



CNCA
CARBON NEUTRAL CITIES ALLIANCE



PORTEN TIL GRØN VÆKST



CITY OF COPENHAGEN

UPSCALING GREEN VEHICLES IN NORTHERN EUROPE

Synthesis Workshop Report
Copenhagen
April 2016



TABLE OF CONTENTS

EXECUTIVE SUMMARY	2
BACKGROUND	3
WORKSHOP OBJECTIVES	3
EXPECTED RESULTS OF THE WORKSHOP	5
PARTICIPANTS	5
PROGRAMME AND DESIGN.....	5
CONTENT	6
INTRODUCTION.....	6
IT'S ALL ABOUT INNOVATION.....	7
CLEAN VEHICLES: ON THE VERGE OF SCALING UP?	9
DEVELOPING CLEAN FUELS AND VEHICLES IN EUROPE	11
ELECTRIC VEHICLES IN OSLO – PUBLIC INCENTIVES	13
ELECTRIC VEHICLE MARKETS IN CALIFORNIA.....	16
PROJECT 1: DISRUPTIVE BUSINESS MODELS ON CAR SHARING.	20
PROJECT 2: IMPROVING INTEROPERABILITY BETWEEN CHARGING SYSTEMS.....	24
PROJECT 3: DEVELOPMENT OF EXISTING ENVIRONMENTAL ZONES.....	29
PROJECT 4: ESTABLISH PURCHASING COOPERATION ACROSS BORDERS.....	34
FEEDBACK ON THE WORKSHOP FROM THE PARTICIPANTS	37
ANNEXES	39
ANNEX 1 WORKSHOP PROGRAM.....	39
ANNEX 2 LIST OF PARTICIPANTS.....	43
ANNEX 3 DISRUPTIVE BUSINESS MODELS ON CAR SHARING	45
ANNEX 4 IMPROVING INTEROPERABILITY BETWEEN CHARGING SYSTEMS	46
ANNEX 5 DEVELOPMENT OF EXISTING ENVIRONMENTAL ZONES.....	47
ANNEX 6 PURCHASING COOPERATIVES ACROSS BORDERS.....	49
ANNEX 7 EVALUATION BY PARTICIPANTS	51



For more information on the Carbon Neutral Cities Alliance (CNCA):

<http://usdn.org/public/page/13/CNCA>

For more information on the work of this report

and for all other correspondence please contact:

Kenneth Jørgensen

Kenneth.joergensent@gate21.dk

www.gate21.dk

Layout and design by

Gate 21

Copyright 2016

Frontpage picture: Mikkel Østergaard

The following abbreviations are used to denote different types of green vehicles:

EV – Electric Vehicle

FCEV – Fuel Cell Electric Vehicle

BEV – Battery Electric Vehicle

HEV - Hybrid Electric Vehicle

ICE - Internal Combustion Engine Vehicle

PEV - Plug-in Electric Vehicle

ZEV – Zero Emission Vehicles

PHEV - Plug-In Hybrid Electric Vehicle

REEV - Range-extended electric vehicles

LPG – Liquefied Petroleum Gas

CNG - Compressed Natural Gas

LNG - Liquefied Natural Gas

EXECUTIVE SUMMARY

The Transportation sector includes the movement of people and goods by cars, trucks, trains, ships, airplanes, and other vehicles. The majority of greenhouse gas emissions from transportation are CO₂ emissions resulting from the combustion of fossil fuels, like gasoline, in internal combustion engines. The largest sources of transportation-related greenhouse gas emissions include passenger cars and light-duty trucks, including sport utility vehicles, pickup trucks, and minivans. These sources account for over half of the emissions from the sector. The remainder of greenhouse gas emissions comes from other modes of transportation, including freight trucks, commercial aircraft, ships, boats, and trains as well as pipelines and lubricants.

This synthesis report focuses on the potential for promoting “green vehicles” in Northern Europe benefitting climate, health and well-being as well as the quality of our air. The report highlights the main observations, exchanges and recommendations identified over the two days of the workshop called: “Upscaling Green Vehicles in Northern Europe” arranged in Copenhagen as part of the Carbon Neutral Cities Alliance (CNCA). The workshop initiative presents an opportunity for new collaborative projects between cities being members of the Carbon Neutral Cities Alliance (CNCA), car industry, energy companies, interest groups and mobility operators with a clear interest in promoting green vehicles.

The workshop was organized around key note presentations from Europe and United States. Furthermore a series of project development sessions involving four projects, identified on behalf of a series of interviews, were central elements.

The projects are:

- Project 1: Developing disruptive business models for enhancing car sharing in cities.
- Project 2: Improving interoperability between charging systems in cities and across borders.
- Project 3: Development of existing environmental zones in cities into Ultra Low Emission Zones (ULEZ) or Zero Emission Zones (ZEM).
- Project 4: Establish purchasing cooperation across borders.

The participants were eager to learn from each other and expressed a desire to see the workshop projects/experiences going beyond the workshop, with additional involvement. For almost all suggested projects participants identified possibilities of co-creation and responsible person to take the first step towards realization.

BACKGROUND

The effects of climate change are being felt all over the planet. Cities play a crucial role in our efforts to reduce the effects of climate change as cities account for the majority of the world's GHG emissions. CO₂ reduction improvements in sectors other than the transport sector are evident. The transport sector is especially challenged as today's transport accounts for nearly one quarter of global energy-related CO₂ emissions with cars and trucks representing the bulk of these emissions, and projections suggest that the transport sector's energy use could be doubled by 2050 thanks to increased car ownership and transportation work. Significant reductions in CO₂ emissions from transport are required to reach long-term climate goals. For example, the EU has agreed on reducing the CO₂ emissions related to transport by 80-95% by 2050, compared to 1990 levels. Furthermore the EU Commission has set up target goals for clean urban transport and commuting, such as halving the use of conventionally fuelled cars in urban transport by 2030 and completely phasing out conventionally fuelled cars in European cities by 2050.

The transport sector is at the beginning of a period of significant disruption, with new technologies, products and services fundamentally shifting customer expectations and opportunities away from a very car-centric mindset. In the future cars will continue to play an important role in our transportation system, and ways of upscaling green vehicles need to be investigated further.

In 2015 the Carbon Neutral Cities Alliance Innovation Fund (CNCA), granted financial support to carry out a two-day workshop called: Upscaling Green Vehicles in Northern Europe. The workshop took place in Copenhagen on January 21 and 22, 2016, organized by the City of Copenhagen in collaboration with the non-profit partner organization Gate 21.

WORKSHOP OBJECTIVES

The main objective of the workshop was to develop four projects of common interest for CNCA cities with the potential for stimulating demand for green vehicles, either directly or indirectly. The four projects were identified; concept notes were produced prior to the workshop and further enhanced at individual sessions throughout the workshop using facilitating methods.

The four projects were defined prior to the workshop as follows:

- Project 1: Developing disruptive business models for enhancing car sharing in cities.
- Project 2: Improving interoperability between charging systems in cities and across borders.
- Project 3: Development of existing environmental zones in cities into Ultra Low Emission Zones (ULEZ) or Zero Emission Zones (ZEE).
- Project 4: Establish purchasing cooperation across borders.

Workshop participants were encouraged beforehand to acquire a mandate from their respective organizations regarding involvement in one or several of the projects. This way the participants were preassigned to 1-2 projects they could work on during the workshop or have the opportunity to change their choice if needed.

The workshop and the pre-workshop activities were further aimed at the following:

- To bring together CNCA cities, the automotive industry, mobility operators, advocacy groups and energy companies for developing potential projects focused on upscaling green vehicles.
- Collect information regarding CNCA cities' involvement in projects concerning the upscaling of green vehicles through relevant interviews in advance of the workshop, in order to identify relevant projects for workshop purpose and help tailor and design the workshop. What have they done, how far have they come and what obstacles have they encountered? The interviews conducted involved the following Northern CNCA cities: Oslo, Stockholm, Berlin, Amsterdam and London and were carried out in late 2015.
- Dissemination of information and relevant experiences on the progress of green vehicles upscaling in Europe and globally, and providing the latest examples from good practices in government stimulus (from Norway and California) for EV's by providing a range of subsidies and other benefits – not only on the demand side but also on the supply side.

Green Vehicle Definition

A "green vehicle" is a road motor vehicle (car, truck or bus) moving people, goods and/or services that produces less harmful impacts to the environment than comparable conventional internal combustion engine vehicles running on gasoline or diesel. Green vehicles are powered by alternative fuels and advanced vehicle technologies and include hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), battery electric vehicles (REEV) and hydrogen and fuel-cell vehicles (FCEV). We also consider gas vehicles (LNG/CNG) based on either natural gas or biogas green vehicles.

EXPECTED RESULTS OF THE WORKSHOP

The expected result of the workshop is to give a set of specific recommendations and immediate actions (way forward) on the upscaling projects being processed at the workshop. This includes project descriptions and direction to viable financing opportunities and bringing CNCA cities and partners together in informal networks, enhancing the future work of new possible project applications. Ultimately, this relies on one or more cities and/or partners taking the lead role in the realization process of the projects.

PARTICIPANTS

The well-attended workshop took place on January 21 and 22, 2016 in Copenhagen. There were 33 workshop participants, after having planned for around 30 participants. In addition to the CNCA cities, participants were invited from the car industry, energy suppliers, mobility operators, interest organizations, the EU, universities and knowledge institutions.

As the workshop's focus was Northern Europe, a large number of CNCA cities participated from this part of Europe: Oslo, Stockholm, Copenhagen, Berlin and London. The City of Hamburg also participated even though it's not an official CNCA city. Hamburg is recognized as one of the forerunners in climate mitigation and has similar climate reductions goals as ambitious cities in the CNCA. The workshop also gained interest and participation from cities in the United States and Canada, including New York, Boston, Boulder, Portland and Vancouver.

