vehicles have driven tens of millions of kilometres on public roads. At the time of writing, Waymo has self-driving taxis in Phoenix, USA, operating without driver assistance – initially serving a group of around a hundred test users.³⁸ Tesla, General Motors, Ford and Volkswagen³⁹ are also investing heavily in self-driving technology.

²⁹ Economist, 1st of March 2018. www.economist.com/special-report/2018/03/01/self-driving-cars-will-require-new-business-models

³⁰ McKinsey – Reimagining mobility. February 2019. www.mckinsey.com/featured-insights/reimagining-mobility

³¹ The role of Regulation in preparing Transport for the Future: Study for the European Parliament, 2016. [http://www.europarl.europa.eu/RegData/etudes/STUD/2016/563424/IPOL_STU\(2016\)563424_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/563424/IPOL_STU(2016)563424_EN.pdf)

³² <http://report.businesscommission.org/uploads/BetterBiz-Better-World.pdf>

³³ Technology for mobility and sustainable mobility, 27 June 2019. Report from government appointed expert committee. https://www.regjeringen.no/contentassets/ccdc68196014468696a-cac6e5cc4f0e7/rapport-teknologiutvalget_web.pdf

³⁴ <https://bilimportorene.no/bilsalget-i-2019-oppsummert/>

³⁵ <https://www.ssb.no/bilreg>

³⁶ <https://twitter.com/BloombergNEF/status/1201788202274709505?s=09>

³⁷ <https://ark-invest.com/big-ideas-2020>. Prerequisite: electric automobiles with 400km range compared with a Toyota Camry.

³⁸ <https://venturebeat.com/2020/01/06/waymos-autonomous-cars-have-driven-20-million-miles-on-public-roads/>. To see how selfdriving works in practice, in December of 2019, see this 7 minute video with journalist Andrew Hawkins from The Guardian <https://www.theverge.com/cdn.ampproject.org/c/s/www.theverge.com/platform/amp/2019/12/9/21000085/waymofullydriverlesscarsselfdrivingridehailservicephoenixarizona>

³⁹ Also check out the case study from Tesla and VW further down in the document

Interacting intelligent transportation systems

By equipping vehicles and road infrastructure with sensors, vehicles can communicate with other vehicles around them and exchange information regarding their geographical position, speed, types of vehicle, cargo, engine category, remaining range, number of people on board, emission levels and much more.

Automated vehicles can also receive information from other modes of transportation and from transport infrastructure itself. This opens vast new possibilities for influencing traffic flow and enabling more accurate regulation. For example, all vehicles can be forced to comply with the speed limits near a school at certain hours. Interacting vehicles can also significantly improve traffic safety, as cars will be able to warn each other about slippery roads and other potentially dangerous conditions and situations. A range of new options to reduce negative environmental impact will also become available, for example through pricing and other restrictive measures.

New business models – shared mobility

Digital solutions in other industries have resulted in a number of innovative services involving a shift from owning to renting. For transport, this means customers can gain access to various modes of transportation—such as public transport, car share clubs/car pooling, electric city bikes, e-scooters, taxis and car rental—through a single digital solution like a smartphone app. This is often called "Mobility as a Service" (abbreviated MaaS). For many, this means investing in a privately-owned car is no longer necessary. The changes described here are paving the way for new companies that have not played a key role in the transportation market until now. It also stimulates the sharing economy among private individuals who can offer their assets to others in ways that are easier than before. The value of access to a customer's time and attention—and thereby data—can also lead to changes in business models. Time spent travelling constitutes a significant proportion of many people's waking hours, especially commuters. Business models in which transportation is offered at low cost, or free, based on payment in data/attention, is not an unthinkable scenario.

The Norwegian expert committee considers these technological driving forces strong enough to force the transportation authorities to consider them relatively robust conditions for planning future transport infrastructures. Other reports from the Institute of Transport Economics (TØI)⁴⁰, SINTEF⁴¹ and interdisciplinary studies prepared for The National Transport Plan for 2022-2033⁴²

describe the same trends in technology that the committee of experts presented in its report. Commercial operators are echoing the sentiment. Toyota refers to this development as CASE (Connected, Autonomous/Automated, Shared and Electric).⁴³ The expert committee also said that each one of these trends has great potential to initiate change by itself, whereas the combined potential of all the trends will create synergy effects all the more powerful.

These technological changes in the transport sector, combined with the rising demand for sustainability, the expectations and behaviour of inhabitants and a data-driven economy, provide completely new opportunities for mobility in Norway. Technology is not a goal in itself; rather, it functions as a tool to achieve various desired objectives. Technology also affects existing modes of transportation and their abilities to achieve desired objectives. For example, an electric, self-driving car can be a sustainable and cost-effective solution for many transport needs. The changes pave the way for new companies that have not played a key role in the transportation market until now. Technology companies, car manufacturers, telecommunications companies, banks and existing public transport/transportation companies all want to solve the customers' mobility needs in new ways. This development is contributing to the rapid change in the transport sector.

⁴⁰ TØI Report 1671/2018 "Technology trends in the transport sector in a Norwegian context", <https://www.toi.no/getfile.php?mmfileid=49209>

⁴¹ SINTEF Report 00303 – 2017 "Technology trends that affect the transport sector". <https://www.sintef.no/publikasjoner/publikasjon/?pubid=CRISTin+1496926>

⁴² NTP 2022/2033 Main Report: Technology trends in the transport sector, https://www.jernbanedirektoratet.no/contentassets/b67e526f127d42fdb985ce6ea6550ea3/teknologi/teknologitrender_i_transportsektoren_endelig.pdf

⁴³ <https://global.toyota/en/mobility/case/>



2.3 The fast pace of change

Product and service development in recent times has shown that customers are quick to implement new technology if it simplifies everyday life. Innovation is about renewing or creating something new that generates value for businesses, communities or inhabitants. Its form is experimental, and is it not easy to predict which solutions will work before they suddenly prove successful.

While incremental or breakthrough innovation involves improvements with a moderate-to-major impact on an existing product, disruptive innovation implies an existential threat to currently active parties who may be blindsided by entirely new services or products.⁴⁴ Disruptive innovation is affecting a number of industries today, and the technological drivers described above are a major reason that these changes are happening so quickly. Examples include the

transition from CDs to Spotify, from video rental to Netflix and from hotel chains to Airbnb. In the transport sector, we see a shift from traditional taxis to Uber in many cities. A potential disruptive development within mobility will challenge the business models of existing operators.

⁴⁴ This concept was defined by a professor of Economics at Harvard, Clayton Christensen <https://www.christenseninstitute.org/disruptive-innovations/>

2.4 Case – What are different mobility operators doing?

Car companies

Autonomous vehicles — Tesla

Tesla is betting aggressively on self-driving technology and presented its strategy for this field in April 2019. All new Tesla cars are now sold with the hardware necessary for autonomous operation, while software is updated by communicating with Tesla's fleet of cars currently on the road. All their cars communicate and send data via mobile data networks. When the software is sufficiently refined and regulatory authorities allow it, anyone who owns a Tesla will be able to offer their cars to others as robot taxis while they are not using them themselves.

CEO Elon Musk said in April 2019 that the concept of robot taxis will be initiated in 2020, provided the necessary regulations are in place. Such a system could radically change the economic realities of owning a car (which on average is only used 5 percent of any given day). All robot taxi interactions will be carried out via Tesla's app, and Tesla will

earn 25-30 percent of the revenues. Basically, Tesla will use its interface to go from selling car products to selling transport services overnight.

