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Sustainable mobility: societal aspects and experiences from Norway

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FOREWORD

Norway is a mountainous country, with a rugged coastline broken by many fjords and thousands of islands. Due to the varied geographies and large distances, there is a high demand for different types of transportation infrastructure to ensure the mobility of goods and people. National and even regional mobility mainly rely on air connections - and to a lesser extent sea connections - and are dependent on fossil fuels. However, the mobility in the main Norwegian cities has undergone major transformations towards becoming more sustainable. The initiatives from these urban municipalities are encouraged by the adoption of the United Nations sustainable development goals (SDGs) from 2015. Several municipalities have developed strategies to reduce greenhouse gas emissions, limit the use of private vehicles, upgrade infrastructure and public transport services, and ensure good accessibility for everyone.

However, these ambitions are often challenged by regional and national authorities that are cautious when it comes to investments in certain infrastructure and want to limit public subsidies. Simultaneously, governmental incentives to facilitate the purchase of electric cars recorded a certain success, as Norway is a leading country regarding the use of electric vehicles. Although this contributes to the reduction of direct greenhouse gas emissions in the cities, this can also challenge the will of the municipalities to reduce car traffic, particularly in central urban areas. Moreover, the promotion of soft mobilities and the development of public transport are at the core of the strategies of several municipalities aiming to improve the quality of life in the cities and guarantee good accessibility for everyone in a sustainable way.

In this paper, we start by presenting major societal sustainability parameters through a review of existing literature and examples of research projects conducted in Norway. Secondly, we describe the main sustainability certificates that currently exist in Norway and how mobility is taken into consideration in their frameworks. Finally, we conclude with examples of concrete experiences from the municipalities of Oslo, Trondheim and Bodø, highlighting the different measures that are being implemented and discussing how the municipalities address sustainable mobility.

1 APPROACHES AND CRITERIA FOR THE ASSESSMENT OF SOCIETAL ASPECTS OF SUSTAINABLE MOBILITY

Sustainable mobility, also referred to as green mobility or smart mobility (with some nuances), is commonly addressed according to environmental aspects, especially with regards to cutting greenhouse gas emissions in the transport sector. Although mobility is an essential part of human activities, there are growing concerns about the negative impacts on the environment deriving from human transportation. Besides the reduction of greenhouse gas emissions, societal aspects are increasingly being included in the concept of sustainable mobility as they also contribute to improving life quality and social cohesion in the cities (air quality, noise, accessibility, inequalities in mobility...)¹.

In recent years, research projects related to sustainable mobility have gained importance in Norway, with a strong emphasis on developing more effective transport solutions that would contribute to reducing travel times, improving accessibility, and cutting greenhouse gas emissions.

- The Research Council of Norway has, for example, granted funding to a research project named “Management of vulnerabilities in the integrated intelligent transport systems of the future” (*Styring av sårbarheter i fremtidens integrerte intelligente transportsystemer* - SIITS) initiated in 2021². This project includes the development of new methods to assess sustainability in mobility projects, beyond only the environmental aspects.
- In 2021, the Norwegian Public Roads Administration (Statens Vegvesen) published a report that presented smart mobility solutions and how measures and services could be implemented in Norwegian cities³. The document is mainly dedicated to public bodies in Norway, especially municipalities, to guide them in the development of smart mobility solutions. These solutions are presented as useful tools to improve innovation, sustainability, life quality, and user satisfaction.
- The Institute of Transport Economics (TØI) has together with the Norwegian Public Roads Administration (Statens Vegvesen) and the county of Viken developed a website presenting environmental measures in the field of transport and mobility⁴.
- A report published by the Nordland Research Institute (NRI) in 2019 analyses barriers for the implementation of measures towards more sustainable mobility in three case

¹ Rodrigue, J.-P., 2020, *The Geography of Transport Systems*, Routledge, New York, 5th edition, 456 p. Retrieved from <https://transportgeography.org/contents/chapter3/transportation-and-society/>