The facilitator for the workshop was Line Bram Pedersen (GoGreen Copenhagen) and co-facilitators were Anna Thormann (Program Manager) and Kenneth Jørgensen (Project Consultant) from Gate 21. Hanne Collin Eriksen from Gate 21 helped during the workshop with recoding, pictures and practicalities. Gate 21 was responsible for the local organization in cooperation with the City of Copenhagen.

See: Annex 2 List of Participants.

PROGRAMME AND DESIGN

The programme for day 1 and day 2 followed more or less the same structure:

- The morning sessions were reserved for thematic presentations with international keynote speakers from European or U.S. cities. A "networking boost" was arranged for the participants at the beginning of day 1, giving participants the possibility to meet each other in an informal way.
- The afternoons were devoted to interactive participation in project-oriented workshop sessions with group facilitation. Two parallel project-oriented workshops lasting two-and-a-half hours were executed each day. A city gave a starting presentation based on "best practice" to inspire others. The presenter was selected on behalf of the interviews performed.



Picture 1: The "upscaling barometer" in use.



Picture 2: Engaged CNCA participants during one of the workshop sessions.

- A so-called "support person" – a person with a lot of knowledge in the field – was engaged afterwards for adding further perspectives to the presentation, answering questions such as: What are the three most important points from the inspirational presentation? What learning can be part of new projects and collaborations among cities? What have you done and what important experiences do you have? Does the presentation lead to any perspectives on how to upscale green vehicles? The "support person were encouraged to use examples from own contexts/concepts.
- At the end of the first day's afternoon workshop session, participants were invited for a city walk to State of Green to hear more about Denmark's decision to become CO2 neutral by 2050. The day ended with a social dinner at an organic restaurant called BioMio in downtown Copenhagen.
- At the beginning of the second day, participants were introduced to the "Upscaling Barometer". The barometer is a fun and visual way to involve the participants. During the morning check-in each participant got a small toy car. Later on the participants were asked to place the car and their name tag on the barometer showing their interest in the project.

The full program can be seen in Annex 1 Workshop Program.

CONTENT

The workshop content will be summarized here, focusing on major topics and discussions related to keynote speakers, followed by the workshop sessions aimed at project development.

INTRODUCTION

The workshop was formally inaugurated by Mr Jørgen Abildgaard, Executive Climate Project Director from the City of Copenhagen, who also represented the CNCA. He explained the project-oriented focus of the workshop and expectations regarding CNCA cities taking the lead on one or more of the proposed projects.

Mr Jørgen Abildgaard also represented the CNCA and described the background of the CNCA. The CNCA is an organization of international member cities committed to achieving aggressive long-term GHG emissions reductions by at least 80% by 2050. The Alliance is a relatively new constellation established in June 2014 in Copenhagen and today it holds 17 membership cities from all over the world including Berlin, Boston, Boulder, Copenhagen, London, Melbourne, Minneapolis, New York City, Oslo, Portland, San Francisco, Seattle, Stockholm, Sydney,

Vancouver, Washington DC and Yokohama. More cities are on the verge of entering the alliance. All of these cities work collaboratively to test and share best practice to support GHG reduction. The CNCA is a thought, as well as action-leading group capable of funding new climate initiatives in membership cities through the CNCA Innovation Fund.

The CNCA Innovation Fund invests in city-led projects that have the potential to develop, test and implement practices capable of amplifying deep urban decarbonization strategies and practices. In 2016 the CNCA Innovation Fund will have \$1,000,000 U.S. dollars (USD) available for supporting climate projects and initiatives in membership cities. The long-term objective of the CNCA Innovation Fund is to support projects that will build a portfolio of tested tools for cities to use to achieve deep carbon reduction goals.

In continuation of the CNCA Innovation Fund, Mr Jørgen Abildgaard also notified participants that there will be a call for Round 2 CNCA Innovation Fund Proposals in early March 2016 with the request for Letters of Intent (LOIs) to propose a project. This was officially announced on the webpage of the CNCA on the January 21, 2016 – the same day as the workshop started.

He finished by stating that he hoped the workshop would help forge a long-term commitment to the alliance among ambitious cities, from as many people as possible.

Interested participants are able to read more about the organization and the call for projects for Round Two (2016) on the CNCA website: www.usdn.org.

IT'S ALL ABOUT INNOVATION

Senior Consultant Mr. Kim Winther from Transport and Electrical Systems at the Danish Technological Institute introduced the workshop participants to the first overall workshop theme titled "Potential Strengths and Weaknesses of Green Vehicles".

TECHNOLOGY MIX

The session established that there will be several new green transport technologies leading the way forward. At the moment BEVs are the most well known green transport technology, with the most models on the market, but fuel cell powered vehicles are coming and FCEVs represent an up-and-coming technology with the same environmental characteristics as BEVs: no tailpipe emissions and reduced noise. New models such as Toyota Mirai, Honda FCX Clarity and Hyundai ix35 Hydrogen are being introduced to early adopters but there are still very few fueling stations. Also, we see more models based on concepts like plug-in hybrids and range-extenders. These types of vehicles, such as Chevrolet Volt, BMW i3 REX, Honda Accord and VW Golf GTE, were mentioned as transitional vehicles while other, more long-lasting, fossil-free technologies are being developed and enhanced.

Electrification of light private vehicles is, in general, the drive of the technology development whether it is BEVs or FCEV. The advantage of the FCEVs is their longer range compared to BEVs, which are still dominant in cities where driving distances are shorter. But it is worth remembering that most people don't require long range and drive less than 50 km each day. Increased electrification has to take advantage of integration with the electricity grid (smart grid) which will provide better energy utilization as well as a potentially lower consumer price of alternative fuels.

On the move is natural gas, especially suitable for public transport and moving heavy goods for long distance transport. The benefit of Compressed Natural Gas (CNG) is that it's a cheaper, quieter and cleaner technology than conventional diesel. Compared to BEVs it also has longer range. CNG potentially has diesel-like efficiency and is steadily growing in Germany and other countries. CNG is normally considered for refuse trucks or busses. Fleets are converting to CNG for cost savings and environmental sustainability.

A more expensive choice is Liquefied Natural Gas (LNG) used for the long distance transport of goods. The advantage of LNG is that it offers an energy density comparable to gasoline and diesel fuels, extending range and reducing the frequency of refueling.

It is also seen that biofuel made from biomass such as Ethanol, Biodiesel and Methanol is used for some cars ready for multi-fuel. This alternative fuel seems problematic as it is usually made from food crops with their roots in conventional agriculture, using pesticides and fertilizers. Furthermore, it was implied that this type of fuel will require huge amounts of arable land.

DIESEL A PROBLEM CHILD

Mr Kim Winther explained that, while not being defined as a green vehicle, much effort has been put into the development of cleaner fuels for ICE, and today diesel cars have become more energy efficient. Still, the widespread use of diesel cars is in fact a problem child. We see a growing number of cars being sold with diesel engines worldwide. While they may have lower CO₂ emissions than their gasoline counterparts, diesel cars emit a higher amount of deadly pollutants – including nitrogen dioxide and sooty particulate matter – which has contributed to dangerous levels of air pollution in cities such as Copenhagen and London. Compared to petrol cars, diesel cars produce 22 times the amount of particulate matter, a cause of cancer linked with premature deaths. In fact, the emission of diesel pollutants outside a testing area is much higher because a diesel engine isn't cold started in a testing environment, something that normally causes an even higher emission of pollutants. Moreover, diesel cars are driven like gasoline cars nowadays even though they should only be used for long-range transport.

DISCUSSION

In the discussion following the presentation, a number of questions were raised about biofuels. In Sweden for instance, where accessibility to biofuels is higher than in almost any other European country, they have a sustainability certification for the production of biofuels. Besides, almost 90% of feedstock has domestic origin, making it easier to regulate sustainability issues, and biofuels can come from sources other than crops, like sorted food waste and such.

Lastly, the issue of safety regulations in regards to CNG/LNG was discussed. For instance in Sweden, safety regulations say that you are only allowed to fill up your car outdoors in contradiction to diesel. Nevertheless, there are standards to be followed and not many accidents if you handle it correctly.

CLEAN VEHICLES ON THE VERGE OF SCALING UP?

The session then continued with Mr. Jacob Teter, Energy Analyst from the International Energy Agency (IEA), presenting on global markets and technology, trends and the future potential for green vehicles. New research findings were also presented on promising policies and lessons learned from specific countries like Norway. Finally, the IEA presented projections on what will be needed in order to stay below two degrees (2DS).

RECENT TRENDS

Mr. Jacob Teter described a rapidly growing market, but with a long way to go before achieving high rates of market penetration. Global sales of BEVs and PHEVs exceeded 1 million in October 2015, but in absolute numbers the market share in most of the countries showed on Figure 1 is only around 1 % compared to the ICE car, and is a bit higher in countries like the Netherlands and Norway.