New business models — Volkswagen

CEO of VW Herbert Diess said in January 2020 that the time for traditional car production is over. He sees cars becoming society's primary and most complex internet devices. Cars will go from being grey boxes to becoming comfortable, multifunctional devices. He thinks people will spend much more time in their cars in the future, maybe two hours, compared to one hour today. He pointed out that Tesla is valued as a technology company, while VW is still considered a car company. VW sees itself needing to make changes. As we speak, Tesla is worth more than VW, despite the fact that VW sold around 11 million cars in 2019, compared to Tesla's 367 500.



New operators

Micromobility

Micromobility means electric and pedal-driven transport solutions. The most common micromobility unit today is the electric bicycle, but the last few years have seen a considerable surge in popularity for electric scooters. In the course of a few years, more than 500 million people have begun to use various forms of micromobility. This is the fastest adoption of a new technological platform ever, even faster than the PC evolution, including internet and smartphones.

Micromobility solutions are popular because they tend to be faster than alternative modes of transport in traffic-heavy urban environments, and because of their ability to take the user all the way to the doorstep of their destination. Only a relatively low investment is required on the user's part in order to get started. Another reason for high investments being made in micromobility companies is their potential to generate mobility data and thereby offer valuable customer insights. McKinsey estimates that shared micromobility solutions on a global basis may be responsible for 8-15 percent of the market share of trips below eight kilometres.

The city of Oslo saw an explosion of e-scooters in the spring of 2019, with seven operators establishing themselves in the city between April and August that year. Figures from the two largest companies suggest that 350 000 individual trips were made over the course of a three-week period. However, this sudden blossoming of e-scooters has stirred mixed feelings amongst the population. As a means of transport they are very popular, but the concept has also been criticised because of the space e-scooters take up in the city when not in use. E-scooters strewn haphazardly along streets and pavements are known to present a frustrating physical hindrance to some groups, such as the elderly and the visually impaired.

Ride-sharing company — Uber

Uber is now available in more than 700 cities and carries out 14 million trips daily around the world. Chinese company Didi has registered more than 550 million users and facilitates 30 million trips per day. Uber is open about the fact that their vision is to be the customers' one-stop-shop for transportation in cities. The company is about to integrate public transport services into its app, as well as e-bikes and e-scooters. Uber has also integrated other services such as food delivery from restaurants (Uber Eat),

goods transportation etc. into their business model. Companies like this have high market value; Uber was valued at more than 83 billion dollars at the stock exchange listing in 2019, and invests a great amount of money into developing future solutions. Self-driving technology is an important part of Uber's long-term strategy, but Uber is also evaluating new opportunities and investing large sums of money in flying drones. In 2018, the company invested around 4 billion dollars in developing new advanced technologies for the future of mobility.

With the Norwegian government's proposal for new taxi regulations scheduled to take effect in 2020, Uber and similar companies will soon be able to offer their services in Norway again.

<https://ir.tesla.com/events/event-details/tesla-autonomy-investor-day>

Mer detaljer om hvor ofte en bil brukes her:
<https://www.reinventingparking.org/2013/02/cars-are-parked-95-of-time-lets-check.html>

<https://www.ft.com/content/8ba1dde4-3869-11ea-a6d3-9a26f8c3c3ba4>

<https://www.bbc.com/news/business-51214824>

<https://www.dn.no/d2/tekno/teknologi/mikromobilitet/elsykkel/den-neste-store-teknologirevolusjonen-er-den-du-snart-ruller-rundt-pa/2-1-497001>

<https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/micromobilitys-15000-mile-checkup>

<https://samferdsel.toi.no/forskning/elsparksyklene-nye-fakta-om-tilbud-og-bruk-i-oslo-article34312-2205.html>

<https://www.uber.com/nb-NO/newsroom/selskapsinfo/>

<https://www.uber.com/no/nb/atg/>

<https://www.uber.com/no/nb/elevate/>

<https://www.regjeringen.no/no/tema/transport-og-kommunikasjon/ytransport/sporsmal-og-svar-om-nytt-drosjeregulering/id2641640/>



3. Consequences of societal developments – changes in the transport sector

The societal and technological developments described in the preceding chapters are making a considerable impact on our journey towards sustainable mobility – providing enormous opportunities and equally sizeable challenges.

This chapter discusses the consequences of these developments and Ruter's proposed solution to best meet the needs of our community.

3.1 Ideal solutions need to take the big picture into account

To provide viable long-term mobility solutions for the inhabitants of our region, we need to strike the right balance between each individual's wishes and the common interests of our community. Inhabitants influence the transport sector's development through their many day-to-day travel decisions, but the sum of all individual decisions does not necessarily lead to developments that are beneficial for society as a whole.⁴⁵ It is difficult for people living in a city to coordinate their choices in pursuit of a common good. Because of this, rules and regulations are in many cases a necessity.

The United Nations' Sustainable Development Goals constitute a sound framework for manoeuvring ahead, providing a comprehensive overview of the challenges we as a society must work to overcome for the benefit of all. Well-functioning transport systems are a fundamental prerequisite for improving economic, environmental and social conditions in any part of the world. Thus, the attaining of several Development Goals depend heavily on contributions from the transport sector. The committee of experts on the

technology of future transport systems mentioned earlier has stated that "without well-functioning mobility services it will be challenging for any community to attend to the needs of its populations, whether those needs be security, health care, employment, well-functioning cities or a healthy climate".⁴⁶ Because of this, the Development Goals need to be integrated into decision-making processes. Any proposed strategy or activity should be deliberated in light of how it contributes towards the Development Goals.

Shared physical space and infrastructure belongs to the inhabitants and should be used in a way that benefits the community as much as possible. Access to land area and infrastructures is limited. An empty vehicle takes up as much road space as a full one. To ensure effective use of resources, the future of mobility solutions must include vehicle sharing. High-capacity transport such as buses, metros and trams offer the most effective use of land, but in some cases these solutions are

⁴⁵ The Tragedy of Commons is a wellknown concept of economics. This is explained in simple terms here: <https://www.youtube.com/watch?v=WYA1y405JW0>

⁴⁶ https://www.regjeringen.no/contentassets/ccdc68196014468696a-cac6e5cc4f0e7/rapport-teknologiutvalget_web.pdf

expensive compared to the number of travellers who use them. Many new mobility services are being implemented (such as car-sharing, city bikes and e-scooters) to help us share our means of transport, but not necessarily by using the same means of transport all the same time.

Inhabitants' choices when it comes to transport are determined by availability, travel duration, price and reliability. Each individual's decisions are also influenced by the decisions made by other inhabitants. Individuals are an active part of the transport system, not only buyers and recipients of services. Ideally, the population should take part in developing transport solutions through active participation and feedback. Inhabitants will always choose the mobility solutions that best suit their specific transportation needs, and publicly provided mobility services should therefore be developed in tune with the preferences of its customers.

Self-driving car study

In 2018, COWI carried out a study on the introduction of autonomous vehicles in Oslo and Akershus, on behalf of Ruter. Ruter simulated the possible effects of a full transition to autonomous vehicles in the study based on shared vehicles for all possible private car trips and collective journeys. The study shows that the consequences of introducing autonomous vehicles will depend entirely on how the new mobility offering is used (degree of sharing in each vehicle), competition with other modes of transport in the existing public transport system, and thus how these parameters potentially could be affected by regulations set by the transport authorities.

The simulations show a broad range of potential outcomes should autonomous vehicles be introduced, depending on which prerequisites are used to analyse four separate scenarios. In the best case, autonomous vehicles could help Oslo reduce traffic (kilometres driven) by as much as 31 percent; in the worst case, traffic could double and the road network effectively collapse. In any case, sharing vehicles will be a decisive factor for reducing traffic. Based on the assumptions that form the basis of the study, the total amount of self-driving vehicles required to serve the Oslo-region is likely to vary from four percent to nine percent of the current number of private cars in the region.

