

Electric Vehicles in Urban Europe (EVUE II) EXPLORING THE OSLO EXPERIENCE - CITIES DELIVERING E-MOBILITY



**URBACT II Pilot Delivery Network
Lead Expert Final Report
March 2015**

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FOREWORD

When we started the EVUE project in 2009, Norway and Oslo in particular, were seen as world leading with regard to electric vehicles. From a supportive policy and fiscal environment, through to the willingness of Norwegians to adopt the vehicles, their approach was comprehensive and effective.

As we conclude the EVUE II project, six years later it is positive to see that not only has Norway built on their early success, but still remaining committed to emission free transport. Having reached their target of 50,000 electric vehicles ahead of schedule, there is always a risk that policy incentives and strategic impetus may be relaxed as different priorities take precedent. Norway however is not relaxing their approach and that needs to be commended.

While there are a lot of lessons that can be drawn from the Norwegian approach, the most important, and which is not only applicable to electro-mobility, is what can be achieved through integrated and comprehensive planning. Through uniting all activities, irrespective of scale or scope, into a coherent, transparent package, sound planning can result in strong, positive outcomes.

In essence, it is a key example of the Urbact way in practice.

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EXPLORING THE OSLO EXPERIENCE

1. INTRODUCTION

1.1. Oslo has a previous conviction

The EVUE project gathered together a progressive group of partner cities committed to advancing the cause of electric vehicles, which included the city of Oslo - probably the leading European (if not world) city in terms of advancing E-mobility. The participation of the Norwegian capital provided the network with invaluable understanding and know-how on the question of how to initiate an environmental trend break in urban mobility, by encouraging automotive alternatives to challenge the globally accepted internal combustion engine solution.

Promotion of E-mobility by the city has been instrumental in influencing a huge national uptake of electric cars, with reports indicating that more than 45,000 pure-electric vehicles (BEVs¹ Feb. 2015 statistics Grønn Bil²) are now registered across Norway. With a population of some 5 million people this is a remarkable evolution when compared to other countries in Europe, pure EV registration in the UK, for example, with a population of 63 million is approaching the 7,000 mark (6,697 Dec. 2014 Society of Motor Manufacturers and Traders³). In 2013 an electric vehicle topped national car sales for the very first time with the US made Tesla S accounting for 5.1% of new car registrations in the month of September. The Tesla and Nissan Leaf were the best selling models over the last quarter of that year and figures show that Norwegians today are buying battery powered vehicles at a rate in excess of 2,000 per month.

This phenomenon is not simply a recent expression of national environmental conscience. Norwegian industry set up the Norwegian Electric Vehicle Association to promote EV interests as early as 1995. With the takeover of the Danish Company Kewet in 1999 by Elbil Norge (now Pure Mobility), Oslo even produces its own electric car. A new model of the small city run-around "Buddy" produced in Økron started to roll off the production line in 2005. In 2007 this cheap (by Norwegian standards) pioneer, little 3-seater vehicle represented 20% of the electric car fleet in Norway. In a country where more than 90% of electricity supply is produced by hydro-electric power, the fascination for E-mobility is consciously driven by national and city policies. Norway is a rich country with most families able to run 2 cars. However the range of incentives offered to encourage the use of electric vehicles is a major factor influencing people`s decision to buy electric.

At the start of the EVUE project in 2010 it was estimated that there were 1,735 electric vehicles in Oslo (80% privately owned) served by some 130 standard charging points (predominantly on-street locations). Since then the experience has been of exponential growth underpinned by a National strategy, at that time, to have 200,000 electric vehicles on the roads by 2020, and a City Council target to achieve a 50% reduction in CO2 emissions by 2030. However Oslo is conscious that many cities are catching up in the race to promote and increase use of electric vehicles and is determined to hold its position as one of the leading exponents and stay ahead of the game. It is exactly this type of constant dynamic which forces successful cities,

¹ BEV – Battery electric vehicle

² Green Car – www.gronnbil.no

³ SMMT – www.smmt.co.uk

themselves, to develop new delivery models, seek innovative solutions - and so presents a prime motivation for EVUE II partners to revisit the Oslo experience.

1.2. Oslo (EVUE II) partner meeting

It was decided to hold the final Pilot Delivery Network meeting in Oslo to allow partners to update progress in the Norwegian capital (since the first contacts through EVUE) and examine application of practice at first hand. This was regarded as particularly important for cities in the early stages of developing or implementing an E-mobility programme. This note sheds some light on the approach taken by Oslo to become the world's leading city in electric vehicles: including the economic incentives necessary; and establishment of the appropriate charging infrastructure needed to stimulate a widespread adoption of electrical vehicles among ordinary car users. It also assesses major costs and benefits associated with the measures adopted in Oslo

2. E-MOBILITY IN OSLO 2015

2.1. A joined-up policy approach

Decisions taken by the city of Oslo to promote use of electric vehicles are strongly connected to parallel National environmental and transport policies. The Norwegian government in respect of the Kyoto Protocol committed to a 30% reduction in emissions of greenhouse gas by 2020 as compared with 1990 baseline levels. The transportation sector was identified as a key area of intervention, estimated as accounting for around 20% of emissions in Norway, and this resulted in a range of measures targeting the sector. These translated for example into encouragement of E-mobility through introduction of tax benefits, funding of the Green car initiative and in respect of battery range limitations, adoption of a clear strategy to support widespread public charging stations to facilitate greater range potential.