Most governments have very ambitious targets for the number of EVs on the street but these are far from the current reality. Many countries face significant challenges, as they will need exponential growth in sales to meet their near-term targets in 2020. Mr. Jacob Teter formulated three main trends and behavioral drivers that will play a role in green vehicle upscaling:

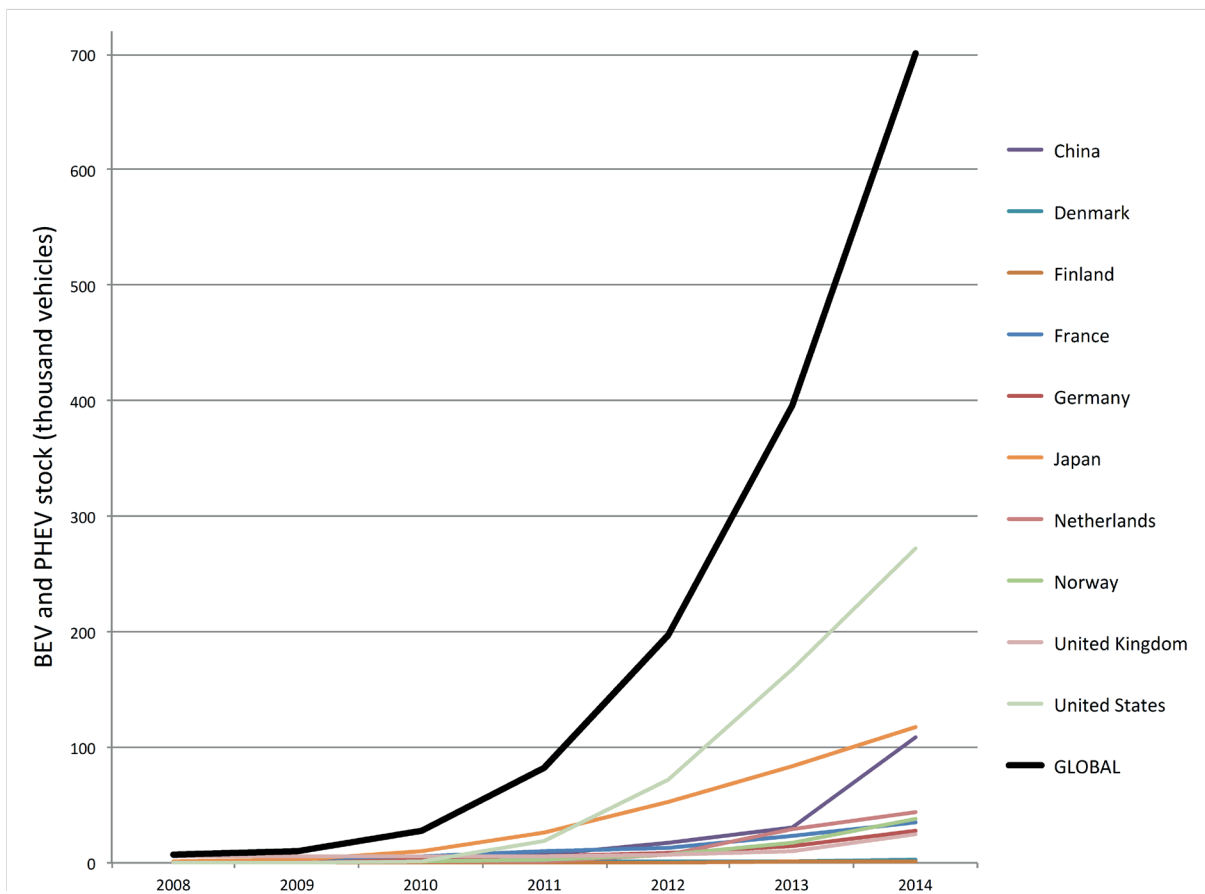


Figure 1: Annual electric passenger light duty vehicle stock.

1. Batteries. One specific trend we see is the energy densities of passenger vehicle lithium-ion batteries improving, but they still remain below 200 Wh/dm³. The US Department of Energy and other government bodies have set the target of doubling battery density in order to reduce weight, limit space and improve range. Another issue mentioned in relation to batteries is battery costs, which have fallen by roughly 20 % per year, to around USD 300/kWh. Tesla aims to break the USD 100/kWh mark by 2020. Range is therefore expected to improve and the battery costs will be lowered.
2. Lightweighting. Another trend is reducing the total weight of the car. An example is BMW's i3 being the world's first car made by carbon composite material fiber. When carbon fibers are bound together with plastic polymer, a composite material is formed that is both strong and lightweight. The IEA expects that the use of carbon composite material fiber has the potential to change car bodies.
3. Automated driving and Mobility as a Service (MAAS). The use of information and communication technologies has the potential to transform transport completely from what we know today. It is also a "wild card", because we don't know the specific effect on the upscaling of green vehicles. On one hand automated driving and MAAS can lead to new mobility concepts and business models where the use of green vehicles is dominant, but on the other hand it can have a rebound effect where cars become too convenient to use so that people move away from walking, cycling and using public transport.

RESEARCH FINDINGS

Mr. Jacob Teter also went through best practice for bringing EVs into a given fleet. An assessment recently finished by the International Council on Clean Transportation (ICCT) reveals some of the early successes for upscaling electric vehicles using different tools. Consumer incentives, electric charging infrastructure, model availability, and city-level actions to promote awareness of electric vehicles are necessary for upscaling EVs. For instance, examples from Seattle show a mix of incentives, utility action and charging infrastructure and have three times the U.S. average for EV deployment. Atlanta's electric vehicle market has benefited from subsidies and carpool lane access; Atlanta's electric battery vehicle sales were more than eight times the U.S. average. Portland, with the most extensive electric charging network and extensive planning and outreach, is seeing three times the average U.S. battery electric vehicle sales, without subsidies (see Figure 2).

However, some of the major U.S. cities in the study don't show signs of success in stimulating the green vehicle market even though they have been implementing extensive new policies. More research is needed to understand this – mid-sized American cities, which have greater electric vehicles shares, could be important for further lessons.

In general, the takeaway is that cities are important focal points or gateways for collaboration between governments, the auto industry, utilities and advocacy. This is necessary, along with a mix of policies adapted to local conditions. From Norway we can see that having a consistent policy matters but, at the same time, the right technology also has to be sufficiently mature and the consumers must be eager to buy it.

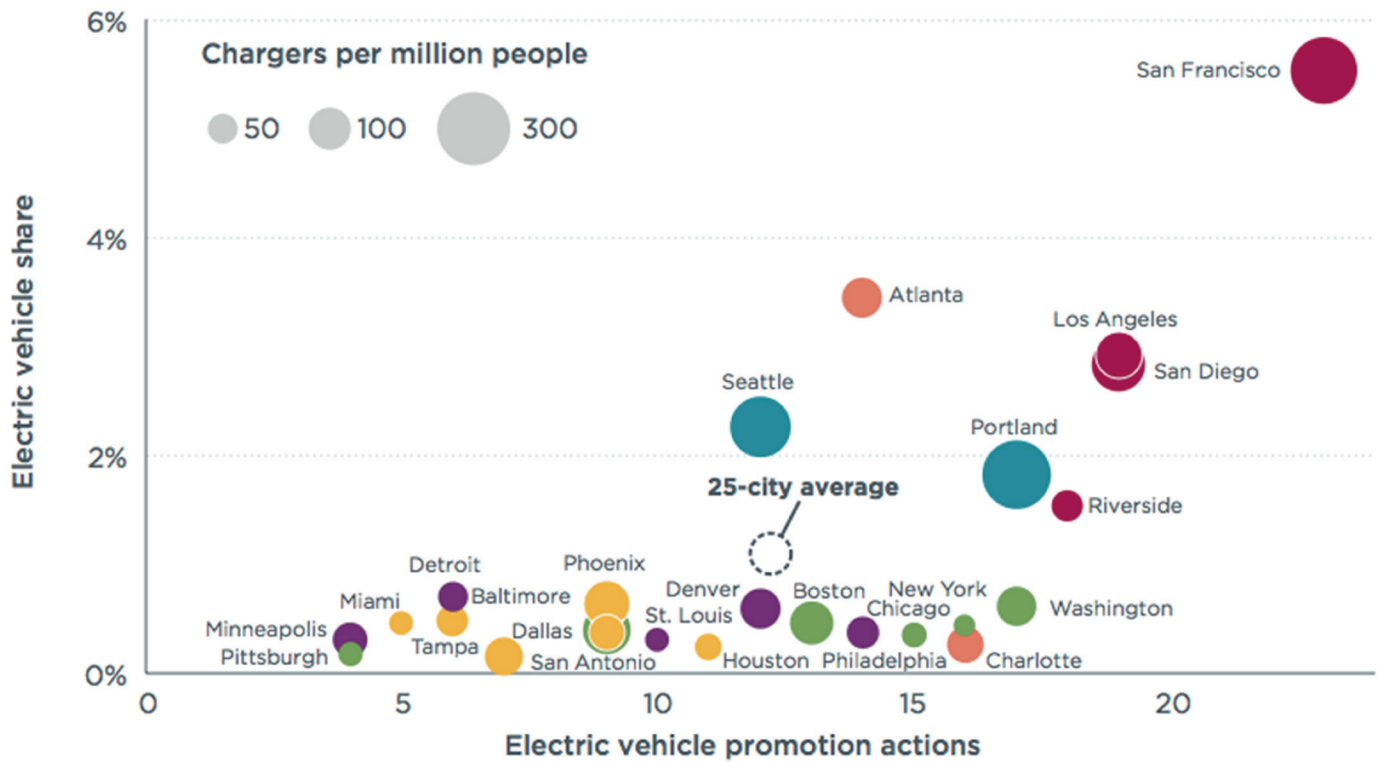


Figure 2: Illustration of 25 most populous U.S. Cities showing EV share compared to electric promotion actions. Source: The international Council on Clean Transportation (2015). Assessment of Leading Electric Vehicle promotion Activities in United States Cities.

WHAT'S NEEDED FOR A TWO DEGREE SCENARIO

To achieve a two degree scenario (2DS) or even “well below two degrees”, as decided at the Paris Climate Conference (COP21) in December 2015, Mr. Teter argued that we need very ambitious actions to reduce transport-related GHG emissions. This can be done in several ways, but it is important to keep in mind that national policies have to support local policies as local policies are better tailored to local context. In this way, local policies can better target impacts that vary in space and time, such as congestion and local air pollution, to avoid or reduce car travel and aid the shift to public transport and walking/cycling. Here, electrification is a much-needed technological step to improve transport by reducing GHG emissions, but there are still barriers related to FCEVs on the infrastructure side. The possibility of EVs as passenger car fleets emerging in time to help combat climate change is a question that remains to be answered.