More info here: <https://www.cowi.no/om-cowi/nyheter-og-presse/ny-rapport-slik-vil-selvkjorende-transport-paavirke-oslo-regionen>

3.2 Societal development in a data-driven economy

3.2.1 Enormous opportunities

Norway has to work smarter and more efficiently to maintain its competitive strength and level of welfare in the years to come. Digitalisation, the data economy and artificial intelligence will all play key roles in solving both day-to-day hurdles and significant societal challenges in the future – from sorting family photos and identifying smart investments to making more precise medical diagnoses and carrying patients safely home from hospital. Smart utilisation of data is absolutely essential to achieve the UN's Sustainable Development Goals.⁴⁷

Norway is in an excellent position to take advantage of these opportunities, and we are among the highest ranked countries in Europe when it comes to digital competence.⁴⁸ Furthermore, Norwegian society is built on a very high degree of mutual trust and respect for human rights and privacy.⁴⁹

3.2.2 Major challenges

The changes that come from a data-driven economy are enormous for individuals, businesses and the community as a whole.

Society is currently organized in a way that allows private operators to deliver services and products to end users within a given set of rules and regulations. Competition between operators—and the customer's freedom to choose or switch between different suppliers—is crucial to ensure that quality products and services are available at reasonable prices. The development of digital monopolies, however, is uprooting some of these basic economic conditions. New network effects and scale effects make it difficult for newly-started operators to offer equally good services as those offered by the leading companies. This type of development is contagious and spreading quickly across many industries. Many industries are being changed very quickly by innovation. Customers get better services in the short term, but it is doubtful that the development of a few giant operators controlling large parts of the economy is in the best interest of society. If society becomes too dependent on the services of multinational companies, it can become more difficult to determine which rules should apply to the digital economy.

Individuals disclose large amounts of data to private (often foreign) companies without sufficient regulation and knowledge of how data is used. Data is in many cases also resold to other companies.

This raises some major concerns within society. Personal data can be used illegally and unethically, which is challenging our basic right to privacy.

Large amounts of private data and smart machines open the door to social surveillance and manipulation of a nation's citizens. Some countries around the world are investing in and utilising data and artificial intelligence on a large scale to monitor and control their populations. Microtargeting is an example of a type of digital advertising based on personal information collected from various digital sources such as internet usage and social media activity. This type of advertising has made Google and Facebook two of the world's most profitable companies. It is also being used by companies such as Cambridge Analytica to deliver highly targeted messages to individuals. Various forms of microtargeting political messages have become commonplace in the United States, but as a tactic it is also being employed in the United Kingdom, the Netherlands, Germany, France and Norway.⁵⁰

An important question must be answered when data and new technology are used to offer tailor-made customer solutions: What criteria and ethical considerations govern the choices the machines make? Algorithms, and those with access to the data that the algorithms are fed, have the power to influence an individual's decisions and thereby how a region will develop.

Data about individuals, the public sector and businesses represent an enormous value for the community, and the data becomes more valuable the more it is utilised. Several countries (including Norway) and international organizations are now assessing how rules for utilising and sharing data can protect the value of the data of their citizens and customers as much as possible, in order for the information to benefit the community. The taxation of multinational enterprises in a data-driven economy is a key challenge in this work.

Pre-existing structures for managing society, as well as the economic rules of the game, were designed for a time without a data-driven economy. The public should work to gain control over digital developments. Rules for collecting, storing, managing, sharing and utilising data will be critical in the management of communities and to ensure development according to the Sustainable Development Goals and democratic principles.

Thoughts on data factories

Companies in the United States and China are at the forefront when it comes to attaining and handling large amounts of data – largely within the private sector and aimed at individual users. The public sector in Norway is at the global forefront when it comes to scope and quality of data collected on its population. Mobility services developed on the basis of public data utilise existing public infrastructure. This implies that the value of utilising such data should benefit the public.

The community must therefore try to establish business models in which the application of public data benefits its owners (the citizens). For example, we might imagine the establishing of a 'data factory' tasked with collecting valuable data from various sectors in society. Management of such data can contribute directly to the creation of innovative customer-oriented services within the mobility sector. Business models can then be developed in which the value of this data becomes the property of the community by ensuring that stakeholders utilise the data for innovation and development. Of course, business models of this kind must be set up according to existing legislation within any given area. Protecting privacy and establishing common ethical rules will be important.

⁴⁷ <https://www.menon.no/wp-content/uploads/2019-88-Verdskaping-med-data.pdf>

⁴⁸ <https://www.ssb.no/teknologi-og-innovasjon/artikler-og-publikasjoner/norge-i-europatoppen-pa-digitale-ferdigheter>

⁴⁹ https://www.regjeringen.no/contentassets/db9bf2bf10594a-b88a470db40da0d10f/no/pdfs/digitaliseringsstrategi_for_offentlig_sektor.pdf

⁵⁰ <https://www.datatilsynet.no/globalassets/global/om-personvern/rapporter/pa-parti-med-teknologien.pdf>



3.3 Opportunities for sustainable mobility

The challenges and opportunities described above show how a data-driven economy can become part of our society, and how creates a backdrop for the developments that can be expected within mobility. What are the implications of these changes? And are they compatible with our desire for sustainable development, safeguarding personal privacy and good management of society's scarce resources?

3.3.1 Better services

New technology and the development of data-driven services make it possible to align individual needs with common goals of sustainability in all-new ways. Trains, subways, trams, buses, private cars, boats and—not least—bicycles and walking are all well-known mobility options available today. Other solutions such as car-pooling, autonomous vehicles and incentive-based services (where the user is rewarded for desired behaviour) are being introduced at a rapid pace.

Ongoing technological developments will be decisive in determining which means of transportation can be offered to customers, as well as how they are presented. Technological advancements will have many consequences for public transport in cities and in sparsely populated areas. The combination of paying for transport as a service and the use of digital customer interfaces means customers can be offered a wide range of transport solutions covering all of their transportation needs. In the future, the sum of all transport options available through a digital customer interface can present a real alternative to owning a private car. Negative environmental effects like air pollution, injuries and accidents can also be significantly reduced.

Digitalisation allows for increased customisation of services based on the customer's preferences and data history. A travel suggestion can be based on how you have chosen to travel in the past or which modes of transportation you generally tend to prefer. Travel apps can also take into account such things as the weather forecast for the rest of the day, congestion developing in certain areas etc. Service updates will not only inform you about changes to a transport service; they will propose relevant options. Services will be increasingly dynamic and adapt to specific needs. Where public transport used to be bound by rigid time tables and physical stations, today's mobility services have started to encompass real-time ride hailing, pickup at any location transport all the way to the doorstep of one's destination. All inhabitants are equally important. It is important in any society that transport systems are acces-

sible to as many people as possible. Individually tailored mobility solutions will open up completely new opportunities for groups with special needs. The concept of Universal Design entails converting current services and infrastructure to make them available and user-friendly for all customer groups. At the same time, the obstacles and challenges faced by an individual are often unique and prone to change over time. The individualisation of mobility services will benefit all travellers, but especially persons with disabilities.

A system of autonomous, connected vehicles will open fantastic new opportunities to provide citizens with a sense of being able to move freely around. The vehicles will autonomously find the optimal route to any destination, whether to pick up someone from work, deliver goods, drive children to school or partake in a ridesharing service. Roads will be used more efficiently and traffic systems will be more effective as the autonomous vehicles communicate continuously with each other. In case of heavy traffic, vehicles will automatically identify alternative routes. Since most traffic accidents are caused by human error, traffic safety can be expected to improve drastically.