While Oslo can justifiably claim globally to have one of the smallest per capita carbon footprints, improvement of air quality is remains a major concern for the city. This led to the formulation of an ambitious goal: *"Oslo will reduce its greenhouse gas emissions by 50 percent relative to the 1991 level by 2030, and will be climate neutral by 2050."*

This objective is framed in strategy set out in ["The Urban Ecology Programme"](#) (2016 -2025) which states that the City of Oslo gives priority to reducing noise levels, air pollution and greenhouse gas emissions and to creating an eco-efficient transport system. The principal focus points are the phasing out of oil-fired district heating systems (zero emissions from heating of buildings by 2020) and reduction of emissions from road transport (enabling eco-mobility).

To achieve eco-mobility Oslo wants to further strengthen the public transportation system (replace traditional public transportation with CO2 neutral technologies), increase levels of cycling, replace its own municipal fleet with CO2 free vehicles, and stimulate the growth of electrical vehicles; including commercial CO2 free vehicles.

There is a clear and consistent thread in city policy setting out a number of measures to boost the share of electric vehicles in the city. Already since 1999 public parking has been free for EVs and today through procurement policy the complete municipal vehicle fleet is targeted to be based on zero emission technology by the end of 2015.

2.2. An exponential growth in electric vehicles

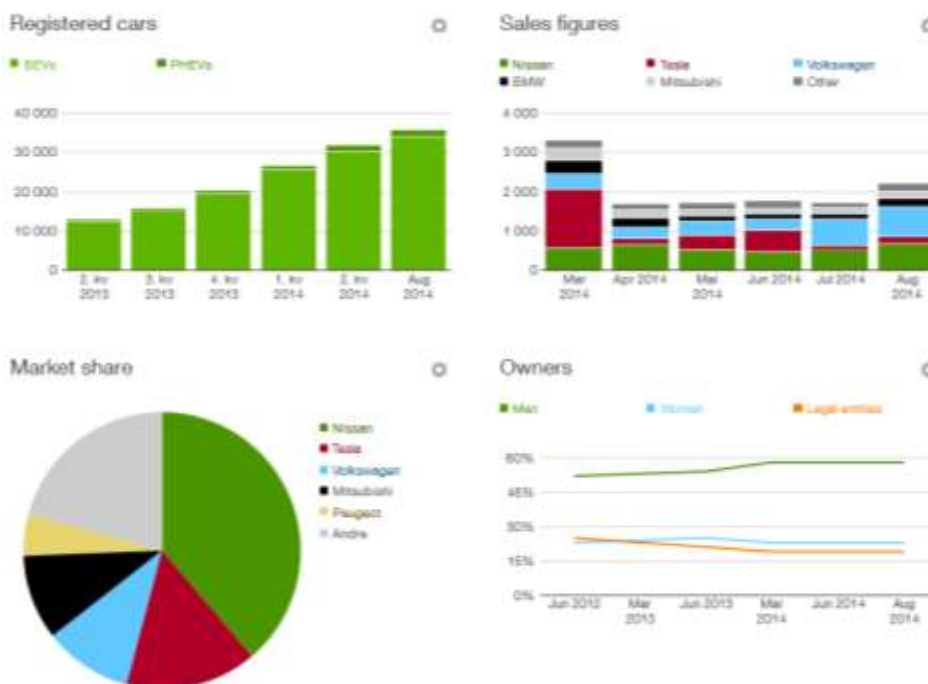
The success of measures taken and ongoing is evident; currently Oslo has the world's highest number of electric vehicles per inhabitant. In August 2014, Oslo with surrounding suburbs accounted for 14,070 electric vehicles, close to a 100% increase from August 2013; which again was a 100% increase from August 2012. An exponential growth is visible from a meagre 1,729 EVs in January 2010.

