

The World's First Mass Market for Electric Vehicles – The Oslo Case Study

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Today, **Oslo is the world's first mass market for electric vehicles**. You will not find a higher density of electric vehicles (EVs) anywhere else in the **world**. More than 50% of all new cars sold in Oslo in 2017 were electric. In 2018, the number increased to more than 60%. This means that more than every second car sold is now an EV.

The sales of EVs are skyrocketing. At the same time, sales of diesel and gasoline cars have dropped, and the sale of diesel cars is in a free fall, especially in the largest cities like Oslo and Bergen (less than 10%). Beginning in 2025, the goal is to sell only zero emission passenger cars and vans and become the world's first zero emission city by 2030.

A broad political settlement between all political parties and a synergistic interaction between the national government and the City created stability and consistency over time. The Norwegian government made the EVs affordable to buy, while the City made EVs affordable to use, practical and convenient.

A whole package of incentives boosted the sales of electric vehicles in Oslo, including: zero purchasing tax, no value-added tax (VAT), free parking, no road tax, free charging, free passing in the toll gates, free tunnels, free travel with ferries, access to the bus lines, etc. In sum, these incentives made EVs:

- *Affordable to buy* – no purchasing tax, no VAT
- *Affordable to use* – free parking, free electricity, free passing in toll gates
- *Practical to use* – access to charging, free parking, bus lines

Going forward, Oslo sees three main challenges:

1. We Need a Faster Deployment of Chargers

Even though Oslo has deployed **more chargers per capita than most other cities**, the numbers of chargers per EVs are falling behind because of the unexpectedly high growth of EVs. Securing enough chargers in a growing mass market is a major challenge. The challenge is enhanced by the fact that all passenger cars sold will be zero emission by 2025.

The exponential growth of EVs also creates a historic window of opportunity. For the first time, we have a mature mass market of EVs that can help finance the urgently needed green shift in transportation. The solution is available to boost the deployment of chargers, but also to make the charging infrastructure smarter and more efficient.

To achieve this Oslo will:

- Triple the deployment of new charging points
- Deploy more fast chargers on the corridors in and out of the City (in close cooperation with private companies)

- Deploy a large network of semi-quick chargers (7.4 – 22 kW) which can secure higher charging speed and higher turnover of cars
- Build new indoor parking garages for EVs like the “Fortress” (The World’s first dedicated parking garage for EVs only)
- Construct new green mobility houses including electric car sharing, bicycle hotels, electric bicycles, electric scooters, and MCs etc.

Starting in March 2019, Oslo will start to charge a small user payment to finance the green shift in mobility. The price for charging will be reasonable and low compared to diesel and gasoline prices. It will also give priority to residents and priority sectors like electric taxis and electric freight vehicles. The City expects that this revenue will be sufficient to finance the needed investments in additional charging infrastructure.

2. We Need to Provide Charging Opportunities for People Living in Multi-Family Buildings

Over 60% of Oslo’s citizens are living in apartments or townhouses in Oslo, not in detached houses and villas with private charging opportunities. This means that not everybody can charge at home, a common but serious challenge to a further electrification of transport in many urban cities.

Home charging is cheaper and more convenient than curbside for both drivers and the city. Oslo has thus developed a support scheme for home charging:

- Private housing associations and housing co-operatives can apply for a grant covering up to maximum 20% of all needed investments in charging infrastructure on private ground, up to a limit of NOK 1 million (~ \$117,613 USD).
- In 2018, more than 16,000 chargers in private housing co-operatives and associations have been financed. This is a substantial figure compared to the deployment of 600 new curbside/ on-street chargers owned and operated by the City on a yearly basis.

3. We Need to Shift Commercial Fleets to Electric

The sales of private EVs are skyrocketing. The sales of commercial electric vehicles, however, are still far from high enough. We need a substantial boost in sales of commercial EVs for taxi drivers, craft and service drivers, and freight if we want to meet our ambitious environmental goals. This is especially important because the use of commercial vehicles is expected to increase much faster than the use of private cars.