The potential of autonomous vehicles is bound to play out differently in urban areas than in more sparsely populated areas. As the technology is introduced, city inhabitants will likely start to notice a greater selection of transport options becoming available, with solutions that better combine each customer's preferences with available transport capacity and routes. In more sparsely populated areas with more surface space available for transport, increased flexibility will likely be key, i.e. fewer scheduled routes, more door-to-door on-demand transport services. Since present-day public transport solutions are most effective in areas with high population density, it is not unlikely that those areas will see the biggest changes in the short term.

3.3.2 More cost-effective solutions

Transport sector costs amount to vast sums every year. However, an increasingly data-driven transport sector will in time be able to provide the same level of mobility to a given population using fewer resources than before. This means cost-effective solutions and more efficient use of infrastructures, vehicles and other resources than a transport sector that is less data-driven. Adapting the use of resources to match the level of demand will lower costs per trip compared to today's levels. Some examples of how data-driven service development can produce more cost-effective solutions:

- Vehicle sizes adapt to changing customer volumes throughout the day.
- Transport can be ordered as needed using an app. Customers are no longer bound to static timetables and routes. This can reduce the cost of routes that usually transport few passengers.
- Electric vehicles are expected to decrease the marginal cost per driven kilometre.

- A new signalling system will make it possible for subway trains to operate with shorter distance between them, increasing departure frequencies along existing subway infrastructure.
- The need for infrastructure such as information screens and ticket vending machines will be greatly reduced when customers plan their trips.
- Digital solutions can more easily be scaled for common use. Common use can lead to shared development costs.
- Vehicles will be automated.

An important cost driver for current public transport solutions is the expansion of maximum capacity in order to cover morning and afternoon rush hours. It is difficult to establish cost-effective solutions to deal with these capacity peaks using current technology for various reasons (such as limited access to vehicles and drivers). The developments outlined in this strategy will allow completely new solutions to reduce these critical capacity peaks. Incentive schemes for travelling

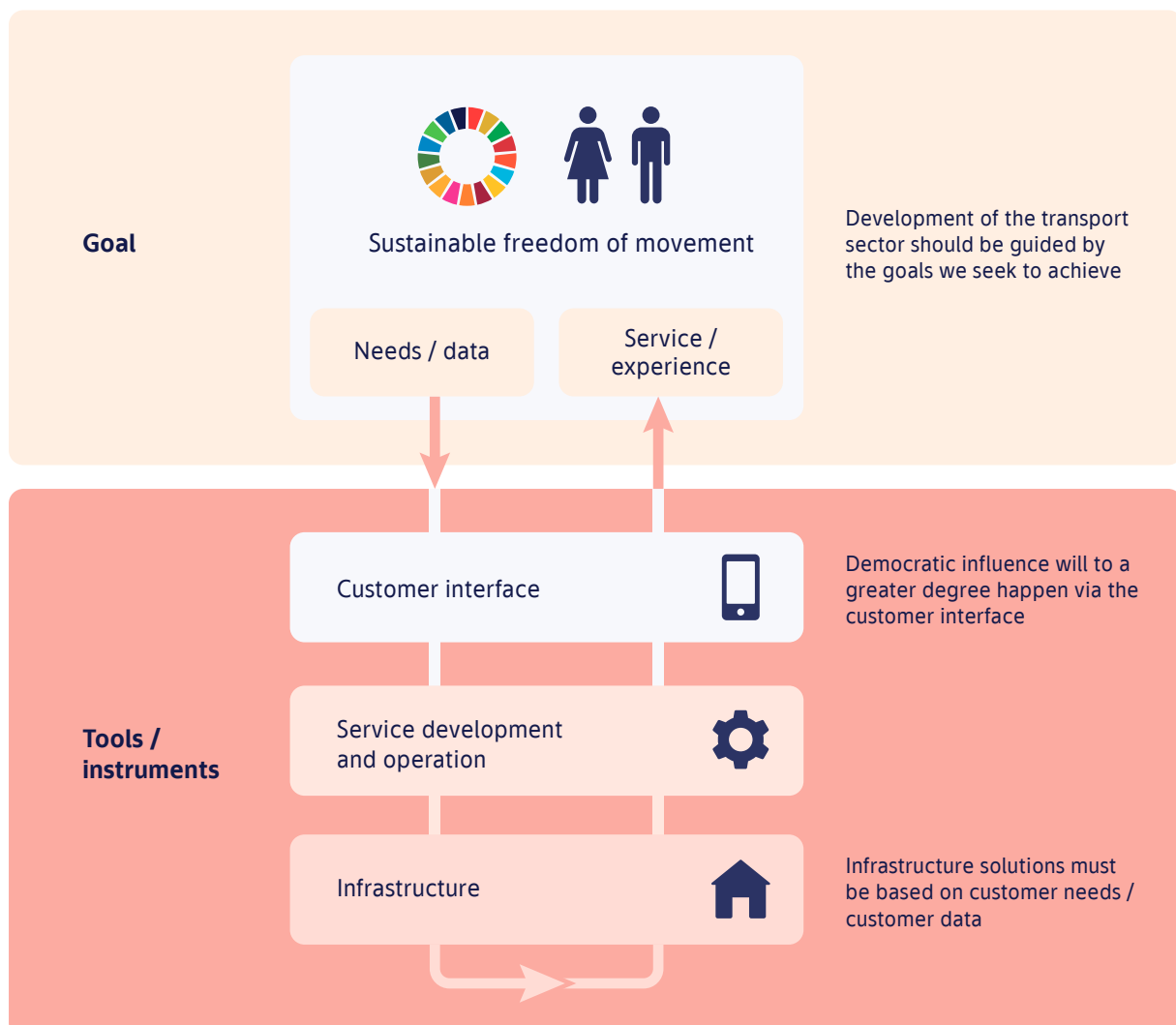


Figure 8: Democratic governance of future transport systems

outside rush hours, new transport solutions, using the same vehicle for disparate transport service (passenger transport in the morning and afternoon, goods transport the rest of the day) etc. can save the community major investments and help make transport operations most cost-effective.

3.3.3 Holistic management

Today, inhabitants of the Oslo-region are generally limited to choosing between their private car, public transport, bicycling or walking in order to move about. In the future, inhabitants will be able to choose between various modes of transport available from various different providers, purchasing each journey as a service. With a variety of travel options available to every customer, it is important that we understand how the customers make their choices. What kind of app do they prefer using? Or in the near future: What kind of voice command device will they be speaking into when ordering their trips?

A large part of present-day transport sector management relates to decisions about infrastructure investments, route schedules and number of departures. Restrictive measures to reduce car use, such as toll roads and prioritised lanes for bikes and public transport, are other ways to manage public transport. An increase in modes of transport and the emergence of new business models will change the community's power to influence the development of mobility. Up until today, democratic control over the development of public transport has been secured by sharply increasing the capacity of existing services and investing in new infrastructure.

The company or otherwise who owns the customer interface for a service will also own the default solution, and thus be in a position to greatly influence customers' decisions.⁵¹ When it comes to mobility, several different factors combine to determine what the 'best' solution for the customer is, including travel time, time of departure, price, safety, comfort and eco-friendliness. Consequently, as shown above, customer interface data will become an increasingly important resource in the development of attractive solutions. Ownership of the preferred customer interface opens the door to more comprehensive traffic management, where measures such as the following may be employed:

Service development – Future services can be targeted towards specific social groups (such as age-friendly transport for the elderly or activity-transport for children after school), be easier to integrate and easier to prioritise as part of comprehensive service offering.

Recommended standard solutions for customer interfaces – Which solutions/options are presented at the top of the customer interface will have a great impact on the customer's choice of how to get around (including walking). Incentives for cycling, walking or vehicle sharing during rush hours are a way to influence travellers' choices to the benefit of the community.

Price – With a wide range of public mobility services available, pricing of the various services can be a tool to influence desired developments.