DEVELOPING CLEAN FUELS AND VEHICLES IN EUROPE

Ms. Dorothee Coucharrière from DG Mobility and Transport, EU Commission, was the last keynote presenter on the first day's morning session. Her presentation largely dealt with existing EU policy and legislation for promoting market growth of green vehicles and funding opportunities for clean transport initiatives.

EXISTING LEGISLATION

What drives EU policy work on transport is the following: 1) Energy supply at risk 2) Necessary reduction of GHG emissions 3) Air quality and congested infrastructure and 4) Competitiveness

of EU industry.

For conventional ICE technology, the EU legislation set standards for a 10 % share of renewable energy sources in motor fuels (Renewable Energy Directive 2009/28) and a CO₂ intensity of fuels by 6 % required by 2020 (Fuel Quality Directive 2009/30). Public procurers also have to take into account energy consumption, CO₂ and pollutant emissions (Clean Vehicles Directive 2009/33). New vehicle manufactures must adhere to European emission standards (EURO norms) for exhaust emissions when selling vehicles in the EU, as well as the regulation of CO₂ emissions – that is 130g/km by 2015 being limited to 95g/km for passenger cars in 2020. For light duty vehicles it's 175 g/km by 2017.

In 2013 the EU released a Clean Power for Transport Package (CPT), being the first wide-range strategy for the long term substitution of fossil fuels in all transport modes including: electricity, hydrogen, liquid biofuels, synthetic and paraffinic fuels, LPG, CNG and LNG. The CPT sets out a minimum infrastructure to be implemented through national policy frameworks for the four most promising alternative fuels: electricity, LNG, CNG and hydrogen. The alternative fuels, except hydrogen, are set up in urban and sub-urban areas, as well as in the designated TEN-T Core Network connecting with major European cities.

Further prioritized policy works in 2016 following the Urban Mobility Package and Guidelines on Sustainable Urban Mobility Plans (SUMP) are as follows:

- The concept of SUMP Plans has gained considerable momentum in recent years and the European Commission will continue to support the development and promotion of the concept in the future. There seems to be a need for some member states to promote SUMP practices at national level and to ensure the right legislative and support conditions for their local authorities. Therefore the European Commission wants to support National Policy Frameworks for alternative fuel vehicles and infrastructure between and within cities.
- Support of a coherent Alternative Fuels Action Plan as part of the Transport Decarbonisation.
- Stepping up the support for public procurement of clean vehicles (revision of the Directive 2009/33/EC).
- Investments in a strategy for "urban nodes" through The Connecting Europe Facility (CEF) investing in trans-European transport network (TEN-T) projects.
- Focus on the development of an EU urban mobility scoreboard, by identifying harmonized indicators to benchmark and compare the progress of urban areas across the EU.

Funding opportunities

As seen from Figure 3, Ms. Dorothée Coucharrière gave the participants a brief overview of financing opportunities available for upscaling green vehicles.

Relevant links:

www.ec.europa.eu. The Sustainable Transport Forum tackling specific issues such as electro-mobility market of services, interoperability and alternative fuels in cities.

www.eafo.eu. New European Alternative Fuels Observatory initiative to provide alternative fuels statistics and information on electricity, hydrogen and natural gas.

www.cencenelec.eu. The European Commission mandated in March 2015 standardization to Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC).

Funding	Description
Horizon 2020	<p>For 2016-2017 Horizon 2020 on R & D projects on electro-mobility such as electrified heavy duty vehicles and L-category vehicles. Urban mobility and Smart Cities are also focal points. Horizon 2020 also supports CIVITAS. CIVITAS now includes not only city led demonstrations, projects and support projects but also knowledge-generating projects including electric mobility, fuelling infrastructure, hybrid vehicles, biogas etc. The Horizon 2020 support projects such as:</p> <p>Green eMotion – electric cars www.greenemotion-project.eu ZEEUS – electric buses www.zeeus.eu FREVIEW – electric city logistics www.freview.eu</p>
ELTIS Portal	The European Platform on SUMP supports implementing and further development in the concept.
ELENA/EIB	European Local Energy Assistance (ELENA) is funded by the European Investment Bank (EIB) and has a dedicated transport component in 2016/2017 with 15 million dedicated to smart urban mobility and transport. Up to 90 % of the technical support cost is covered, including feasibility and market studies.
EFSI/EIB	The European Fund for Strategic Investments (EFSI) has several thematic funding areas but the most relevant for upscaling green vehicles is "mobilizing finance", supporting strategic investments in key areas such as infrastructure, as well as risk finance for small businesses.
EIP-SCC	The European Innovation Partnership (EIP) focuses on Smart Cities and Communities. Innovative solutions connecting the energy sector and the transport sector are poised to overcome environmental, health and societal challenges.

Figure 3: Financing opportunities for upscaling green vehicles.

ELECTRIC VEHICLES IN OSLO - PUBLIC INCENTIVES

The morning of day two was dedicated to how public incentives can be used as tools for upscaling green vehicles. Ms. Guri Tajet, Project Manager from the City of Oslo, presented perspectives on how Norway and especially the City of Oslo have become global forerunners when it comes to per-capita EV adoption for private consumers.

Ms. Guri Tajet stated that in Norway more than 75,000 BEVs and PHEVs have been registered, and more than one fifth of new cars sold are electric vehicles. Nevertheless it's not all about upscaling green vehicles in Oslo. A green transport shift is also needed as a high percentage (43 %) of the transport-related GHG emissions originates from private cars in the city. The city is therefore working on shifting transport modes and since 2005 the general trend has been that the number of daily trips made by private cars has dropped, so that 65 % of daily trips today are undertaken by public transport, walking and biking.

INCENTIVES FOR UPSCALING GREEN VEHICLES

Ms. Guri Tajet made it clear that upscaling green vehicles is a result of supplementary initiatives from both the Norwegian government and the City of Oslo. It's been important for the success of the initiatives that the incentives have been supporting the upscaling of green vehicles on a continuous basis. The important relationship between government stimulus and the city level was also expressed by Mr. Øystein Ihler during the interview:

"We have the City of Oslo that is promoting local initiatives, the charging stations and a lot of local work but the government of Norway has made it possible to have a free tolling road and there is no tax on EVs. So the incentive package is made in cooperation between the state level and the city level".

Interview, Øystein Ihler, Development Director, City of Oslo, 22/10 2015

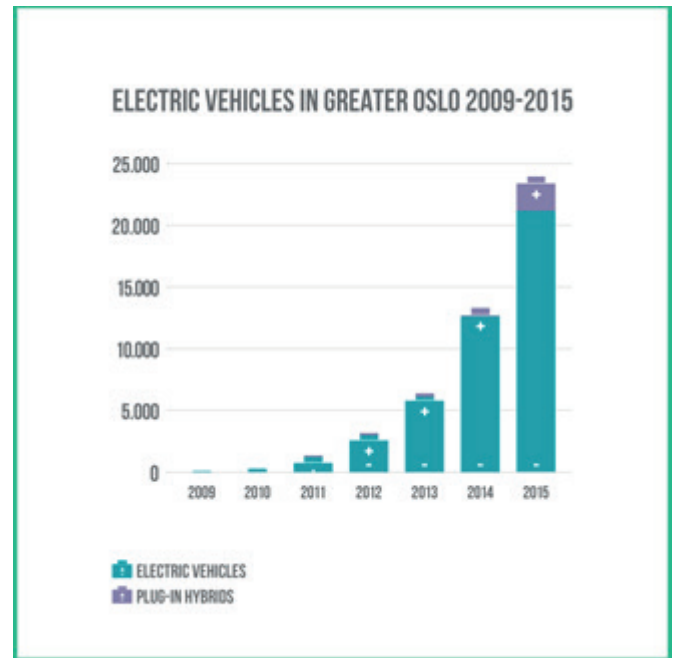


Figure 4: Development of EVs and PHEVs in the City of Oslo from 2009 – 2015. PHEVs are slowly progressing but most people buy EVs. The development is the result of a comprehensive incentive package. Source: Guri Tajet, Presentation CNCA Upscaling Green Vehicles January 22nd 2016.

Government stimulus	City of Oslo
Zero purchase tax and VAT (since 2001). Low annual road license fee	Driving in the bus lane (since 2004).
50 % reduced company car tax	Free public parking and charging (since 2008). The City of Oslo is today the largest owner of charging infrastructure with 1000 on-street charging points.
No tax on leasing	Public procurement – 1000 electric vehicles in the City of Oslo.
	Coming: Fossil free zone/low-emission zone
	Coming: Toll ring with differentiated taxes depending on emissions

Figure 5: Incentive package promoting EVs in Norway and the City of Oslo

The City of Oslo, as well as the government, is very conscious that the incentives should be modified over time as the success of upscaling EVs becomes more and more evident. For example the incentive regarding EVs driving in bus lanes was modified last year so that it now requires two people in an EV instead of one person.

This is to give more room for city buses and at the same time encourage carpooling. Another example is that the current VAT exemption on the sale of electric cars will disappear on January 1, 2018, with the potential for a credit-based or grant-based replacement that entitles those who buy an electric car a subsidy or discount instead of a VAT exemption. In the future Oslo also plans to bring in new incentives such as a fossil free/low-emission zone in 2024 where the pricing is differentiated depending on the vehicle's emissions.