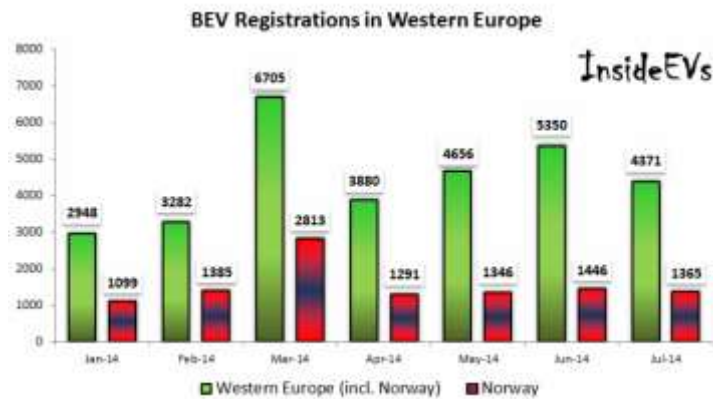
Region	# cars	Dev. last years
Østfold	963	267,9%
Vestfold	1268	208,1%
Vest-Agder	1258	186,8%
Troms	216	98,9%
Telemark	394	358,6%
Sør-Trendelag	2794	157,2%
Sogn og Fjordane	168	288,4%
Rogaland	3170	163,1%
Oslo	6756	126,4%
Oppland	246	281,8%
Nordland	509	233,1%
Nord-Trendelag	404	180,8%
Møre og Romsdal	992	125,6%
Hordaland	5068	196,4%
Hedmark	295	304,9%
Finnmark	51	100%
Buakerud	1686	125%
Aust-Agder	498	215,7%
Akershus	7314	92,4%
Total:	34066	172,7%

Oslo: 6756 EV's, + 126,4% (from August 2013)

Akershus: 7314 EV's, + 92,4%

Norway total: 34066 EV's, + 127 % (August 2014)





Today Norway with its population of 5 million people holds a market share of 35 % of the whole Western Europe EV market, and 1 out of 4 popular models like Nissan Leafs and E-Golf and Tesla are at the moment sold in Norway.

3. ENCOURAGING AN EV MINDSET

3.1. From zero to hero

It is clear that in Oslo a number of cultural and socio-economic factors have facilitated acceptance and uptake of the electric vehicle as a realistic transport alternative: general heightened interest in environmental issues among the population; importance of renewable energy as source of energy production; high average income levels. Even in Norway however, ground breaking transfer from ICE⁴ to electric would not have happened without external impulse, or would have been much slower and would not have reached the scale we witness today. Authorities recognised that in order to boost the sales of electric vehicles, from almost zero back in the 90`s, and leap frog the many barriers present at the outset (both perceived and real) a serious toolbox of diverse measures would be required, including incentives to convince buyers to embrace this new innovation.

This recognition resulted in a very coordinated or at least a strongly coherent approach across the national and local levels of governance, with accumulation of advantages making a strong argument for change.

3.2. Measures designed to boost the proliferation of EVs

To support the goal of dramatically increasing take-up and use of electric vehicles, the Norwegian government implemented several schemes to make electric driving more attractive.

⁴ ICE – internal combustion engine

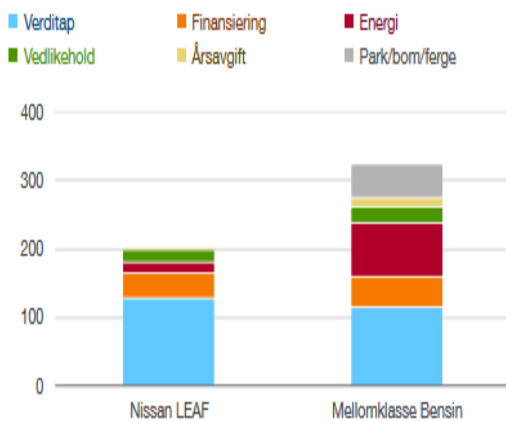
Incentives on purchase:

- No 25% Value Added Tax (VAT)
- No «One-time registration fee» calculated on the basis of:
 - the weight of the vehicle
 - the emissions (CO₂ and NO_x)
 - the engine size (ccm) or effect (hp)

Electric vehicles are also exempted from purchase tax and value-added tax on the purchase price, and are charged a lower rate of vehicle tax. On average this can typically save the buyer of an electric car some €12,500 through limitation of purchase tax and €9,000 in VAT for an equivalent small to medium-sized car with standard engine.

The figure below indicates the total cost of purchase and usage of a Nissan Leaf EV over five years compared to an average priced conventional car with a combustion engine of similar size:

Costs over 5 years, in NOK 1.000



The same cost pattern is visible for other EV producers like: VW, BMW, Kia, Ford, Renault, Citroen, Mitsubishi, Tesla etc. The table reveals the relative economic benefit for the buyer of a new car in purchasing an electrical vehicle compared to a conventional car with a combustion engine. Combined with other incentives (itemised below) introduced at national and city level this creates a forceful combination of arguments for the purchase and use of an electrical vehicle by the ordinary consumer. When applied to the Tesla model which is only realistically affordable for a relative minority segment of the population in most European countries, these measures represent a levelling of the playing field. The total cost package becomes very favourably comparable with similar conventional sedan type vehicles without even taking into account other advantages such as the driving experience (acceleration and smart technology), low noise, and free-fast charging at Tesla installed charging points. This means that Tesla is also an interesting option for company vehicle fleets in Norway.