Electrification of commercial vehicles is now the focus. In order to succeed with the electrification of commercial vehicles Oslo will create tailor-made solutions for different sectors in addition to more normal and quick chargers.

New solutions include designated hubs for commercial vehicles, including high-performance DC quick chargers (150-350 kW), V2G and inductive charging etc., as well as well-designed support schemes for electric freight vans and taxis.

The city also gives a grant of 50% of total investment cost for needed charging infrastructure for all craft and service drivers and owners of freight vehicles and taxis who want to switch to electric vehicles.

To boost the sales of commercial electric vehicles Oslo has actively used its public procurement

policy to demand/or favor zero emission freight deliveries of goods and services purchased by the City. The experience is promising and clear: environmental demands in public tenders do trigger development of new innovative green solutions for transportation of goods and services.

Even if the numbers of electric commercial vehicles are far from satisfactory there are positive signs for vans and small freight and service vehicles. In 2018 we witnessed 2-digit sales figures for freight and service vehicles (12%) for the first time.

Like with private EVs, Oslo sees the need for incentives to boost commercial EV uptake, and the city has a generous incentive scheme to achieve this:

- New “Centre of excellence” for professional users of EVs with tailor-made charging solutions for professional users of EVs and pre-booking possibilities. A good example is already in place at **Vulkan**, Norway’s largest and most advanced mobility house financed by the EU-project **SEEV4 City**
- New hubs for commercial vehicles (including pre-booking opportunities, high performance chargers, smart grid, etc., reserved for commercial vehicles)
- Designated taxi ranks for electric taxis only (some of the best locations will be reserved for only zero emission taxis)
- New super-quick chargers (some reserved for commercial EVs)
- Inductive charging (for electric taxis only, as it’s much simpler)
- Reserved parking with charging possibilities for commercial vehicles (downtown Oslo) Grants for investment in charging infrastructure for light commercial vehicles and taxis
- Grants and subsidies for zero emission trucks and heavy-duty vehicles (50% of the extra cost of zero vehicles and needed charging infrastructure)
- Free parking for zero emission commercial vehicles (on all public parking)
- Free passing (or high discount) on passing through the gates (in and out of the City)
- Demand for zero emission transport in public procurements of goods and services
- Discount on quick charging for priority segments like electric taxis and freight vehicles

ELECTRIFICATION OF TRANSPORT – A HOLISTIC APPROACH TO TRANSPORT IS NEEDED

Oslo aims to be the world’s first emissions-free city within the next 12 years. The skyrocketing growth of EVs is fantastic, but only part of the solution. Oslo takes a holistic approach to ensure that all transport becomes zero emission and convenient through:

- more public transportation
- zero emission public transportation (by 2028)
- bicycling lanes and pedestrian walkways (2018-2020)
- zero emission taxis (by 2023)
- zero emission freight vehicles (2025)
- electric ferries (2019)
- electrification of the harbour (2019)
- car sharing (2018-2025)
- autonomous vehicles (2019)
- public transportation on-demand

- electrification of **the maritime sector** and domestic aviation (2040)

The focus is now on mobility-as-a-service (MaaS) and electrification of all types of transport. The use of public transportation in Oslo has increased substantially the last ten years (80%), and is, today, at a historic high. The number of people using cycles and walking is also increasing rapidly. Incentives are important, but we also need more regulations on the use of cars. In Oslo several new measures are already deployed or planned:

- A **Car Free City Centre** (inner city, 2018-2019)
- New **Low Emission Zones** for freight vehicles (major part of Oslo, 2019)
- **Residential parking** zones where residential areas are converted into regulated parking and you have to pay for parking, but it's free parking for EVs (major part of Oslo, 2018)
- **Congestion tax** (not for EVs, 2018)
- **Increased numbers of toll gates/road** throughout the City, but free passing for EVs (2019)
- A **fossil free City** inside Ring 3 (major part of Oslo, in 2024)
- Only **zero emission taxis** (the whole City, in 2023)
- **Ban on sales of diesel and gasoline vehicles** (all of Norway, in 2025)
- Temporary **ban on diesel cars on the most polluting days** (the whole City, in 2017)