TCO AND EV AMBASSADORS

According to The Norwegian EV Association (2015), the majority of new EV owners (48 %) are choosing to buy an EV because of the cost. Another 27 % state that they bought an EV out of concern for the environment. It's been important for the City of Oslo to bring the total cost of ownership (TCO) below the TCO of ICE vehicles, even when taking into consideration the uncertainty of battery wear, range anxiety and aftermarket risks concerning after-sales revenues. Ms. Guri Tajet described that it's simply a question of minimizing the risk to the consumer to have them to enter the EV market when the green choice is the best in terms of economy, use of time, comfort and design.

Moreover the City of Oslo is very aware of what they call the "neighborhood effect". This has also been clarified by The Norwegian EV Association (2015), which has found that for every happy EV-owner there will be three more. The same study states that 91 % of EV owners are satisfied or "super-satisfied" with their EVs.

This was further elaborated by Øystein Ihler during the interview:

"In our communication to new potential EV buyers we have to communicate that there are three parallel shifts: a technology, an economic and a moral shift. It's not all about communicating "why" but we also need to communicate "how" they can do it."

Interview, Øystein Ihler, Development Director, City of Oslo, 22/10 2015

THE EVS NEED START HELP

In her closing remarks, Ms. Guri Tajet explained that the EVs need start help in the form of incentives. Without these, the EV market wouldn't have developed so fast in Norway or in the City of Oslo. An efficient model for financing incentives is to let the polluting cars support the transition towards EVs and other green vehicles. The model used in Norway needs determined politicians and also persistence when the model is criticized. A lot of critique has been based on incorrect assumptions. For example, many believed that the benefits from promoting EVs would result in fewer people using public transport, bicycling or walking, but this is not the case. Actually 86 % of EV buyers have changed their petrol or diesel car with an EV, and only 14 % of people buying an EV have previously been using public transport, cycling, walking or using other means of transportation.

DISCUSSION

After the presentation, questions were asked and discussed.

- Have the incentives been adding more cars to the city streets? Ms. Guri Tajet replied that EVs do not solve the problem of urban congestion, so it's extremely important to put an effort in to promoting public transport means at the same time. In the case of Oslo they have managed to reduce car traffic and increase public transportation work. Norway has one of the lowest number of vehicles per capita and mileage per capita compared to the rest of Western Europe.
- Have EV users been aware from the beginning that incentives might be modified or even removed? From the beginning it was public knowledge that when the target of 50,000 cars was reached, incentives were going to be modified or even removed. So it has been obvious for the EV users.
- What have the conversion costs been? The highest costs have been the tax exemption. Conversion costs have typically been financed by ICE users.
- How important is public charging? Recent studies suggest that the provision of charging infrastructure is not a critical essential for most EV urban use patterns (private vehicle owners, for example, have a daily urban milage of less than 50 km per vehicle). Nevertheless perception and range anxiety still dominate this aspect, demanding the psychological comfort of destination charging facilities as a determinant factor for buying EVs. An energy station at home is the most frequently used, but a charging opportunity at your workplace is also essential, clarified Ms. Guri Tajet.

ELECTRIC VEHICLES MARKETS IN CALIFORNIA

Following the presentation from the City of Oslo, Mr. Joshua Cunningham from the California Air Resources Board continued the theme on the importance of regulatory framework conditions for upscaling green vehicles, but this time from a Californian perspective.

Mr. Joshua Cunningham made a few introductory remarks relating to the California Climate Strategy that forms an integrated plan for addressing climate change. The strategy sets out California's vision for combating climate change and achieving a GHG emissions reduction target of 40 % below 1990 levels by 2030. For petrol cars this means a 50 % reduction. In 2050 the GHG emissions reduction target is 80 % below 1990 levels. Mr. Joshua Cunningham stated that when states or governments decide to regulate the transport sector it is a difficult task as the transport systems are interwoven with different human activities such as work and production, leisure and consumption, supporting a worldwide flow of goods, linking people and societies. But this should not prevent us from taking up the challenge.

ADVANCED CLEAN CARS PROGRAM

California's existing Advanced Clean Cars Program runs until 2025. It has been and still is an essential strategy for market penetration. Today California leads the way in Electric Vehicles

sales in the U.S with almost 190,000 PEVs sold and eight other U.S. states have adopted California's vehicle regulation framework. California is a clear leader in innovation and venture capital investment, which will benefit from the Advanced Clean Cars package. California has developed into an economic hub for technology and job creation.

As seen from Figure 6, Mr. Joshua Cunningham presented one scenario developed by the California Air Resource Board to achieve GHG emissions targets in 2050. Some of the key findings from the scenario analysis are that a natural turnover alone is not sufficient to meet targets. For achieving a transformation of fleet, you'll need to change focus beyond 2025 so that the fleet technology mix mostly will be composed of advanced technology vehicles, such as electric and fuel cell vehicles, in order to meet GHG targets in 2050. Another finding mentioned by Mr. Joshua Cunningham is that limited renewable fuels should be targeted where advanced technologies like ZEVs need more time to develop – trucks, rail, off-road, marine and aviati**ROLE**

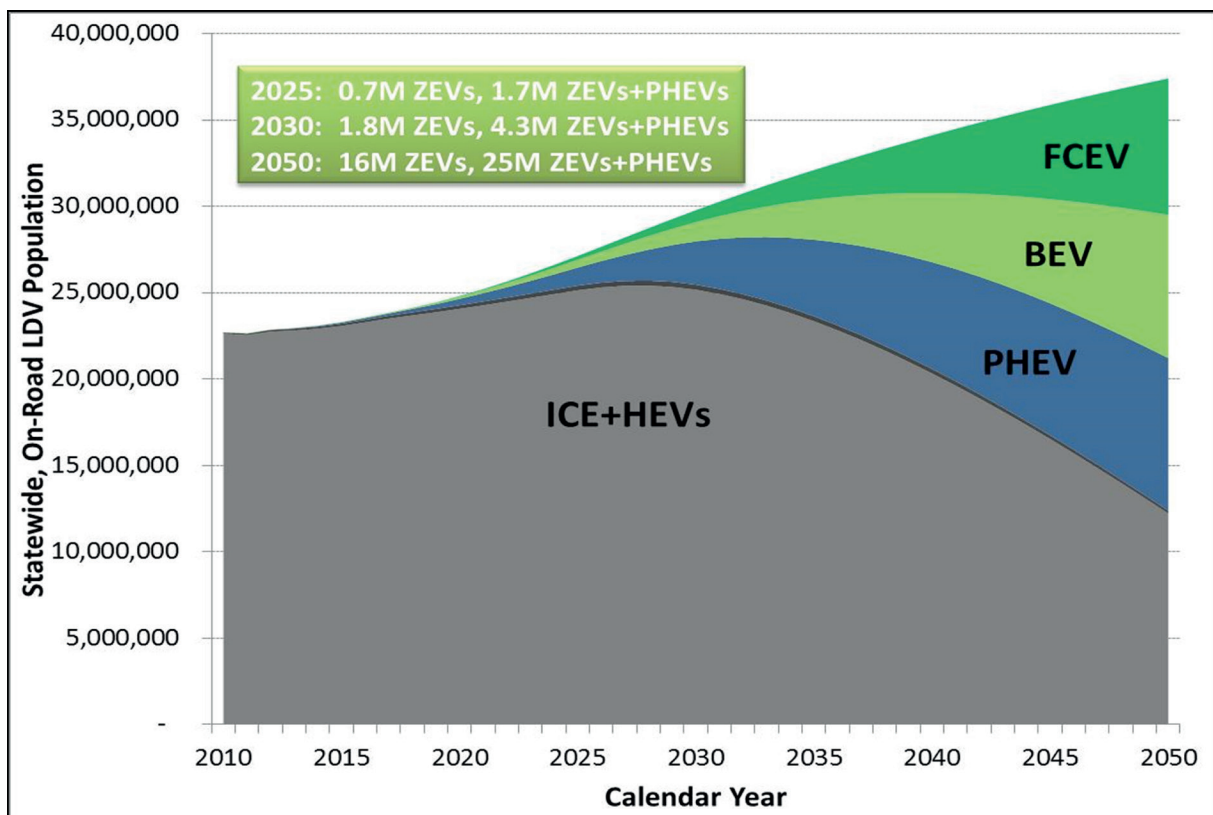


Figure 6: Shows the cumulative light passenger vehicle fleet mix for one scenario analysis developed by California's Air Resources Board.

THE ROLE OF ZEV FINANCIAL INCENTIVES

The increasing awareness of the need to improve California's air quality goals and the maturity of the green vehicles technology led to the ZEV program in 1999, which includes a range of financial incentives. Since then, the program has been modified several times. The ZEV regulation, which affects passenger cars and light-duty trucks, is a major driver for California's green vehicles sales. The various ZEV financial incentives can be seen from Figure 7.

Clean Vehicle Rebate Project	Pilot projects to benefit disadvantaged communities	Additional incentives
130,000 rebates for 280 million U.S. dollars since 2010	Car Scrap and replacement	EV charging equipment purchase rebates
Income cap for higher-income consumers (from 2016)	Car sharing involving EVs in Zip Car fleet.	Access to drive in carpool lanes (HOV)
Increased rebate levels for low- and moderate income consumers (from 2016)	Financing assistance	Free electric charging at many public sites
Complementary fueling infrastructure investments	Increased rebates for public fleets	Free parking in many facilities

Figure 7: Light-Duty vehicle incentives in California initiated by California Air Resources Board.