Incentives on daily use:

- Free access on toll roads (1997)
In Oslo (savings for users € 3,5 – 5)
National roads and tunnels up to € 20.
- Free parking (Oslo 1999)
(savings for users € 2 – 5 per hour)

- EV's charge for free on public charging stations (Oslo)
- Access to use bus and taxi lanes (Oslo 2003)
(10 min -1 hour of time saved per day)
- Free transport on ferries (2009)
(saving € 12 – 24 each way)
- Low annual car tax (saving € 375 pr. Year)
Combined with a low electricity price (0, 06 euro pr. kWh) this gives a very strong economic rationale for buying and using an EV.

There is no doubt that carefully considered and integrated policy approach has achieved an almost unexpected level of outcome, at least a significant change of mindset and consumer behaviour. Today the "Buddy" is perhaps not as prominent in the city streetscape eclipsed by a growing range of e-vehicle types supplied by the more familiar mainstream car companies. In Oslo electric commuters represent 75% of vehicles using city bus lanes which is becoming problematic. Equally the progress made implies a serious financial effort from the public authorities involved and so a limit was set to review the "incentive strategy" either in 2018 or when the number of registered zero-emission vehicles reaches 50,000 (the situation today suggests that this will already be in 2015). There is a possibility, probability, that incentives will be stopped or at least limited and this evolution will pose some interesting new challenges in terms of maintaining the E-mobility momentum.

4. CHARGING AND THE OSLO (EVUE) LAP

4.1. Public charging points, an essential pre-condition?

Some recent studies suggest that provision of charging infrastructure is not a real critical essential for most EV urban use patterns⁵, particularly with improving battery performances (package delivery companies for instance generally have a daily urban mileage per vehicle of less than 100km). Nevertheless perception and range anxiety still dominate this aspect, demanding the psychological comfort of destination charging facilities – workplace, inner city parking places, leisure locations – as a determinant factor influencing the choice to go electric.

So one major barrier to the proliferation of the electrical vehicle was identified as the lack of charging infrastructure in Oslo. The new EV users needed access to electricity in the same way conventional car users need access to petroleum or diesel. Recognizing this obvious but important reality, the City of Oslo installed 400 EV charging points between 2008 and 2011. The price tag was 4 mill NOK (€508,601) per year in the first period.

The project was a big success and transformed the whole charging infrastructure available for potential EV users, and was followed up in the URBACT Local Action Plan for the city setting out the task of installing a further 400 public charging points by

⁵ Electric vehicle household charging: behaviour in Ireland and aims for a carbon neutral electric fleet by 2020 – Patrick Morrissey, Peter Weldon, Margaret O'Mahony Dec 2014, Centre for Transport Research, Trinity College Dublin

December 2014. This brought the available capacity of standard charging facilities in Oslo at the end of 2014 to a total of 900.

Oslo went from this:



To this:



And finally this:



The prices for new charging points are on average NOK 21,600 (€2,500) for 2 new charging points, or NOK 2,160,000 (€274,500 Euro) for 200 additional charging points a year.

The aim is to provide a complete and wide-reaching charging network for EVs in Oslo, in this way ensuring availability of infrastructure necessary to lower CO2 emissions from the transport sector, as well as local emission of other detrimental pollutants.

Two large EU tenders were completed in respectively 2009 and 2013.

2009-2012



- Old EVs (PSA, Think, Kewet) to consider
- 230 V
- 2 x Schuko (European domestic) socket
- 2 x 16A circuit breaker
- 2 x hook for heavy EVSE box
- Physical key access
- No communication or intelligence in the charging stations - inexpensive
- Average cost in electricity per point per day: € 0.50

2013-2015



Winner: Charging station produced by Mennekes (Germany)

- 230 Volt
- 2 x Type 2 sockets
- 2 x Schuko socket
- 2 x 16A circuit breaker
- Hook on each side to hang UMC-box
- RFID and SMS access control
- Communicates via GPRS
- 400 charging points with this model will be established in 2013-2014