² <https://www.siits.no/about-siits/>

³ Statens Vegvesen, 2021, *Smart Mobilitet - Veiledning og tiltak*, Statens vegvesens rapporter, 60 p.,

<https://vegvesen.brage.unit.no/vegvesen-xmlui/bitstream/handle/11250/2738660/584%20Smart%20Mobilitet%2021-0047%20%2008-04-21.pdf?sequence=1&isAllowed=y>

⁴ <https://www.tiltak.no/>

municipalities in Norway (Bodø, Bergen and Trondheim)⁵. Although all the stakeholders in these municipalities agreed on the necessity to develop sustainable mobility, several political, legal and economic challenges remain. Another report by NRI from 2021 analyses how smart mobility solutions could contribute to improve public transport services outside the main urban centres in Norway, particularly through new business models, new communication systems and autonomous vehicles⁶. The authors of the report emphasize that the development of these mobility solutions must be conducted by public authorities to benefit the whole society.

Moreover, there are numerous societal aspects that are relevant when talking about sustainable mobility. Many of them are discussed in scientific publications without necessarily being specifically linked to the concept of sustainable mobility. We can classify these aspects in six different groups:

- **Environmental impacts and life quality.** While greenhouse gas emissions often are considered due to their negative impact on the global climate, their reduction also plays a significant role in improving air quality in urban areas. Furthermore, beside CO₂, other greenhouse gas emissions also need to be taken into consideration since they all are affecting the life quality of inhabitants in big cities. Additional hazards are traffic noise and traffic congestion. The preservation or the creation of green areas in cities (instead of expanding new transport infrastructure like parking lots and roads) is also praised by many inhabitants. More broadly, vitality in cities should be considered beyond car traffic and include better soft mobility solutions to access commercial/central areas in cities.
- **Improvement in accessibility and better connectivity.** The networks of public transport and the frequencies of transport services are essential to ensure access to job markets, educational institutions, or leisure places. To monitor the demand on the networks and service frequencies, municipalities and transport companies rely on statistics and their own criteria, for example to position bus stops to cover the largest possible housing areas within a short walk distance.
- **Universal accessibility and diversification of users.** The users of public transport are different people and thus they have different needs. Many cities ensure public transport systems that are accessible for everyone, regardless of age and physical condition. However, it can be challenging to design an attractive network for the various traveler groups (local residents, tourists, workers, students...). Different people have different travel purposes, which, for example, influence the time that a user is willing to spend in public transport, the moment of the day that a user wants to travel, and the direction of the trip (from home/to home). Car sharing and transport-on-demand are solutions that have been developed to guarantee some flexibility for the users of public transport. These travel options can save costs in comparison to a scheduled bus service.

⁵ <https://www.nordlandsforskning.no/sites/default/files/files/NF-rapport%2001-2019%20Barrierer%20mot%20mer%20b%C3%A6rekraftig%20mobilitet.pdf>

⁶ https://nordlandsforskning.no/sites/default/files/files/NF-rapport%207_2021%20Smart%20mobilitet%20i%20distriktene.pdf

- **Urban planning.** Increasingly, different mobility solutions and their integration into the city are being considered in the development of new urban areas. For example, the planners of new areas analyse the opportunities to develop bus lanes and reduce the space allocated to parking lots. Thus, sustainable mobility is becoming a significant topic in urbanisation plans that are being designed in many cities.
- **Substitution of the use of private cars and competitiveness of public transport.** As many municipalities focus on the reduction of car traffic, the development of an attractive public transport system is perceived as an important tool to encourage more inhabitants to choose other means of transport than their private cars. Besides the existence of an adequate transport network with good frequencies, prices are also important aspects that influence travel habits. Moreover, affordable prices are measures that could help to reduce mobility gaps in the society, as a population group may be hindered by limited economic resources.
- **Traffic safety and population health.** Ensuring a safe environment for pedestrians and bikers can convince more inhabitants to choose such mobility alternatives for certain trips. In addition, this is a way to promote active and healthy lifestyles, and reduced car traffic could contribute to improve the safety on roads.