Control of the customer interface brings new opportunities for pricing societal assets that are not currently priced. Examples of this include clean air and land area. In situations where private operators supply new mobility services to a public mobility system, price mechanisms relating to the use of physical space may play a part. This is particularly applicable where space is limited; the higher the scarcity of land, the higher the price and vice versa. The use of vehicles that have a negative impact on air quality can be restricted during periods of poor air quality. Behaviour can also be influenced by informing users about the various effects of their choices.

⁵¹ The Book "Nudge" by Richard Thaler and Cass Sunstein from 2008 elaborates on this phenomenon in detail for various industries.

3.4 Increasing competition for the customer interface

A number of ambitious transport and mobility companies are currently competing for advantageous positions on the mobility market of the future. There is every reason to believe that such parties see the value of owning the preferred customer interface in a given city or region, either by being the platform for browsing and selecting mobility services (provided by others) or by supplying solutions themselves by managing their own fleets of vehicles. Below are a few examples of companies taking strides into the future of mobility.

Examples – increasing competition for the customer interface

1. Tesla – There are now an estimated 20 000 Teslas in the Oslo region*. CEO Elon Musk claims self-driving cars will be on our roads in the near future. If so, and given that the necessary regulations are in place, all owners of newer Tesla models could soon be able to offer their cars as a means of transport to others via the Tesla app – potentially putting thousands of new autonomous taxis on our roads overnight. The marginal cost of an electric self-driving car is very low (one Tesla currently uses around 2 kWh/10km = 2 NOK /10km), so the prices Tesla could offer would be completely different to the current price of existing taxis.

Note: * <https://teslastats.no/>

2. Uber – Uber primarily offers a taxi service where individuals use their own cars as taxis, with the Uber app connecting customers to drivers. A related service, Uber Pool, provides the opportunity for several people to travel in the same car at once (ride sharing). With the scarcity of land in urban areas and demand for more efficient use of resources, ride sharing and car pooling are positive developments for society. The consequence of introducing such a service must be seen in the context of where this service is provided and which services/trips it replaces. How does the community want such services to work, in conjunction with other mobility services being offered? Is it desirable or beneficial to society that a private company starts operating minibuses along a city's most heavily trafficked roads (and thus its most profitable routes)?

It is a good thing for private operators to use their market insight and travel pattern data to provide capacity where it is needed most. At the same time, this can adversely affect the ticket income of the public transport authority in the given area – an authority tasked not only with operating along profitable routes, but

3. MaaS operator* – With changes to legislation, Uber or another MaaS providers such as MaaS Global could start selling public transport tickets via their own customer interfaces (i.e. their own apps). In the Oslo region, such companies could plausibly benefit from selling Ruter tickets cheaper than Ruter is willing to sell them in order to draw users to their app/interface. As its user-base grows larger, the company in question would to an increasing degree be able to influence and direct customers to whichever mode of transport it sees fit – be that public transport, walking, shared cars, private cars or otherwise.

Algorithms determining the transport options displayed in the customer interface would be controlled by the company, and there is reason to believe that profitability would be a strong driving-force. Such a development would also mean that the company would be able to get better and better access to data on customer travel patterns. This would allow the company to develop the most attractive mobility services in the area, thus assuming an ever-increasing level of control over the population's movement patterns, choices and habits.

Note: *MaaS = Mobility as a Service

Developments imply increased opportunities for private companies to take a greater share of the market from existing public solutions, either directly by offering services or own solutions, or indirectly by allowing customers to select and book travel via their interfaces. This decreases the ability of publicly owned companies to influence developments in the mobility sector. Safeguarding the needs of the public amidst these ongoing developments in the transport sector requires effective regulation. Furthermore, a development

of this kind may lead to fewer customers for public services, resulting in reduced income for publicly owned companies. Reduced income (if not compensated by additional government subsidies) will lead to a reduction in public services offered to the population. Ultimately, fewer customers will also lead to a reduction in access to data. As a consequence, the quality of public transport services will be unable to match that of private service providers.

3.5 Positioning for potentially disruptive changes

It is difficult to accurately predict the implications of the technological developments and societal changes described in this document – i.e. what kind of changes will occur when and how. Ruter's approach is to accumulate insight by observing and analysing changes that occur and use this insight to draw conclusions about fundamental issues. This allows us to draw up hypotheses regarding the consequences of current developments, and to suggest actions. These are some of our key observations at this point in time:

- The changes that are now occurring globally point towards more data-driven business models, powered by—among other things—artificial intelligence. This development will have a significant impact on the development of society in general, and on the transport sector in particular.
- The changes can happen very quickly.
- If the public sector is to maintain a degree of control over developments in the transport system, we must assume that service development and customer interface will increasingly influence how people travel – and that future service development will to a much greater degree be based on access to data.

In Ruter's opinion, these development trends mean we have to act now. Evidence from other industries indicates that a continue-as-before approach is likely to have negative consequences for the community, and that these consequences may be difficult to reverse. Once a new solution becomes apparent it may already be too late to act, because someone else has already assumed a position of control.

3.6 What is a good solution for the community?

Given the societal and technological developments we can observe: What is a common frame of reference for the solutions that our inhabitants are going to expect from the future of mobility? Our vision of Sustainable Freedom of Movement assumes that the inhabitants want

- the freedom and ability to live their lives moving unrestricted around as they please – regardless of their income or social standing (Freedom of Movement)
- sustainable solutions that are eco-friendly and take social and economic factors into consideration (Sustainability)

Societal development as described above means the following factors are important to safeguard:

- democratic governance of the transport sector, where politicians actively influence desired developments on behalf of the community
- privacy, where information about a customer is managed and utilised in a responsible and safe manner based on good ethical principles
- that the value of the use of infrastructures, land use, and data belongs to the community
- innovation and a competitive business sector

Ruter believes that in order to properly address societal concerns, publicly owned companies must play an active role in developing the future of mobility. Publicly owned companies must be able to offer competitive and attractive services to customers, in order to win that most coveted position in a data-driven economy: Ownership of the preferred customer interface. Public ownership of the preferred customer interface for mobility in our region is vital to ensure the democratically-controlled development of the transport system. This is equally relevant in densely populated urban areas and more sparsely populated areas.

To be able to provide good mobility solutions, the transport system has to be developed in cooperation with the inhabitants of the region and with the community's best interests in mind. Insight into, and an understanding of, the population's needs is critical to the development of services. Local operators who know the market and understand local needs have an advantage. Insight down to the level of the individual traveller must be attained, but without identifying or exposing individuals themselves, and an approach must be chosen that creates understanding, trust and support. Access to and responsible utilisation of data is key.

This requires digital expertise and infrastructure that enables data-driven service development.

It will not be possible for the public sector to produce attractive, comprehensive mobility services unless we draw upon the innovative potential of the entire value chain. Doing this will require new forms of cooperation, new kinds of relationships and perhaps even entirely new or different value chains. All parties have to work smart, together, and leverage their respective advantages in order to develop the transport sector in a desirable way. It is not possible to achieve this without innovative, competitive and ambitious suppliers.

The approach described here does not rule out an environment where private companies compete against each other in developing innovative and attractive solutions; rather, it means that the competition amongst private companies will be directed towards the publicly owned company, which in turn will take on a coordinating role in making the most attractive services available to the end users (the customers). It will also involve private operators offering their own solutions directly to customers.