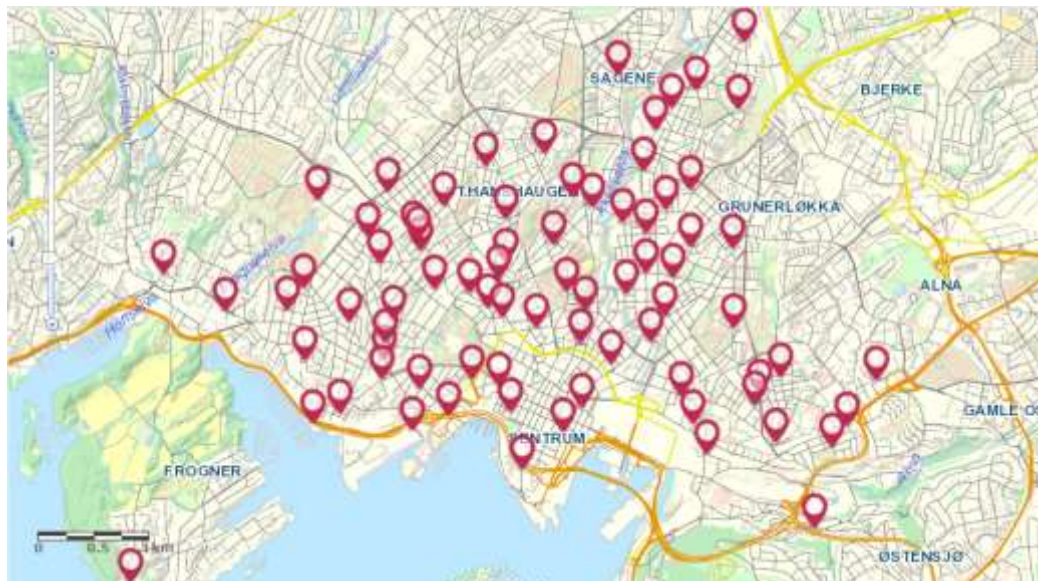
The new Mennekes chargers are more advanced but are also more stable. The model covers more charging standards, and is open to allow more provision of essential information for consumers, and to introduce a system for potential future payments by users.

The new charging points were placed:

- After suggestions from EV owners or potential EV drivers
- In highly visible places – to create awareness
- Where EVs are normally parked
- After monitoring the use and capacity at the most frequently used locations
- After suggestions and communication with the local EV users organization and relevant environmental groups

The new highly visible charging net transmitted a powerful message to potential EV buyers that it was safe to embrace the new technology. This clearly contributed to a larger demand and the increased exponential growth in the numbers of electrical vehicles that Oslo has witnessed since 2011.

To increase the accessibility for the users the Municipality has created an online map of all charging points in Oslo, where the information is continuously updated.



4.2. Subsidies from the Climate – and Environment Fund

In addition Oslo introduced a scheme to install charging stations in non-public areas, such as shopping malls, housing complexes, housing cooperatives etc. Owners of EVs can apply for a subsidy which can be up to 50 per cent of the purchase and installation cost of a charging point - up to a maximum of NOK 10,000 (€1,200). This resulted in over 350 additional charging points, and the figures are rapidly increasing.

- Private companies, apartment complexes, shopping centres etc. can apply for subsidies to establish charging points for EVs. Subsidies range from up to NOK 10,000 (€1,200) per charging point established, and in fact up to 60% of the total cost can be subsidized.
- The Agency for Urban Environment administers the applications and issues their recommendation to the Energy Efficiency Agency. The EEA approve the recommendation and issue the refund once the charging point has been established. One requirement is that the charging point is equipped with a kWh meter (used for the accounting of the CO₂ emissions in the City of Oslo).
- More than 350 charging points in private spaces have been established with the support of subsidies since 2008.

4.3. Fast Charging and the Business Model Dilemma

Despite the comprehensive territorial cover of charging points achieved, the city always viewed the provision of this “standard” charging service as representing a basic level of facility, essential to deliver consumer comfort. As technology has advanced it was very soon the ambition that the basic service level would be complemented and supplemented by the introduction of fast-charging opportunities. The city of Oslo has however neither the resources or the will to also fund this network extension and looks to the private sector to deliver this segment. Up until the present this has proved very difficult to encourage in the urban context.

We might ask – is this in fact an essential element? In some countries or regions (Belgium, the Netherlands, metropolitan regions etc.) fast-charging might not be a crucial determinant in terms of forcing EV take-up. However outside the main urban centres (Oslo, Bergen, Stavanger, Trondheim... which are also distant from each other) Norway is sparsely populated. Added to this many middle-income families have second homes in the countryside or on the coast where they spend weekends and holidays, so distance of travel expectation - commuting, business or leisure - can quickly surpass current standard battery ranges. The Green E-motion project organised an EV rally from Milan to Brussels in 2014 and using currently available charging facilities en route, average journey time was about 3 days.

Companies like Grønn Kontakt (owned by 23 Norwegian power companies) have stepped into the market and today this provider has 40 fast chargers in operation across the country – primarily located to facilitate inter-city or longer journey travel rather than urban provision. In order to achieve a positive cash flow situation it is estimated that 100 charging points are necessary, where the parameters of user friendliness, hardware and network stability, and standardisation need to be satisfied. So even here the viability of the business model is uncertain and when one starts to imagine a situation of improved battery performance, alternative charging solutions etc. simply reaching the 100 threshold may not guarantee return on investment or any real durability of the business model in a fast-moving sector. According to Managing Director Ole Henrik Hannisdahl “the most important charging point of all in the Norwegian situation is still the home for most EV owners”.