By conducting a literature review on how Sustainable Urban Mobility Plans (SUMP) take into consideration societal aspects, we have noticed that the aspects detailed above are partially covered⁷. However, there are publications discussing all these themes without specifically relating them to sustainable mobility.

⁷ The following keywords were used in the literature review: *sustainable urban mobility plan; SUMP; mobility; green mobility; transport; public transport; society; societal criteria; societal aspects; societal impacts; societal parameters; social dimension; models.*

2 STATE-OF-THE-ART OF SUSTAINABILITY CERTIFICATES IN NORWAY

Sustainable certifications have become commonly used in Norway through several schemes focusing on different fields/groups of stakeholders and on diverse geographical areas. Transport and mobility are often included in wider certification schemes that have a strong focus on cutting greenhouse gas emissions and stimulating the use of environmentally friendly means of transport. While environmental aspects regarding sustainability are emphasized in these programs, societal aspects related to mobility are in many cases understated.

It is important to notice the distinction between environmental management systems, environmental certifications and ecolabelling schemes as they are being used in Norway⁸:

- An **environmental management system** is the part of a company's management system that designs, implements and maintains the organisation's environmental policy, whether it is a private company or a public body. It consists of a set of procedures and routines that will ensure high environmental standards in the organisation, like an annual environmental action plan, an annual environmental report, or a follow-up of the environmental action plan during the year.
- **Environmental certification is an external verification of the environmental management system** that aims to ensure that the company is working seriously to reduce its impact on the environment. Environmental certification means that the company follows standards for preparing and implementing an environmental management system.
- **While environmental management and environmental certification** mean that the organisation itself (including operations and production) is certified, **ecolabelling** concerns products and services.

Here are some examples of **environmental certification programs** widely used in Norway:

- **Eco-lighthouse (*Miljøfyrtårn*)**⁹

Currently, this is one of the most recognized certification schemes for environmental management in public and private organisations in Norway (the two others that are commonly used are ISO 14001 and EMAS). It was created in 2003 as a foundation, managed by different central organisations in business and public administration. To become Eco-lighthouse certified, the organisations have to meet a set of common criteria, in addition to specific criteria depending on their area of activities.

This certification scheme aims to improve the working environment, waste management, energy use, purchasing and transport, but also to limit food waste and the use of plastic. There is a strong correspondence with 8 of the 17 of the UN Sustainable development goals (SDGs).

⁸ <https://www.miljodirektoratet.no/ansvarsomrader/klima/for-myndigheter/kutte-utslipp-av-klimagasser/klima-og-energitiltak/miljostyring-miljosertifisering/>

⁹ <https://www.miljofyrtarn.no/>

Although the scheme concerns a broad range of organisations and covers diverse topics, it is possible to highlight the following transport-related common criteria:

- “The company shall, as much as possible, make it feasible for employees to travel in an environmentally friendly way to, from and for work.”
 - “The company will prioritize fossil-free transport in its access and parking solutions where possible.”
- **Bicycle-friendly workplace (*Sykkelvennlig arbeidsplass*)¹⁰**

This certification scheme is owned and operated by the Norwegian National Association of Cyclists (SLF). It can be obtained by organisations willing to stimulate the use of bikes among their employees as their main mean of transportation to and from work. With around 50 indicators, the certification process survey, among other criteria, safe bicycle parking, accessibility, cloakroom facilities, services, and incentives existing at the workplace.

- **There are also other certification schemes dedicated to specific sectors**, such as “*Blått Flagg*” for the environmental certification of beaches, boats and ports, “*Grønt Flagg*” for schools, or “*BREEAM*” for buildings.