LESSONS LEARNED

There are several lessons learned from the EV capital Oslo, including:

1. Green taxes are working. People will make green choices if they can afford it. A green tax on petrol and diesel cars combined with tax exemptions for zero emission vehicles gives a double incentive to buy electric cars.
2. The growth of EVs in Oslo has proceeded much faster than expected.
3. A high national tax on the most polluting cars can balance the cost of tax exemptions for zero emission vehicles to balance the revenues.
4. Home charging is equally important as public charging. Home charging is the cheapest and most convenient way to charge for EV users.
5. The chicken and egg problem is solved. A ubiquitous public charging infrastructure is needed as a first mover and will create business opportunities and revenues for the private sector over time. To leave everything to the private market before a market has emerged equals too little, too late.
6. EVs are important but only part of the solution. We also need clean public transportation, car sharing, cycling and pedestrians, etc., to solve the (zero emission transport) equation.
7. Experience shows that it is possible to boost the sales of EVs and at the same time increase the use of public transportation, cycling and walking. All green solutions must be in focus simultaneously.

NEW INNOVATIONS AND TRENDS

There are a number of new innovations and trends that will influence the future growth of the EV market, including:

- The offers of new and interesting models are really picking up, and more and more OEMs are gearing up for the race.

- The technology is already available. Over 60% of all new cars sold in Oslo are now electric, either a battery electric (BEV) or a plug-in hybrid (PHEV). New models with longer range and a broader selection of models will increase the sales.
- More EVs on the global market will create economy of scale and eventually the production price for EVs will drop.
- The **battery technology** will improve with longer range and speed of charging, and the battery costs seem to be on a steep downward trend. We have only seen the start of the modern storage technology.
- The public chargers are getting cheaper, better and much faster (6 times faster).
- The on-board chargers in the cars are getting ready for the new high-performance DC chargers and the standards for AC charging are improving.
- The electric engine is already extremely energy efficient and cheap to produce, due to few movable parts and lesser complexity than the combustion engine. It is therefore expected that the electric engine will outcompete the far more complex combustion engine within 5-10 years. In the future you may have to subsidize diesel and gasoline engines if you want the combustion engine to survive.
- New players have emerged on the global scene that now have more experience with the electric vehicle technology than many of the traditional OEMs.
- Shared and autonomous mobility is on the rise and will increase the progress towards electrification of transport.
- New smart grid solutions, V2G and battery storage based on second-hand batteries can bring down the investment cost and operational cost for charging solutions.
- New user friendly innovations like inductive (wireless) charging, high-performance chargers (with 5-8 times higher speeds), machine learning and artificial intelligence (AI) and user-friendly applications can increase the attractiveness of EVs.

THE ROAD AHEAD – HIGHWAY TO ELECTRIC

It is hard to predict the future, and even harder to be right. Today we have a historic opportunity to convert all vehicles to zero emission: private vehicles, commercial vehicles and public transport. We just need the right policy, public-private cooperation and the political and administrative resilience to succeed. New technologies will fuel the progress towards electrification, and experience indicates that things are often moving much faster than anticipated.

The future will depend on:

1. The political willingness to use green taxes, regulations and other incentives to make the shift to put a price on pollution.
2. Technology developments for vehicles, battery, chargers, autonomous vehicles, artificial intelligence and intelligent transportation systems.
3. Policies in major markets that foster EV sales and therefore economy of scale.
4. Global price developments on fossil fuels like gasoline and diesel, etc.
5. National and transnational cooperation including local government, national government and private businesses.
6. Global cooperation and free exchange of examples and ideas.
7. The development of sound business models that can help finance the green shift in the transport sector.
8. A rapid and promising growth in large cities in California, China, Korea and Europe help to fuel the present optimism.

The experience from Oslo shows that it is possible to boost the sales of electric cars and at the same time increase the use of public transportation, cycling and walking. It also shows that EVs work in a rough, Nordic climate and that a major shift could be just around the corner. The future is electric; the future is now!