5. COSTS AND BENEFITS

5.1. Current Business Models

While EVUE partners in general continue to identify difficulties in developing appropriate business models, and we are already aware of the fast-charging problem in Oslo, the situation in Norway is experiencing a positive evolution.

Public, private mix

Recognizing the current market imperfections for a broader adoption of electrical vehicles among potential users, the City of Oslo has clearly taken the driving seat, both concerning financial investment and transformation initiatives. However there has been a substantial cooperation with the national EV community (including the Norwegian EV users association, the Green Car association and ZERO, an Oslo-based non-profit organisation, [Electric Mobility Norway](#)). There has also been an extensive

cooperation with R&D organizations like [Institute of Transport Economy](#) and [Sintef](#), as well as private companies, housing associations and semi-public energy and transportation companies.

Central government initiatives are also extremely important in these endeavours. Important initiatives like no purchasing tax, no VAT on purchase, 50 % rebate on purchasing tax on company EVs has indeed been fundamental. Support from central government through public funding of institutions like [Transnova](#) have been very crucial for instance for the growth of the fast charger net in Norway and other important green traffic projects. In addition the central government [database](#) and map for charging stations has also been an important tool for the EV users. Information is also exchanged with the Municipality's online [database](#).

5.2. Calculation of costs and gains

The complete range of measures aimed at boosting the use of electrical vehicles has indeed proved effective. Oslo has been able to create the critical mass required to convince more than 15% of new car buyers to choose electric. There is of course a significant level of cost associated with the "generous" support/mobilisation measures - but equally there have been many gains and important (also external) benefits, not least from an environmental point of view.

Relevant cost for the City of Oslo has been:

- Charging infrastructure in Oslo: 4 mill NOK (€508,601) per year in the first period 2008-2012. Due to more advanced chargers from 2013 the price is now approximately 6 mill NOK per year (€762,000).
- Maintenance of the charging infrastructure amounts to approx. 2 million NOK per year (€254,000).
- Loss of revenues from parking due to the converting of ordinary chargeable parking places with free EV-parking approx. NOK 21,000 (€2,700) per charging point. For 700 charging points next year it will amount to NOK 14, 7 million (€1,869,000) per year.
- Subsidies from the Climate - and Environment Fund has so far amounted to approx. 3 million NOK (€381,000) since 2008.
- Free use of electricity amounts to approx. 2 million NOK (€254,000) per year

Relevant costs for the central government have been:

- Loss of tax revenues for purchase of new cars is 100,000 NOK per new car (average conventional car tax). For 15,000 new EVs per year the price tag would be 1,5 billion NOK (190 million Euros). However this figure requires that all new purchases of EVs replaces a new conventional vehicle, based on today's actual choice of models. This is not necessarily the case. Also it is important to stress that this is not a cost that the central government has to pay directly, but rather a potential loss of future revenues.
- Loss of VAT on new cars represents approx. 80,000 NOK per car. For 15,000 new vehicles the yearly cost will be NOK 1,2 billion (152,8 million Euros).
- Subsidies to environmental funds like Transnova that supports projects connected to EVs, for instance to build a fast charging net across Norway. Transnova intends to use 150 million NOK (19 million Euros) on such projects over the next two years.

Benefits from these measures:

- A better and cleaner environment
- A possibility to meet ambitious political goals such as the reduction of CO2 Emission by 50 %, climate neutral by 2050 etc.
- Reduced health cost connected to local pollution
- An incentive for new green business development, and spin-offs through cooperation between key stakeholders
- A more rational traffic management, including integration of ITS and smart grids
- Reduced oil demand. Today 36,000 EVs in Norway reduce the demand for gasoline and diesel by at least 324 million litres per year based on today's motor technology and average driving range per year
- Reduced emission of CO2. For new cars the reduction would be an average of 130 g/km x 36,000 EVs if they all replace conventional combustion engine vehicles. The transportation sector is today the main source of local CO2 emission with 0,7Mt. A larger cut in local produced CO2 emission is not possible without replacing a larger number of conventional cars with CO2 free vehicles, both for private cars, public transportation and commercial vehicles
- Reduced emission of NOx, SO2 and CO and other detrimental air pollutants, especially particulates.

As is often the case in this type of analysis it is easier to calculate real investment or incentive costs than some of the qualitative benefits accrued, or "indirect" but targeted outcomes such as health gains.

6. FUTURES

6.1. An ever moving target

Oslo can be described as a high-growth city and forecasts predict an increase in population (from current level +/- 650,000) of 30% by 2030 which logically also has consequences in terms of demand for individual mobility. Freight distribution is expected to grow by 50% within the same timescale. E-mobility therefore is considered as an unconditional necessity if the city is to meet its ambitious but agreed environmental goals (alone representing a 600,000 ton reduction in locally produced CO2 for example). The cost of inaction would indeed far exceed the funding needed to transform a greener paradigm shift. Unless present trends are corrected, the economic costs of traffic congestion will increase by about 50% by 2050, the accessibility gap between central and peripheral areas will widen and the social costs of accidents and pollution will continue to rise. Therefore the need to keep up the pressure for uptake of private EVs as part of a sustainable mobility approach is still an essential strategic objective.