This approach to development will demand a high level of competence across the entire value chain, requiring companies to share their knowledge with each other and with various levels of the administrative authorities. Authorities must in turn make sure that an appropriate framework for developing and operating infrastructure is place (digital as well as physical), and ensure that the system stimulates innovation. Collaboration and the sharing knowledge and experience are key; results will be greater and the degree of innovation higher than if everyone works individually. In the long-term, continuous development of the sector will require research activities based on a common framework. Cities around the world are trying out different models to achieve good mobility for their inhabitants. The roles of—and relationships between—public and private companies vary from place to place. Norway and the capital region of Oslo can be considered to be at the forefront of developments in this field. The economic, political and institutional system in the Nordic countries is often referred to as “the Nordic Model”. If Oslo and Viken succeed in reaching a shared vision for Sustainable Freedom of Movement as described in this strategy, we can contribute to making Norway a pioneer in the development of new, sustainable mobility solutions. Our ambition could be to develop a new Nordic Model for Sustainable Mobility.



Arguments for why Ruter believes companies owned by the community should play an active role in the development of future mobility are summarised in the table below.

Important social considerations

Sustainable mobility	Private companies can deliver good mobility solutions. Private companies are also increasingly committing to achieve the UN Sustainable Development goals. Still, companies have economic incentives to maximise their own profits. For example, the customers with the highest willingness to pay are often prioritised. Many sustainability concerns can be met with laws and regulations, but doing this effectively will become challenging as the data-driven economy develops faster and faster. A publicly owned company that meets and communicates with its customers every day will be able to act and respond quickly to their needs and wishes while simultaneously being governed by important societal and political goals.
Ensure democratic governance of mobility	Public ownership of the preferred customer interface is fundamentally important to ensure good, democratic governance of the transport sector. A publicly-owned mobility company that does not own the preferred customer interface risks finding itself as a supplier of public transport within a system that is in reality governed by private (and most likely international) companies.
Ensure privacy and responsible management of data	Development in the data-driven economy—driven by artificial intelligence, machine learning and the processing of large volumes of data—makes privacy, data security and the ethical use of data important topics for discussion. The government’s strategy for artificial intelligence emphasises accountability and reliability. Close collaboration between regulatory authorities and the companies of the sector will be important to ensure development in an ideal direction. A local, publicly owned company in close contact with its customers would in a good position to comply with and safeguard the important principles of data management.
Ensure that the value of the use of infrastructures and data is owned by the community	Data is becoming increasingly important for value creation in society. The public can continue to own this value by obtaining, utilising and sharing data from vital sectors of society – such as the transport sector. A company with an active role on the market is in a good position to assist authorities in developing sector regulations. Ownership and management of mobility data will also make it easier to create systems where value created within the public infrastructure benefits the community that has invested in this infrastructure.
Ensure innovation and a competitive industry	The approach described here does not rule out an environment where private companies compete against each other in developing innovative and attractive solutions; rather, it means that the competition amongst private companies will be directed towards the publicly owned company, which in turn will take on a coordinating role in making the most attractive services available to the end users (the customers). With strong driving forces pushing us towards digital monopolies, such developments could contribute to a greater diversity of suppliers and effective competition.



4. Ruter's Strategic Direction

4.1 Sustainable, inhabitant-oriented service development

Ruter exists for the benefit of the community, and the company's strategic goals are directly tied to the expectations of our region's inhabitants. We believe our company can best contribute towards sustainable mobility by providing and owning the region's preferred customer interface for mobility. This can only be achieved if we manage to offer attractive services that our customers want to use. This, in turn, will require the development of new and better transport solutions with a greater degree of individualisation – in close cooperation with the region's inhabitants themselves.

This can be done by

- developing new solutions that are integrated into existing services and infrastructures
- building a digital infrastructure and developing expertise within data-driven service development
- leveraging market forces and promoting collaboration and innovation across the entire value chain

The key elements of Ruter's work towards sustainable mobility can be summarised in the following strategic framework:

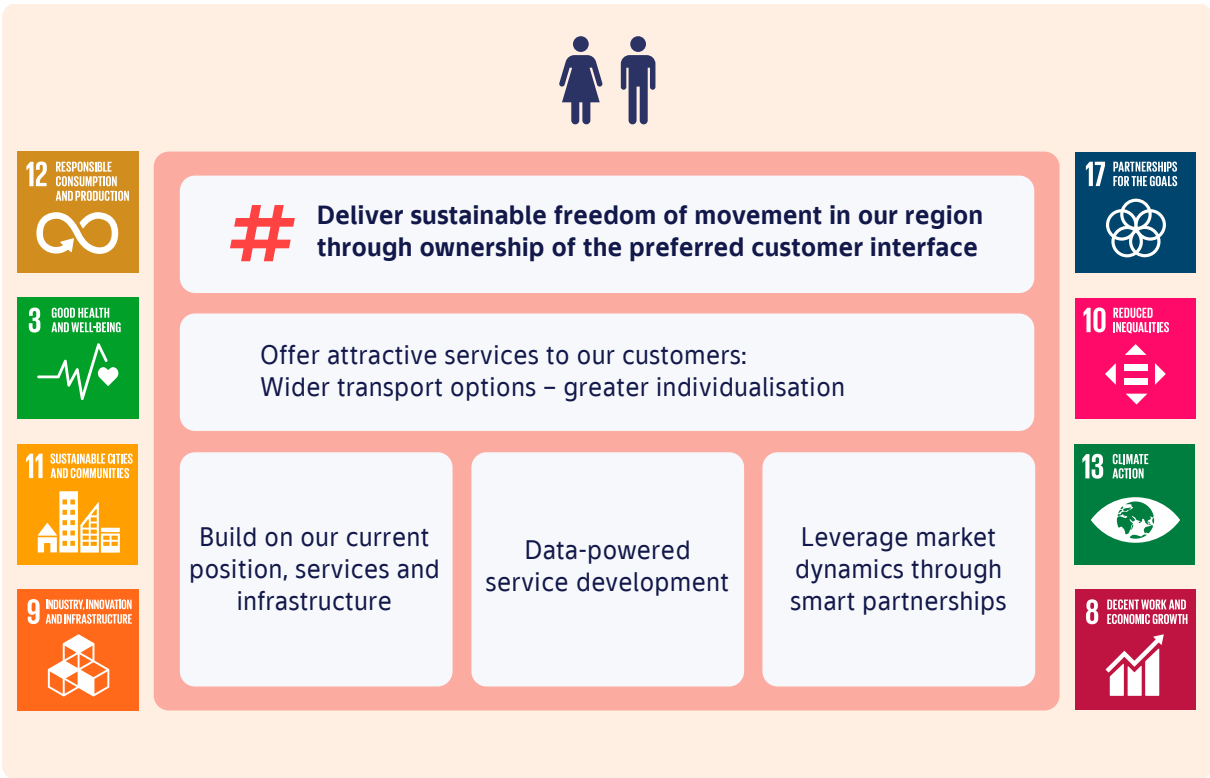


Figure 9: Ruter's strategic framework

Being a publicly owned company entails transparency. It also entails staying closely in touch with the inhabitants of our region in order to understand their needs and demands. Proper involvement of the public means inviting our customers to the table at the start of any process, allowing them to help define the problem, not just the solution. Ruter must be customer-oriented in our approach to developing mobility services and creating good customer experiences. Our goal is to make the customer the centre of attention, always be aware of who they are and always focus on how our services can be developed to better meet their needs.

Ruter is to work for a more inclusive society. Every person in our region should have access to our solutions and services, everyone should afford and be able to use them, regardless of factors influencing their individual lives.

Ruter was created for the people who live and travel in the Oslo region, and it is our job to earn their approval. For Ruter to succeed in this, the inhabitants need to feel that Ruter provides services they can rely on. Safety and security are important to the customer and for all other users of the transport infrastructure. For example, customers are entitled to know who is responsible for the transport service they are using, how any unforeseen incidents will be handled, etc.

4.2 A wide range of transport options and more individualised services

Future services will be more tailored to the individual's needs, to geographical conditions and will incorporate a greater selection of transport options. What we offer must be attractive, provide great customer experiences and be able to adapt to developments in society as well as our customers' preferences.