Here are some examples of **ecolabelling schemes** widely used in Norway:

- **The Nordic Ecolabel (*Svanemarket*)¹¹**

The Nordic Ecolabel is an eco-label that is used in the Nordic countries (Norway, Sweden, Denmark, Finland and Iceland). The label scheme was established by the Nordic Council of Ministers in 1989 to provide consumers credible environmental information about consumer products. The label’s environmental requirements give manufacturers a recipe that indicates how they can produce their goods and services with the least possible environmental impacts. These requirements are revised every three to five years in order to be adjusted according to new knowledge, new product technology and market conditions. The Nordic Ecolabel is a sister-brand of the European Union’s Ecolabel.

- **Sustainable Destination¹²**

The state-owned company Innovation Norway’s Tourism section has together with the tourism industry, research institutions and national authorities, developed a labeling scheme for sustainable destinations. The tourist destinations must document their progress, set goals and develop in a sustainable way in a long-term perspective. The scheme’s standard is composed of 42 criteria and 104 indicators that are measured and monitored by the destinations. To keep their label, the tourist destinations must document improvements every three years in accordance with the scheme’s standard. Some of the criteria are transport related since they focus on cutting greenhouse gas emissions related to travels to and from a destination. The indicators that are used consider the emissions of CO₂ and the use of non-motorised means of transport.

¹⁰ <https://syklistforeningen.no/prosjekter/sykkelvennlig-arbeidsplass/>

¹¹ <https://svanemarket.no/>

¹² <https://business.visitnorway.com/no/verktoy/merket-for-barekraftig-reisemal/om-merkeordningen/>

3 EXPERIENCES FROM NORWAY IN THE FIELD OF SUSTAINABLE MOBILITY

Norwegian municipalities design ambitious mobility plans that can be related to Sustainable urban mobility plans (SUMP) being developed in other European cities. In Norway, such plans have various goals and often a broader focus than merely transport and mobility. However, they include measures aiming to reduce greenhouse gas emissions while at the same time promoting life quality, accessibility, and the use of public transport. Below, we describe the cases of the municipalities of Oslo, Trondheim and Bodø.

- Oslo

The municipality of Oslo's climate ambitions are to reduce car traffic with one third by 2023, to have an emission-free public transport by 2028, and emission-free private and freight cars by 2030. The Urban Environment Agency (*Bymiljøetaten*) oversees the transportation in the municipality. Recently, the Agency published a report on the development of a Sustainable Urban Logistic Plan (SULP)¹³, the closest plan related to a Sustainable Urban Mobility Plan (SUMP), concerning the municipality's many operative roles: a buyer of goods and services, a contractor, and an owner and operator of its own vehicles and machines. In the report, the authors make the distinction of *active mobility*, e.g. walking and biking (within the perspective of people's health and society's need for a healthy population), thus focusing on the individual's needs as opposed to transport, which is more vehicles and infrastructure focused. *Green mobility* is environmentally, economically and socially sustainable transport: a transport system with emphasis on walking, biking and public transport, giving more flexibility for more people regardless of age, functional capabilities and socio-economic conditions.

In 2017, Oslo Municipality started a project called "Car-free city life" to reduce greenhouse gas emissions and air pollution. Among the measures were removal of parking lots, reducing driving-through possibilities, increasing space for pedestrians, and establishing networks of bike lanes. For example, the roads in the city center have been narrowed to allow for more space for pedestrians and a vibrant city life. Moreover, by removing 760 street parking lots since 2017, more space has been freed up to boost good city life as well as necessary handicap parking, product deliveries and business parking in the whole of downtown Oslo. The project's measures have contributed to a marked reduction in fossil fuels vehicles and an increase in electric vehicles. For example, innovative carpenter companies have started using smaller, electrically charged freight bikes. However, the largest effects for the increase in zero-emission vehicles have been the tolled ring road around Oslo, the availability of public transport lanes, and the reduced accessibility of parking spaces.