In this the city LAP delivered within the EVUE project is only one part of a strand of a well-connected and complex policy approach designed to address and resolve the environmental – mobility equation. In addition a well-founded and composite response opens up opportunity for transition towards a smarter and greener city,

with abundant business opportunities and new entrepreneurial creativity based on innovations and synergy between new stakeholders in the energy, ICT and transport sector. This will also ultimately call for an increased cooperation between public and private businesses.

In the immediate future a strong focus will be afforded to greening municipal and public agency fleets, transforming public transport, encouraging the commercial transport sector (trucks and trailers for various uses), as well as an electrification of the maritime transport system. The shift in terms of light freight, parcel services and taxis is already visible and pilot projects are under way (hydrogen) for large trucks and bus services, but this will require the building of new energy centres strategically located in the city.

When the local charging structure is regarded as sufficient, there will also still be a need for building out the national fast charger net. At the moment the fast charger net is limited with around 90 fast charging stations in Norway, but is continuously increasing through initiation of new projects joint funded by public and private money.

6.2. Electric vehicles for the municipal fleet

Oslo is committed to setting an example by acting as a responsible and pioneering customer. The city is already in the process of replacing its existing fleet of conventionally fuelled cars with EV's. The transition phase from conventional vehicles to EV's was planned over three years, and the agreement on this was designed to contribute to reaching the municipality goal that the entire vehicle park would be CO2-free within 2015.

Oslo owns a large number of municipal vehicles, which are largely used for short-distance trips within the city. In 2011, the Agency for Urban Environment and Østensjø District took part in a project to test two types of electric vehicles. The aim was to find out how well the vehicles functioned in day-to-day use (including meteorological conditions) for municipal purposes and if it was possible to charge the batteries to 100% between the errands. The project was a huge success and on this basis Oslo concluded a purchasing agreement for 1000 electric vehicles, instigating a systematic and structural replacement of gasoline and diesel vehicles to pure electric vehicles. The total cost of the project amounts to 50 million NOK (6.2 mill. Euro).



The Mayor of Oslo in an electrical vehicle.

6.3. Carbon free public transport

Public transport will be climate neutral by 2020 is the proud claim of the Oslo public transport agency Ruter. In 2013, 309 million journeys were made across the various public transport modes serving the city - metro, bus, tram, train and ferry. Predictions suggest that this figure will reach 550 million trips in 2030 and while the public transport system is challenged to achieve this level of service without use of fossil fuels it is also intended that increase in demand for motorised transport in general be covered by public transport, cycling and walking.

Of the public transport modes only buses and ferries use fossil fuel (pure diesel fuel share of bus service 58% in 2014) and so immediate focus is on transforming the remaining conventional vehicle component of the bus fleet. H2 Fuel Cell, and electric buses are being used and tested with the fuel cell solution evaluated as having the best potential economic/environmental credentials. Commercialisation of these alternatives is programmed for full operation from 2017 onwards to meet the 2020 deadline and there seems no reason to doubt that this will be achieved.

6.4. Smart City, Smart Urbanisation

Underpinning the ongoing sustainable urban mobility dynamic is the drive in Oslo to use smart city strategy and technologies - to integrate efficient environmental solutions in respect of energy and mobility. Intelligent transport systems, digital vehicle identification and public transport real-time information exemplify the city approach to facilitate:

- Congestion charging and low emission zone access
- Travel time, parking and charging time monitoring
- Parking payment and fines
- Public transport smart ticketing
- Park and ride management
- ...

Introduction of these technologies is in the process of linking to new focus areas for the city: increased charging point provision outside the city ring road (Ring 2); extension of park and ride operations; green freight distribution; electric taxi services; green car sharing; new inner city parking garages exclusively for EVs etc.

7. REVIEW AND CONCLUSION

Oslo has the possibility to go forward and establish the green change earlier than most other cities in the world, with a strategy which can be firmly based on its unique position – the ability to deliver 100% energy from renewable sources. It is evident that this represents an advantage which most other cities cannot even imagine at this point in time. Yet even here investment and subsidy initiatives in the EV sector were considered indispensable in the early adoption phase. From this year onwards it is likely that such types of public sector stimulus will be systematically phased out or modified, diminished – shifting the financial burden to involve more realistic user payment and development of sound business models in a transformed mobility system.

The combination of coherent Norwegian (national) and city policies, cooperation together with cross-party political backing and local stakeholder commitment has been instrumental in changing mindsets and establishing a new mobility climate in the city of Oslo. It is possible to hear the stillness of the electric vehicle in the streetscape. City representatives remind us however that it is not a done deal and that "strategy must be flexible, things are continuously changing and today`s measures must be monitored and adjusted accordingly".