A variety of public transport solutions can be combined into a comprehensive system that makes it easier for the region's inhabitants to live their lives without owning a private car. Car sharing services such as car share clubs,

car-pooling, different varieties of city bikes, rental cars and many other means of transport can all be made available via a simple digital solution. At first, this could mean

- that various mobility solutions are made available (such as public transport, car sharing and micromobility options) and coordinated within a dedicated geographical area, or in conjunction with development of new residential areas etc.
- integrating micromobility, e.g. electric scooters, to relieve other modes of public transport during rush hour
- to combine public transport with car-sharing services that make it easier to travel to and from the public transport network

Existing public transport solutions will still make up the foundation of a comprehensive network and be absolutely essential to the success of such a system.

In order to constitute a real alternative to owning and driving private cars, future transport services must to a greater degree be suited to individual needs. If our customers allow Ruter to use their travel data within the framework of the General Data Protection Regulation (GDPR), services can be tailored to individual needs and preferences to a great extent. This could entail

- giving Ruter access to the calendar on your smartphone, for the customer interface to proactively suggest the best means of travel to your destination
- customised solutions for people with specific needs
- adapting proposed solutions to individual preferences regarding physical activity levels (cycling/walking vs. motorised transport, seats/comfort versus the desire to get somewhere quickly etc.)
- a more predictable park-and-ride system with reserved parking spaces, reservable city bikes or e-scooters to take you the rest of the way to the city centre etc.
- discounts for behaviour that prevents overcrowding the transport system during rush hours, such as offering the customer a discount for travelling outside of rush hours

Non-motorised transport such as bicycling and walking should be an important part of the services we offer. Currently, Ruter’s Route Planner also calculates walking time for a selected route, as well as availability and location of city bikes nearby (provided by a separate operator). In the future, bikes and walking could be promoted and facilitated to a much greater extent. This may mean that

- bikes are integrated into our service offerings by using a fleet of Ruter bikes, or the bicycles of other suppliers, or the inhabitants’ own bikes
- cycling and walking are promoted through various incentives (e.g. discounts on bus tickets by using city bikes)
- Ruter will contribute actively with expertise and advice for the public authorities on new measures, infrastructure and general facilitation of cycling and walking which prove to be effective

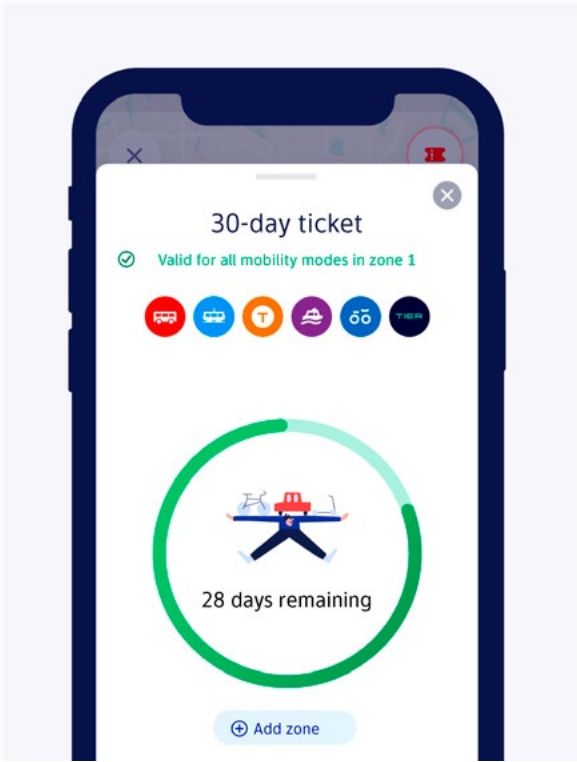


Figure 10: Various modes of transport are presented alongside each other in a digital customer interface.

4.3 Building on our existing position, services and infrastructure

New solutions need to be based on and integrated into existing services and infrastructures. Existing services should be improved continuously. It is also important to monitor the market closely and sometimes dare to offer a new solution that could potentially have an adverse effect on an existing service.

Developing a fine network of integrated services is an important aspect of public transport. One key element is keeping the main lines of the transport network running at a high frequency and high capacity. By shifting attention from single lines and transport modes to a network, more inhabitants have been provided with more options to choose between. Good trafficability for all vehicles in this system is important. Trafficability is necessary to ensure consistent and predictable departure times. Customers expect to know when they will arrive at their destination and that they will reach their connecting journeys. As the network continues to develop and grow, reliability must also continuously improve.

Some of the most important upcoming infrastructure projects in the Oslo region are the new signalling system for the metro, the Fornebu Metro Line, the rebuilding and modernisation of Majorstuen metro station and the construction of an additional metro tunnel through the city centre. These projects will not increase capacity or improve services until several years into the future. Nevertheless, Ruter believes these investments are appropriate and necessary in order to meet the growing transportation needs of the region. Further, failing to establish alternative solutions should existing infrastructure not be bolstered would have severe consequences. Currently, Oslo’s tram tracks and accompanying infrastructure is being upgraded to allow the city to phase 87 new trams into service during 2020-24. One important decision to be made in the future is whether or not to further bolster tram infrastructure and exercise the option of purchasing up to 60 additional trams.

Technological developments also lead to new vehicles becoming available. Ruter's fleet of transport vehicles will all be fossil-free (electricity / biofuel) by the end of 2020, and emissions-free by the end of 2028. The size and utilisation of vehicles should to a greater extent be adapted to fit the new needs of our customers.

4.4 Data-driven service development

Ruter must continue its development towards becoming a data-driven company in order to take full advantage of the possibilities of technological developments. Ruter does not think sustainable mobility can be achieved without smart and responsible use of data.

Therefore, data must be

- obtained on a larger scale and from more sources than today
- stored in a manner that allows for reuse and sharing
- managed according to ethical standards, security and quality requirements, and regulatory legislation
- shared, when sharing can contribute to value creation for society
- analysed to achieve ever better insight

This will increase the need for digital expertise – both internally and at our collaborators and partners – and the need to develop a flexible digital infrastructure. Ruter has already started building a digital infrastructure which, aside from having led to a number of improvements in current offerings, will make it possible to improve our mobility offering in new ways in the future.

One prerequisite for success is Ruter having greater access to and the ability to use data from and about our travellers. This must be done in a responsible way, in which ethical standards are important to safeguard. Information on individuals, such as travel history, payment transactions and their use of the Travel Planner are subject to regulation via the Personal Data Act and the GDPR. A central requirement in this context is a privacy policy built into the digital solutions.

Beyond data from travellers, it will also be important to link to data from other sources. For example, linking to data about the weather can provide more tailored solutions, while linking to traffic data can help us price trips dynamically and ensure a better flow among the different means of transport.

4.5 Leveraging market dynamics through smart cooperation

For Ruter, developments in service offerings should be built on the current model where private and public companies perform services for Ruter. Currently, a number of private and public companies are contracted to Ruter and provide various transport services on our behalf (metro, tram, bus, ferry and special transport), and a number of other companies are connected to Ruter via our various development activities. Sporveien (which is owned by the city of Oslo) is currently Ruter's largest supplier and partner.

Active collaboration with private suppliers, other public companies and the regulatory authorities is necessary to further develop the services at the level of ambition we aim for in this strategy. In a changing environment, Ruter is completely dependent on establishing inclusive and interdisciplinary cooperation. Early involvement is vitally important in achieving this. For Ruter, this means ensuring good collaborative relationships, procurement strategies and facilitating new and innovative business models. Ruter is a significant public purchaser. Part of our sustainable mobility work involves contributing to a competitive business market. An innovative procurement process helps ensure the supply industry an increasingly competitive ability to innovate and deliver solutions based on need. This implies a continued transition to contracts with functional descriptions of what is to be achieved, with the elbow room and economic incentives for continuous innovation and business development.