ROLE OF PARTNERSHIP AND PLANNING

California has Public-Private Partnerships as a unique collaborative of auto manufacturers, energy companies, fuel cell technology companies and government agencies to facilitate the growth of the green vehicles market. The California Fuel Cell Partnership (CaFCP) promotes the commercialization of hydrogen fuel cell vehicles and California Plug-in Electric Vehicle Collaborative (PEVC) accelerates the adoption of PEVs in California. The members collaborate on activities that advance the technology, such as first responder training, community outreach and agreeing on protocols while standards are being developed. Mr. Joshua Cunningham mentioned that the partnerships have been effective at working in a non-regulatory environment, identifying barriers for market adoption of green vehicles at an early stage and making recommendations that can help promote green vehicles in city planning and building construction. That could, for example, be guidelines for workplace charging.

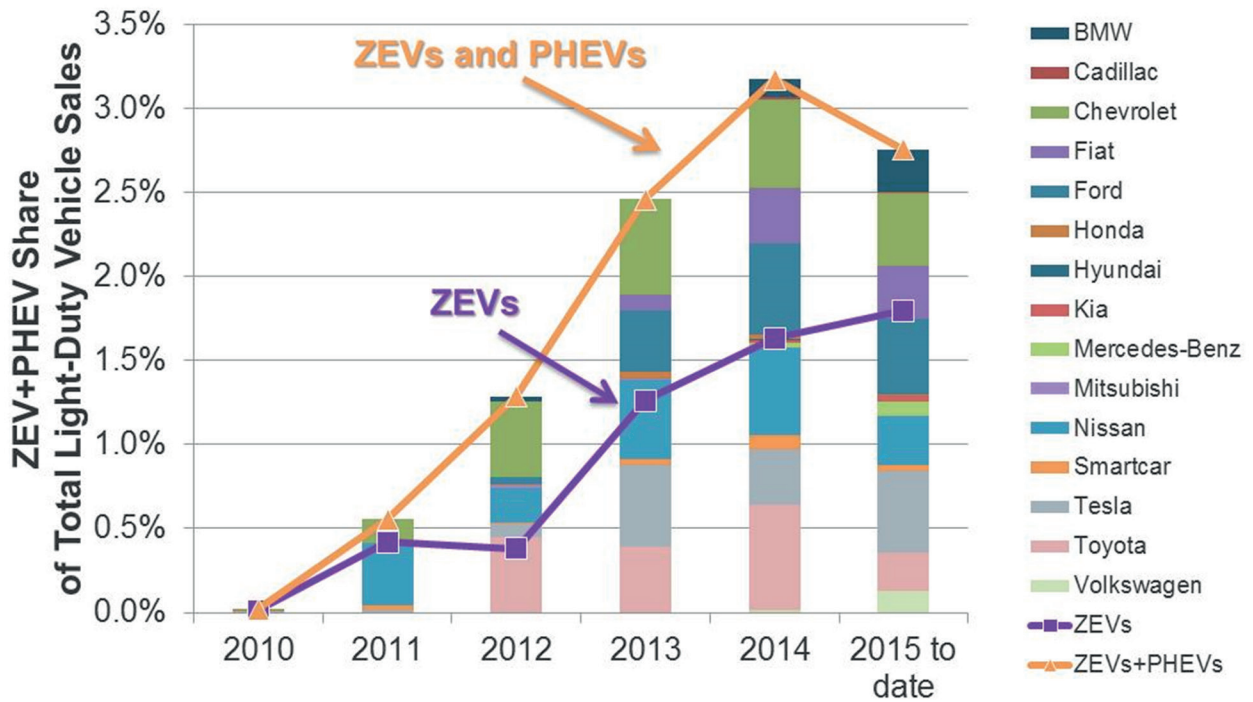
AUTOMAKERS REQUIRED TO COMPLY

Mr. Joshua Cunningham ended up focusing on how major automakers (> 20,000 sales/year) have to comply with California's emission standards as part of the ZEV regulation and ensure that at least a small portion of their volume comes from ZEVs. As a result of this, more than 21 PEV models are available in California today, with the Nissan Leaf, Chevrolet Volt, Tesla Model S, Toyota Prius PHV, Ford Fusion Energy and Fiat 500e leading U.S. sales. As it stands now, automakers are bringing new ZEV models to the market and we see from Figure 11 that sales in California have been driven by the ZEV program. With exceptions, most manufacturers are only putting the minimum numbers they need into the market to meet the regulations, making so called "compliance cars" that meet the Air Resources Board rules for generating credits but aren't great driving experiences. California is still in an early ramp up on an emerging market, and unfortunately not all automakers see a business case just yet.

DISCUSSION

Participants' comments and discussion points afterwards included:

- Has it created problems for EVs using the High Occupancy Vehicle lanes (HOV)? In California it was one of the early incentives and was originally also counting PHEVs. Currently it's for



Source: IHS Automotive, Polk new vehicle registrations for CY2010-2015 as of August 2015.

Figure 8: California sales divided by different automakers driven by ZEV program.

buses, HOVs and EVs, but in 2019 it will only be for HOVs. Mr. Joshua Cunningham replied that they see increasing congestion in the HOV lanes so there will be a future need to adjust this incentive.

- The City of Copenhagen agrees that incentives are important. In Copenhagen the city has limited tools compared to others. Many of the incentives have to be decided on a national level. For example, at the moment there is no legal authority to enforce free parking for ZEVs but the City of Copenhagen is working on it and awaiting an answer from the Ministry of Transport and Building. Other than that, the City of Copenhagen is working on an EV strategy, including demands for charging points in new building constructions and retrofits. The idea of creating partnerships, like California has done, seems very attractive and could be a way of promoting incentives for ZEVs, if politicians see a demand from interest groups.
- The City of Stockholm replied that if they are to make demands for chargers in new buildings or retrofits they need to own the land.
- In the City of London they are able to set a requirement for 20 % of all parking spaces to have an electrical charger. Still, there are not enough EVs, but the cables are ready in the ground so London is prepared for the future uptake of green vehicles.
- The City of Vancouver is able to provide space for car sharing in new building constructions.
- It was generally acknowledged that if you have the mandate and incentives you can do plenty to spur on demand. The example from California shows that the policy works just the way it should.

Scope of the project - project 1

To the degree that mobility as a service, and specifically car sharing as a new important disruptive business model, can integrate market up-take of green vehicles, this will be the scope of the project. The relevance of the project is supported by data from the industry estimating that the number of car sharing customers in Europe is increasing from 1 million today to 15 million by 2020 making this an interesting opportunity for upscaling green vehicles.

PROJECT 1: DISRUPTIVE BUSINESS MODELS ON CAR SHARING

Mr. Christoph Steinkamp, representing hySOLUTIONS, briefly introduced different examples of clean urban transport in Hamburg under the headline, How Can a City Set a Framework to Support Upscaling of Green Vehicles. To begin Mr. Christoph Steinkamp explained about the overall approach for investments in low-emission technology in the transport sector. The main drivers are sound planning requirements, environmental and climate protection (such as EU directives) and economic reasoning adding regional value. hySOLUTIONS' strategic approach is based on three fundamental principles:

- Coherency of technologies between FCEV's and BEV's as they are part of the same technological path.
- Complementary use rather the competition between ZEV's and public transport.
- Use of renewable energy is mandatory.

Concerning the last principle, hySOLUTIONS' strategy doesn't include gas as an innovative technology:

" According to our strategic framework, gas vehicles, does not count as innovative. So we are focused on innovative climate positive vehicles and connection possibilities to energy sector, hereby especially the wind sector."

Interview, Heinrich Klingenberg, General Manager, HySOLUTIONS, 6/11 2015

Systematically hySOLOTIONS have worked for the implementation of a bus strategy, only purchasing zero emission buses from 2020 onwards and FCEV's and BEV's in municipal/commercial fleets. Projects like "Electrified Economy" (740 EVs for companies and municipal fleets) and "E-Powered Fleets" (450 EVs in corporate fleets, focus on German original equipment manufacturers such as BMW, Daimler and Volkswagen, scientific monitoring on eco parameters) have moved Hamburg towards cleaner transportation. Hamburg is also a role model for other cities worldwide because of a masterplan for CPI in Hamburg (Charge point infrastructure Hamburg) providing easy and transparent access for EV users on public space.

E-QUARTER HAMBURG

For having residents benefit from new mobility schemes such as "car sharing" and quit their own

cars the project called e-Quarter Hamburg has been developed. The projects rationale is that resident's use EV's collectively in so called "neighborhood pools" with different classifications, see Figure 9.

The project includes the development and testing of mobility options with EVs in the development of new residential areas as well as supplementing existing residential building

Classifications
1 closed vehicle pools and intermodal mobility concepts for private local residents
2 closed vehicle pools, integrated energy concepts and intermodal mobility concepts for private local residents
3 closed vehicle pools and intermodal mobility concepts for private and commercial users
4 public car-sharing in reference to the residential region
5 public car-sharing combined with closed vehicle pools and intermodal mobility concepts
6 individual use for private residents with integrated energy concepts



Figure 9: Classifications for "neighborhood pools".

projects through electromobility applications. The result of the project will enable the derivation of urban planning scenarios and parameters, standardization methods and create indicators for planning procedures.

SWITCHH - MOBILITY AS A SERVICE

Through the Switchh project the city of Hamburg is making a system based on the principles in Mobility as a Service (MaaS). So far nine so-called "mobility service stations" on public transport stations have been build. At the stations you find rental cars, free floating car sharing vehicles and rental bikes connected to public transport such as busses, trains and metro. From the interview Heinrich Klingenberg explain the mobility principle like this:

" What we do is that we systematically connect the public transport sector with car sharing and biking. We set up the mobility service stations close to transport nodes such as stations". The idea behind this is that we reduce the number of cars in a household that are not used on a regular basis. Instead we offer a mobility package including a flexible use of cars according to specific needs. One day you might want a bigger car and the next day you only need a bicycle".