As a closing exercise of the EVUE II Pilot Delivery Network, the city partners and local support group members were asked to reflect on the Oslo story seeking to identify key lessons and draw parallels with their own experience and situation.

The case of Oslo in terms of stimulating use of electric vehicles is generally regarded as demonstrating a viable and effective approach, even although EVs still represent a minority share in the transportation model at this point in time. There are a number of factors which contribute to the **success** of the Norwegian/Oslo approach which may or may not be possible to replicate in other partner cities:

- Strong and targeted communication and awareness raising was able to exploit and extend an existing tradition of "green-thinking" and so shape an EV mentality, acceptance of the electric vehicle as a normal part of the mobility pattern in the city.
- A coherent subsidiarity where legislation (regulation and incentive) at national and local level is complementary and combines to form a clear framework for action, drawing on a political consensus model in this sector.
- A well-balanced package of various and convincing incentive measures, from no-cost permission to use bus lanes, to granting of enticing financial subsidy – while recognising this as a finite term stimulation mechanism.
- Adoption of a clear long term strategy fed by incremental intervention in the short and medium term
- The use of incentives (at least for an important initial period) to establish a real price comparable level playing field for EV purchase versus the conventional ICE vehicle. The advantage of low electricity life cycle costs as opposed to still high fuel costs for conventional vehicles is an important factor in this.

In terms of transferability of the Oslo model, partners consider that most of the key success factors are potentially transferable to their own situation but that a number of pre-conditions need to be either present or built-up – not least an acceptance mentality and political will. Where this match is imperfect it is important to analyse precisely which best practice can fit the local situation in terms of:

- Legislation and regulation/incentive measures (enhanced cooperation between relevant levels of authority, service providers etc.).
- Adoption of a transparent and targeted strategic approach.
- In an initial phase focussing on small-scale (no-cost/low cost) but effective actions and encouragement incentives alongside longer term mechanisms. The notion of "picking low-hanging fruit".
- Link to intensified communication and awareness raising campaign as a critical ongoing (opinion changing) activity.
- Construction of a viable win-win charging point business model, seeking the appropriate balance between public and private provision which can be adapted over time.

The discussion on local context and approaches connecting to transferability, of course brings us back to the identification of barriers and obstacles which need to be tackled in many cities across Europe. While Oslo has appeared to have overcome, or is in the process of overcoming, deeply engrained difficulties it is also not immune. The tipping point when incentives are reduced or phased out, it is realised, will need to be carefully managed in order to avoid slipping back to the comfort of the status-quo. Major challenges remain for most cities:

- Insufficiently developed (or lack of) legislative framework to support growth in EV use.
- Conventional stakeholder mentality, the effort needed to change mindsets translates into longer timeframes for introduction of measures and market development.
- Lack of an EV market, vehicle producers see no market potential so no (or few) vehicles are made available for sale in local dealerships.
- High real purchase cost for EVs and uninformed perception of lifecycle costs.
- Limited range of vehicle types, this has improved dramatically in terms of private cars but is still a critical issue for freight and even public transport options.
- Adequate grid supply and capability of electricity infrastructure.
- Insufficient customer friendly charging points (particularly as visible statement of journey security - on street, destination points).
- Slow development of private investment or even public/private business models for provision of services and infrastructure (a consistently recurring theme through EVUE and EVUE II).
- EVs do not solve the problem of urban congestion.

Even although the URBACT EVUE initiative has now arrived at a definitive end point it is important that cities can continue to follow the situation in Oslo, what further progress will be made, which existing or new pitfalls will require to be addressed and which solutions developed. Oslo is not alone as "pathfinder" city but the deeper understanding gained of the experience in Norway and the contacts made between partner cities should allow the learning process to continue - to examine and draw lessons from the continuing momentum as Oslo sets out to take important **next steps** and extend its commitment to E-mobility by:

- Maximising new-tech smart grid solutions.
- Reviewing legislation, particularly in relation to the challenge of implementing an incentive exit strategy – balancing incentives and disincentives.
- Consolidating effective business models.
- Developing the strategic framework building on consequent local implementation.
- Examining the low (no) -emission zone potential.

Perhaps the most important message to draw from the Oslo experience is that the strength of the approach is not based on the impact of punctual or individual initiatives, however effective they may be. The real strength of the approach is in the interaction and integration of a coherent and well understood range of actions - complementary and incremental - supported by an operational multi-governance model and open to real cooperation with, and provision of opportunity for, key stakeholders.

URBACT II

URBACT is a European exchange and learning programme promoting sustainable urban development.

It enables cities to work together to develop solutions to major urban challenges, reaffirming the key role they play in facing increasingly complex societal challenges. It helps them to develop pragmatic solutions that are new and sustainable, and that integrate economic, social and environmental dimensions. It enables cities to share good practices and lessons learned with all professionals involved in urban policy

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