5. Regulation and scope of action

Major comprehensive changes are needed if we are to make sustainability a priority for the community and meet the opportunities and challenges of a data-driven economy.

How the development trends described in this document end up affecting society will depend on the extent to which the population has confidence in, and desire to, use new data-driven services. It also depends on the degree of political governance.

Achieving good solutions for future transport systems will require courage and resolve. The previous chapter presented Ruter's primary strategic framework for the future. To succeed with our vision of Sustainable Freedom of Movement, Ruter's owners, the Municipality of Oslo and the County Municipality of Viken need to share the same frame of reference. We need to find new and even better ways to solve the challenges faced by the capital region, together. The pursuit of Ruter's vision will be contingent on the framework for our operations and on future financing. Furthermore, change will require new skills and regulations, on a regional and national basis. Good, constructive dialogue about regional regulations is important. Changes in regulatory legislation and framework conditions will also be required at a national level. This will provide the basis for the input our owners provide to the government. Finally, this chapter describes the importance of research and development (R&D) and how Ruter envisions contributing to such activities.

5.1 A framework for speed and agility

Ruter's approach as described in this strategy entails a change in the way we approach risks. Ruter must be willing and able to react quickly to developments if we are to provide complex mobility solutions in a competitive market. As well as adapting quickly to major changes in the market, we must continue to trial new solutions on a small scale, observing how the market reacts to these experimental solutions and fine-tune them to fit the preferences of our customers. Transitioning from a more protected market (monopoly on public transport) towards the inclusion of services that compete with private sector companies implies a greater degree of exposure to strategic risk. This is, however, an acceptable consequence of pursuing our proposed strategic direction. Ruter exposing itself to greater risk is a conscious and strategically necessary decision.

Conversely, a more passive approach than the one outlined in this strategy would involve a risk that the mobility sector develops in an uncoordinated and unsustainable way, ignoring important societal considerations and political goals. In a world where competition for the customer's time and attention is fierce, decisions do sometimes have to be made despite underlying uncertainty and with a conscious awareness of risks. The framework we operate within should also allow the establishment of new solutions even though they might adversely

affect the popularity or viability of existing services. This will only be possible with a high level of trust between our management and our owners. Transparency and good communication are key in making this happen.

5.2 Future funding

The Ministry of Finance published a Perspective Report in 2017 which concluded that the pressure on public finances is going to be considerable in times ahead.⁵⁵ In 2019, our customers funded (through ticket purchases) just over half of the current public transport services, while public funding covered the rest. There is no guarantee that the government will be able to offer similar levels of funding for public transport in years to come.

Future transport solutions will still require large investments. It is important to make room for the uncertainties of technological developments and to be flexible when we consider future investments, to take into account the long-term social benefits of our investments.

Ruter assumes that subsidies in the foreseeable future will be determined through the four-year economic plans which form the basis for the annual budgetary items.

The implementation of this strategy will have implications for future financing of Ruter.

- The need for public influence on sector developments does not necessarily entail increased public funding in the long term. User funding should be re-examined, and Ruter intends to trial various alternatives in close cooperation and dialogue with our owners. A 'user' in this context can be a municipality, county, company or customers. A more data-driven Ruter will be in a position to create value directly from the data, or by selling the resulting technical solutions.
- Ruter's work towards sustainable mobility will produce positive effects for society that reach far beyond public transport itself. That is why we should work towards more public funding, because the positive effects on society are positive for many other sectors beyond transport.
- Investments in physical and digital infrastructure will be significant and will not always result in immediate changes to our services or the customer experience. Investments will be needed to continue to offer services that are attractive to customers in the long term, and to streamline operations.
- The possibilities in digitalisation will allow operations to be streamlined, reducing the need for financing in the long term.

The value of Ruter's digital service development is not reflected in the company's balance sheets. Ruter is experiencing great curiosity and interest in how digital solutions are being developed in combination with the company's customers and with emphasis on sustainability. The potential of this interest should be explored further.

5.3 New skills and new regulatory requirements

The authorities have much experience in managing and regulating land use and infrastructure, while data management and digital solutions are comparatively new disciplines. Developments mean companies and authorities need to gain new expertise and skills, and there is a need for new regulation that views data and mobility in the same context. At the same time, data and new technology provide us with the tools to ensure more effective targeted regulation. It is important that parties across the sector stay updated on how various framework conditions – or lack of conditions – influence the mobility of citizens, and whether or not sustainable development is taken into account. This applies to regional and national authorities.

New types of mobility and new business models require a new kind of regulation. Examples at a regional level can be

- regulating parking spaces and car charging infrastructures for shared cars and car pooling etc.
- regulating the use and parking of micromobility solutions, such as e-scooters
- considering whether private cars with only one passenger will be allowed to use the infrastructure in the same way as shared vehicles

It is important to maintain good dialogue between the authorities, companies and other parties across the sector to achieve a common understanding of what it means to contribute to sustainable mobility. Here are a couple of examples where Ruter thinks closer cooperation with regional authorities would be appropriate:

- There should be close dialogue between Ruter and various levels of public administration related to integrating bicycles and walking into the public mobility services.
- Ever more data is available from various public agencies. Collecting data for all means of transport (cars, public, bikes) will provide valuable insights, both in relation to regulation and when it comes to developing public mobility services.

Establishing comprehensive rules for sharing data within the transport sector and across sectors is an important challenge for the national authorities. It will be vital to respect social considerations, and data must be managed in a responsible manner to protect personal privacy and adhere to ethical standards. The authorities should be open to experimenting with new forms of regulation, including establishing regulatory sandboxes.⁵⁶ At the national level, regulating the phasing-in of self-driving vehicles would be a natural candidate. Necessary changes to regulatory legislation and framework conditions at a national level must also be prepared in collaboration between Ruter, the Municipality of Oslo and the County Municipality of Viken.

5.4 Research and development

The government's committee of experts for mobility pointed out that the transportation authorities are faced with more challenges than simply converting technological progress into concrete solutions. Responding to these challenges will require coordinated mobilisation and a boost to national expertise when it comes to transport technology and future mobility.⁵⁷ Ruter supports the committee in this, and believes strong and independent research and development environments are important.

In order to contribute to this work, Ruter considers it our obligation to

- maintain good and open dialogue with research communities and provide input on what we see as important issues
- provide facts, data and insight
- initiate and participate in collaborative projects of various types, such as pilot projects and other commercial R&D-activities

⁵⁵ <https://www.regjeringen.no/contentassets/aefd9d-12738d43078cbc647448bbeca1/no/pdfs/stm201620170029000dddpdfs.pdf>

⁵⁶ For example, the Financial Supervisory Authority of Norway started a project with a regulatory sandbox for fintech companies; <https://www.finanstilsynet.no/tema/fintech/finanstilsynets-regulatoriske-sandkasse/>

⁵⁷ https://www.regjeringen.no/contentassets/ccdc68196014468696acac6e5cc4f0e7/rapport-teknologiutvalget_web.pdf - kapittel 6



6. Ending note

Today's mobility solutions are facing major changes, driven by a need for sustainable solutions, new pioneering technologies, innovative business models and – as a result of this – transformed customer expectations.

Ruter has produced this document in the hope of establishing a common understanding of how to develop the mobility sector of the Oslo-region in accordance with the needs and wishes of the region's inhabitants — a vision of Sustainable Freedom of Movement.

We hope that the content of this document will be studied, contemplated, discussed and challenged across the whole transport sector and that it inspires change in and between organizations. Our strategy implies that authorities and businesses must pull in the same direction. Ruter looks forward to close cooperation with our owners, operators, suppliers, the community, the city, the countryside and our friends. ❤️



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