The report shows that the different stakeholders in the SULP, the municipality, transport sector, and trade sector, all recognize that a rich and vibrant city life requires that businesses, restaurants, culture institutions and others get their goods and services delivered in a good and effective way. For the transport and service sector, the municipality has established

¹³ Bymiljøetaten Oslo kommune, 2022, *Forprosjekt bylogistikkplan - Sustainable Urban Logistic Plan (SULP)*, 140 p.

particular *Cityhubs* where designated companies can hire area from the municipality to construct terminals with charging infrastructure. Through these hubs the larger freight trucks can avoid narrow streets by transferring products onto smaller, often electrified, vehicles at the hubs, which help making the distribution more effective. Moreover, specific mobility points have been established as places for common transport services that combine the movement of humans and products. In these mobility points there are common bike access, car access (car sharing), and public transport access, as well as ordinary bicycle parking and a place for pick-up and delivery of small packages.

An example of this is the cooperation with the publicly owned company *Ruter*, which mainly provides transport of people, to look at the possibilities of combining goods- and people transport. Today, *Ruter* runs a mobility service for elderly people (67 years old and older) in parts of the municipality. The transport is run by dedicated busses from door-to-door according to demand, without a defined schedule. This transport service can become combined with the transport of goods on the request of the elderly, which would make the service more economically sustainable. Three types of destinations drive the on-demand operations by *Ruter* for the elderly: shopping malls, local city centers, and activity centers for the elderly.

Moreover, an important part of the Urban Environment Agency's work is to change travel habits and promote environmentally friendly transport. Campaigns and measures in 2021 have been free outdoors bicycles repair across the city; a subsidy scheme to support studded tires to promote winter biking; removal of parking lots to create wider sidewalks and bike parking; restricting car parking in particular streets during the wintertime; introducing passenger requirements for electric cars in the public transport lanes on municipal roads; testing of self-driven vehicles; increasing the availability of municipal charging stations for private passenger cars in the city; and provide 11,3 km of improved bike accessed roads in 2021. It has been shown that the improvements in the conditions for bikers also increase the quality for pedestrians, such as focus on safer crossroads and discouraging biking on the sidewalks. Furthermore, in 2021, a pilot project was initiated to promote car sharing. By 2022, 450 parking lots were assigned to car sharing companies in the city. There are 2200 cars available for rent through this system. Compared to 15 other large cities in Europe, Oslo has the most available cars for car sharing per 100 000 inhabitants.

- **Trondheim**

The Municipality of Trondheim is working in a collaboration between the State (Norwegian Public Roads Administration and the Norwegian Railway Directorate), Trøndelag County, and the other municipalities of neighboring Melhus, Malvik and Stjørdal to cut greenhouse gas emissions and reduce passenger car traffic. In the scope of the project *Miljøpakken*¹⁴, they are improving transport mobility and reducing emissions and traffic jams. While the population of Trondheim increases, the goal is that car passenger traffic shall not increase.

The financial framework is approximately 27 billion NOK for 2010-2029. At the end of 2020, approximately 17 billion NOK remains. 30-40 percent of the funding allocated for building new

¹⁴ <https://miljopakken.no/>

infrastructure and financing measures to make it easier and more attractive to use public transport, walking and biking, comes from toll taxes put on car traffic in the city. According to a large attitude survey in 2022, three out of four people find this arrangement acceptable/positive.

To increase the use of bicycles, the municipality has placed several bike parking lockers in the city center. These are operated via apps and are free of charge the first four hours and then a 1 Euro per hour. In addition, the municipality has made reductions in the ticket prices on buses and trains, also to neighboring towns outside Trondheim.

Moreover, to encourage work commuters to use bikes, the Municipality lends out electric bikes to employers free of charge. In this way, their employees can experience how electric bikes can become real alternatives to passenger cars. This also saves space for parking at the workplace and provides physical activity and health benefits to the employees. Both public and private companies are welcomed to make use of this offer, and the workplaces that join get the bikes delivered at the door.