Interview, Heinrich Klingenberg, General Manager, HySOLUTIONS, 6/11 2015

The mobile application (search for HVV in App store or Google Play) of linked transport systems

shows available modes of transport and gives a multimodal comparison of routes and travel time. An RFID card can also be used for booking. In April 2016 Switchh will besides Car2go also have DriveNow as a free-floating car sharing supplier.



Figure 10: Mobility as a Service- Depiction from www.switchh.de

DISCUSSION

After the presentation from Mr. Christoph Steinkamp participants were curious about the importance of the app development platform. Mr. Christoph Steinkamp explained that the app is crucial for success. It tells you where to find bicycles, cars, trains, busses etc. and where you can switch transportation. It's also very attractive for car sharing companies to join Switchh because they have their cars shown on the platform. A challenge in Hamburg is however that car sharing companies require space which is already a limited resource in cities and the cars can be parked for longer periods blocking charging points. Another participant asked how the city of Hamburg provides help to provide parking for shared cars. In Hamburg the Switchh project is operated by private companies but the city makes extra parking space available on public ground purely for car sharing with the intention to reduce conventional car use in for example new building projects.

When is car sharing green? A number of participants asked this question and it doesn't always seem obvious. For example, sometimes the electricity produced comes from non-renewable sources and car sharing services can maybe not be promoted as a green alternative. The contexts will vary from city to city and their electricity production.

PROJECT DEVELOPEMENT

After the discussion participants were asked to split in two groups to start a "journalist exercise". The two groups were told that in 2020 Europe has reached more than 15 million shared cars. It is a huge success and the journalists are curious: what created that huge success?

We succeeded because we (the group's outcome):

- Focused on the youth who are more positive about the sharing economy.
- Offered free parking for shared cars. Parking rules are central to grow a market for car sharing.
- Firstly helped people who didn't have a car and later we branched out to people who want to get rid of their cars because of environmental issues and the opportunity to save money.

- Offered different cars (vans pickup trucks and different types of cars) for different needs, and the car industry made car models that were easier to share, for example easier cleaning.
- Made it more expensive to own your own car and not share it because it was considered as a luxury.
- Made a more livable city with less parking space and more public space, that convinced the citizen and we again made transport efficient, so congestion is no longer a problem.
- Made a concept called Carbnb similar to Airbnb. We made it attractive for people to share their private cars. At first there were no EVs but that became a priority later when range was enhanced and charging time reduced.

The groups afterwards joined forces and worked on the two project boards. See Annex 3: Disruptive business models on car sharing. Participants discussed various concepts and varieties for enhancing MaaS and car sharing in cities:

- The car industry and car dealers can develop business models encouraging families for buying a Tesla or another green vehicle together for sharing.
- The city's municipal fleet should be part of the sharing system, so citizens can use them in the evening or during weekends.
- Cities should promote various car sharing companies. The city shouldn't lead the project but the city can somehow make the framework and secure public (free) parking facilities for shared cars, charging facilities and demands for new building structures to promote car sharing, hereby parking lots etc. The city shouldn't only prioritise one company but make an open sharing platform like the one in Hamburg. It will properly differentiate from city to city how compatible car sharing is with public transport because of cities' control over public transportation. But you should try to connect it with public transport nodes to get the most out of car sharing. The cities should show commitment to how many parking spaces they can offer for car sharing. That way the other partners and the private organization company know what to expect.
- In general there's a need to enhance a process with different actors and stakeholder companies involved – because some of these partners are missing at the CNCA workshop. The project should be developed further with cities and potential partners, such as car sharing providers.

Way forward

The project needs further development and Joe Castro, City of Boulder, has endeavoured to take the project further. A central focal point is "The EV Roadmap Conference" (www.evroadmapconference.com/) held in Portland on July 20-21, 2016. The conference seeks a supportive "ecosystem" of stakeholders, from utilities and governments to vehicles original equipment manufacturers, charging providers, interest groups, and drivers for enhance the widespread use of EVs. Before the conference interested cities and partners should meet with local suppliers to probe the market. It will be beneficial if 1-2 webinars could be held beforehand. In May 2016, the City of Boulder will host a webinar to seek interest, determine participants for the July EV Conference in Portland, and get an update from Eva Sunnerstedt on her contacts with car sharing companies.

Names	Organization
Joe Castro	City of Boulder
Matthew Lehrman	City of Boulder
Eva Sunnerstedt	City of Stockholm
Kåre Albrechtsen	Copenhagen Electric
Birte Thomsen	City of Copenhagen
Kasper B. Isbrand	City of Copenhagen
John A. Monacelli	City of Boston
Ingrid Fish	City of Portland

Figure 11: Interested cities and stakeholders in project 1.

Scope of the project - project 2

The scope of the project is to support "smart mobility" in cities by identifying possible barriers for interoperability and ways to overcome barriers to deploy integrated approaches and testing of business models for electric recharging. The intention is to support upscaling of green vehicles by having a simple, interoperable, convenient and intelligent information, authentication and billing system in Northern Europe with one entrance for the end users making it possible to locate rechargers and recharge your electric vehicle using one system. There is a huge need for interoperability between electric mobility operators as the number of chargers in cities is increasing rapidly and no interoperable system exists on the market.

PROJECT 2: IMPROVING INTEROPERABILITY BETWEEN CHARGING SYSTEMS

Mr. Hermann Bluemel, Department for Urban Development and Environmental Protection Berlin, started with an inspirational presentation on the Berlin approach that has created an interoperable charging system in the city. Before starting Mr. Hermann Bluemel made it clear that the presentation was based on a work in progress report of the Berlin approach and that the presentation focused on public charging points in contradiction to semi-public charging.

After numerous national and EU-funded projects in Berlin, the city's charging infrastructure was diverse in terms of numerous information platforms, different authentication technologies (several RFID-cards and applications), different procedures for using charging points and different business models (different tariff models, closed customers groups).

PUBLIC SPACE CHALLENGE

The City of Berlin is very conscious about the role of the municipality when introducing electric

vehicles in public space. In regards of limited public space in many cities, Mr. Hermann Bluemel described some of the urban planning challenges and conflicts. As an example a growing demand for public space for parking, bikes, car and bike sharing, delivery zones and so on can be in competition with the growing need for space for public charging infrastructure.

Mr. Hermann Bluemel concluded that high efficiency or high utilization rates in the use of public space needs nonproprietary infrastructure with open access for all users. The potential users for public charging will mainly include users of electric vehicles without permanent parking space, the so-called "on-street parkers". For these potential users public infrastructure is needed to compensate for the lack of possibility to charge at home or at work.

Moreover, based on the limited public space in cities, charging in public space has to be limited for a certain time period and a limited number of charging points. In the future, this will require more charging points on private space in urban areas similar to today's filling stations for gas and diesel. More fast chargers in the city will however make future smart grid communication more difficult as high capacities in the electric grid will be needed and you have no intermediary storage for fluctuating green energy at the moment.

THE BERLIN APPROACH

In June 2016 all existing charging points have to comply to the Berlin model allowing users of electric vehicles to access all public charging stations with one single RFID card, regardless of the different operators of the charging infrastructure. As a result, the city of Berlin will be more accessible for electric vehicles. The Berlin model is technically very simple and as Mr. Herman Bluemel explains it:

"We have installed an identification platform developed by the municipality. It's non-discriminatory and it's open for all operators. We exchange only customer ID. For example when Vattenfall have customers they send nothing else then the customers ID to our platform and we urge every company to use our whitelist on daily basis. This is the principle, technically very simple".

Interview, Hermann Bluemel, Principle Affairs of Transport Policy, City of Berlin, 13/11 2015

The Berlin model consistently separates the two roles of Charge Point Operator (CPO) and Mobility Service Provider (MSP). The system allows other small big CPOs to join the platform that that is in line with regulations for data protection and privacy. The system is in contrast to roaming systems, where the where infrastructure provider distributes his "own" electricity and charges third party customers for "his" power plus a roaming fee, in Berlin third parties have direct access to the public charging points. Roaming systems can also have problems with privacy Mr. Herman Bluemel described.

Compared to other platforms in Europe, the Berlin model also offers integration of interoperable charging and multi-modal travel information:

"I think, compared to other regions in Europe, it [Berlin model] works really well because you have real time information on public transport, rail transport, bus transport, road transport and you have real time information from several charging operators through one application on your smart phone".

Interview, Hermann Bluemel, Principle Affairs of Transport Policy, City of Berlin, 13/11 2015

In addition, the Berlin model offers a mobility card that can be used for charging, bus, rail, bike-sharing, charging, cycle garages and car sharing.

SUPPORT AND DISCUSSION

Policy Officer Ms. Dorothee Coucharrière, DG Move, EU Commission, acted as "support person" following up on the inspirational presentation. Ms. Dorothee Coucharrière described the lack of infrastructure for recharging and refueling as one of the main barriers for a full-scale deployment of clean vehicles. Therefore it's important that cities like Berlin take the lead but it has to be taken from a city level to an intercity level.

The commission has most recently agreed on a new directive called "directive for deployment of the alternative fuels infrastructure". The directive sets a regulatory framework for member states concerning accessibility and a minimum infrastructure to public charging (also including hydrogen and natural gas) to be built by 2020. An ideal target should be one recharging point per ten electric vehicles but the directive also makes it necessary to use a common plug across the EU. Moreover the member states have to ensure that recharging points will be open and non-discriminatory. The member states have to implement the directive before 31 December 2020.

Following this, participants discussed that not one single-system can replace other already existing and future charging systems. Initially, public investments in infrastructure from cities and governments will stimulate an upscaling of green vehicles. Gradually business investments in charging points in private space will take over when a business case is showing. The vision described was that in the future there will be several different operators, but existing and new recharging stations will have to be linked up to form a network with common standards and will have to be open and non-discriminatory for users ensuring uncomplicated mobility of electric vehicles.