Furthermore, the municipality has a mobility arrangement called *HomeWorkHome* to encourage walking, biking and the use of public transport to and from the workplace. This arrangement is open for companies with at least 20 employees and offers a special price per month for busses and trams, good deals for leasing or buying e-bikes, free bike service, free studded tires for the bikes in wintertime, lending of e-bikes and other good offers on transport means. The companies joining this arrangement undertake an internal review of their employees' car usage and a yearly travel habit survey. Furthermore, they must commit to make incentives to not use passenger cars, such as removing parking space or charging/increasing the payment for the parking. The participating companies can also profile themselves with a special *HomeWorkHome*-logo.

- **Bodø**

The municipality of Bodø is working together with the Nordland county and the Norwegian Public Roads Administration in the scope of *Bypakken Bodø*¹⁵. This program includes more than hundred projects related to transport and mobility, and aims to improve infrastructure, stimulate the use of public transport (bus services), and facilitate the use of bikes. Although better infrastructure improves road traffic safety and ensures quicker trips, the introduction of electric buses in Bodø in 2021 was mainly a measure taken to reduce greenhouse gas emissions.

The program aims to boost the amount of people using bus, cycling, or walking instead of using private cars. Thus, a public transport plan for the period 2020-2032 has been developed¹⁶, which evaluated the current public transport services to highlight remaining challenges and possible measures. The public transport plan considers, for example, the share of the population who lives within a five minutes walk to a bus stop, to identify areas that are

¹⁵ <https://www.nfk.no/tjenester/kollektiv-og-veg/samferdselsplanlegging/bypakke-bodo/>

¹⁶ Nordland Fylkeskommune and Bodø Kommune, 2019, *Kollektivtrafikkplan 2020-2032*, 72 p., https://www.nfk.no/f/p1/i64e89b89-1450-421f-8502-52911f3f59c3/kollektivtrafikkplan-bodo-2020-2032_ajourfort-pr-august-2020.pdf

not sufficiently covered by the bus network. Bus frequencies are also assessed, along with the statistics regarding the demand on the whole transport network. Such considerations are important to improve the competitiveness of public transport systems in relation to the use of private cars, for example by comparing door-to-door travel times between different means of transport.

The moving of the airport of Bodø, scheduled in 2024-2025, is an important milestone in the ongoing transformations within the municipality: a whole new neighborhood will be developed in the place of the current infrastructure. This will require an adjustment of the public transport services and provides an ample opportunity to ensure sustainable mobility solutions in this new neighborhood, without the constraints and limitations of existing buildings and established street layouts.

In 2022, the municipality adopted a mobility plan specifically for this new part of the city¹⁷. Green mobility appears as a central concept in this plan and is defined as “*transport that is environmentally, ecologically and socially sustainable*”. This central mentioning illustrates a broad focus on green mobility that goes beyond the cutting of greenhouse gas emissions. Moreover, the inclusion of the SDGs in the strategies developed by the municipality contributes to the consideration of green mobility within a broad spectrum of parameters, such as inhabitants’ health, traffic safety and ecosystem preservation. For example, the newly adopted mobility plan emphasizes the need to develop efficient intermodal hubs in the city; to prevent an increase in the use of private cars; to ensure that as many journeys as possible are done by foot, by bike or by public transport; to make sure that bus stops are located within a walking distance from the most houses; and to guarantee that transport infrastructure will not create any mobility barriers in the city. These criteria should contribute to the creation of a zero-emission neighborhood (ZEN), as highlighted in the plan. To achieve these goals, the municipality consults the existing results from academic research in the field of transport and mobility, but also its own data to evaluate the needs of the inhabitants, and takes into account the particularities of the municipality of Bodø, like weather conditions and topography.

¹⁷ Bodø Kommune, 2022, *Mobilitetsplan – Kommunedelplan for Hernes*, 27 p., <https://bodo.kommune.no/getfile.php/1355107-1641566790/Plan%2C%20bygg%20og%20eiendom/Kart%20og%20arealplaner/Arealplaner/Planprosesser/2022/H%C3%B8ring%20-%20Kommunedelplan%20for%20Hernes%20bydel/Mobilitetsplan.pdf>