The participants didn't agree on a roaming or a system based on the Berlin model was the best choice. Supporters of a roaming system claimed that decision on a flat rate/same price for connection to the grid could be a way of decreasing the cost. Advocates for a system like the Berlin model claimed that it's a time consuming way trying to get a flat rate on roaming. Compared to roaming for cellular phones flat rates across Europe have been time consuming and is still relatively expensive.

PROJECT DEVELOPMENT

Participants were divided into two groups to work on a negative and a positive brainstorm. The plan was that the two groups were supposed to join but at the end of the workshop session but

because of intense discussions the two groups didn't join forces and didn't finish the full project board. The outcome can be seen from Annex 4 Project Boards: Improving interoperability between charging systems.

Below is a summary of central points from the process on project development based on the project boards:

To begin with participants were asked to be negative and answer the question: if an interoperable charging system between cities and borders is an obvious good idea why hasn't it been done yet?

- Different technology standards. At the current moment you have DC fast charging: CHAdeMO, CCS Combo and Supercharger (Tesla).
- Different business models difficult to integrate an interoperable system.
- High costs on transactions between systems and borders.
- Different interoperable charging system in cities.
- Taxation on electricity is in some European countries too high affecting competitiveness in a negative way.

Next participants were asked to be positive and answer the question: why is an interoperable charging system possible?

- From a vehicle perspective standardization is possible. Today you have the European standard Type 2 connector (commonly referred to as Mennekes).
- From a user oriented point a possibility is one smart card covering different providers and business models. For example if one of today's gas stations were to limit access for user of a certain car this would be inefficient, limit customers' choice and competition. Why should it be different for EV charging?
- Single/same price for connection to the grid. E-mobility can be part of a long-term solution the EU commission therefore has to set the right framework. The conditions have to be right before an interoperable system between borders can take off.
- A possibility is to focus on a geographic area such as a transport corridor to develop and implement an interoperable system across borders. Today you have existing pockets of interoperable systems. There's a possibility in identifying them to see how they can be connected in an interoperable system allowing for different business models.
- An Open Charge Point Protocol (OCPP) is already a widely accepted standard in Europe. This means that the network provider can choose their own protocol. This potentially makes it easier for users to charge at different networks.

- An interoperable charging system with optimized charging using intelligent charging (smart grid technology) and value-added services such as incorporation of mobility services is the way forward.

Way forward

The discussions emphasized the need for further standardization of technical equipment of billing and communication infrastructure.

In Europe, the CCS combo is the standard plug for electric vehicles. However, different infrastructure operators use different unharmonised billing systems that still make the use of public charging infrastructure uncomfortable for the user.

No one took responsibility for a follow-up on this workshop session that should be developed further through webinars with a focus on Horizon 2020, available for financing of alternative fuel vehicles and related infrastructure. Especially the MG 4.2-2017: Supporting "Smart Electric Mobility in Cities". The Horizon 2020 call focuses on deploying integrated solutions and business models for electric charging. That is charging solutions that are simple, interoperable, convenient and intelligent billing systems ensuring at the same time a safe and reliable data exchange in cities. This includes integrated energy infrastructure systems, bringing together technologies from the energy, infrastructure and transport domains. It's a two stage application with the first deadline on 26 January 2017.

Names	Organization
Jo Boyd-Wallis	City of London
Joe Castro	City of Boulder
Benjamin Mandel	City of New York
Louis Sentis	Air Liquide Advanced Business
John A. Monacelli	City of Boston
Nils Dullum	Clean Charge
Victoria Wallace	Nissan
Hermann Bluemel	City of Berlin
Jacob Teter	International Energy Agency
Jeppe Nielsen	Copenhagen Electric
Tejs Laustsen Jensen	The Danish Partnership for Hydrogen and Fuel Cells
Christoph Steinkamp	City of Berlin
Øystein Ihler	City of Oslo
Ingrid Fish	City Portland

Figure 12: Interested cities and partners in project 2.

Scope of the project - project 3

The scope of the project is to explore new ways to incentivize green vehicles in cities building on already existing environmental zones to reduce air pollutant and CO2 emissions from transport to improve quality of life and public health and which eventually can lead to the introduction of greener private vehicles, buses and taxis.

PROJECT 3: DEVELOPMENT OF EXISTING ENVIRONMENTAL ZONES IN CITIES

After the lunch break on day 2, the workshop continued with a session on project development. The session on development of existing environmental zones in cities began with Ms. Jo Boyd Wallis, Principal Strategy Planner from Transport for London (TfL) who inspired the participants on how emission zones can be an effective incentive in green vehicles upscaling.

In 2008 London established the first Low Emission Zone (LEZ) that set standards for fine Particulate Matter (PM) for heavy goods vehicles, buses, coaches. The standards were tightened in 2012 and large vans and minibuses were included. It operates 24 hours a day, 365 days a year and is designed to act as a strong deterrent as TfL would prefer vehicle operators to meet the standards rather than pay a daily charge or risk a fine. The fines are very high – 200 £/day for HGVs, buses and coaches and 100 £/day for large vans and minibuses. The LEZ covers the whole of Greater London (1,580 sqkm). . The zone has been very successful in reducing PM and today London meets EU limit values for PM. Other cities in Europe have similar environmental zones.

Contained in the LEZ is the Congestion Charge Zone (CCZ) that covers Central London (19sqkm). The CC was the first zone established in London in 2003. The primary objective of the CCZ is to reduce high traffic flow in the central area. Second, to reduce emissions and raise investment funds for London's public transport system. Ms. Jo Boyd Wallis made it clear that the CCZ is a charge, not a ban. The CCZ works on weekdays from 7 am – 6 pm and applies to all vehicle types, with some exemptions and discounts, for example disabled drivers. It offers a 100% discount for ultra-low emission vehicles so if you have, for example, an EV or a PHEV it could feasibly save you £11.50/day and this has been an effective incentive to encourage uptake of cleaner vehicles.

Ms. Jo Boyd Wallis says the main driver and the key for having the LEZ and CCZ were political commitment, especially from Mayor of London, Ken Livingstone who was leading the way. Further the lessons learnt from LEZ and CCZ shows that the following is important:

- Effective research and clear policy objectives – make sure everyone understands the intentions and options.
- Extensive public consultation involving stakeholder and industry engagement. Both have to be prepared to make changes and improvements.

- In relation to CCZ complementary transport measures have to be introduced at the same time, hereby increase in bus capacity, freeze in public transport fares, improvements to frequency of train and tube services and improved traffic management measures.
- In the case of the LEZ effective management of external suppliers, certification and testing bodies have to be in place. It's important that the industry understands why they have to comply with new standards and that they receive the necessary advice.
- Strong public information campaigns encouraging action as soon as possible are needed and have to be coordinated. The media's focus on reducing harmful emissions up till the LEZ and CCZ was important because it creates a lot of public awareness and support.

Ms. Jo Boyd Wallis also argued that the LEZ and CC sets a strong foundation for the Ultra Low Emission Zone (ULEZ) planned to take off from 7. September 2020:

"We have the existing Congestion Charge Zone [CCZ] in central London and the Low Emission Zone (LEZ) across the whole of London. The CCZ has operated since 2003 and Londoners are familiar with the zone. We are going to use the same zone, the same infrastructure, the same automatic number plates recognition cameras to implement the Ultra Low Emission Zone which will help clean up London's air in the busy central zone and beyond."

Interview, Jo Boyd Wallis, Principal Strategy Planner, Transport for London, 6/11 2015

The ULEZ will operate 24 hours a day, seven days a week in the same area as the CCZ in the current central London. The scheme will apply to cars and motorcycles as well as vans, minibuses and HGVs. The ULEZ standards will be applied in addition to the congestion charge and the existing LEZ requirements.

Ms. Jo Boyd Wallis further described the ULEZ requirements:

"It covers just a small area in central London but it is the area where we have most commercial activity and it is also an air quality hot spot with high concentrations of NO2 and particulate matter. So the ULEZ is going to require vehicles that travel in the zone to meet certain Euro standards which, along with improvements to buses and taxis, will reduce NOx emissions by 49% in the ULEZ area"

Interview, Jo Boyd Wallis, Principal Strategy Planner, Transport for London, 6/11 2015

The specific ULEZ requirements can be seen in Figure 13.

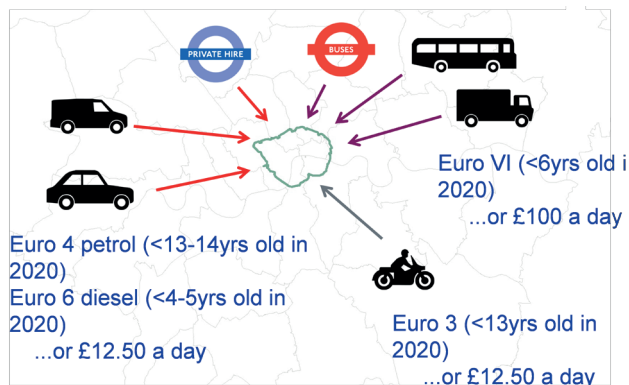


Figure 13: ULEZ requirements in 2020 for central London.

On top of the ULEZ requirements, TfL has committed to make changes to TfL-operated buses and introduce new licensing requirements for taxis and private hire vehicles. London has committed, that all single-deck buses that operate within the ULEZ from 2020 will be ZEVs. There will be about 300 single-deck buses operating within that area. Double-decks are more difficult to make fully electric because of the weight of the vehicle so TfL's commitment is that all double-deck buses operating in ULEZ will be hybrid electric.

Regarding license taxis (i.e. the iconic black cabs), new black cabs that are presented for licensing in 2018 will have to have zero emission capabilities for at least 30 miles. Private hire vehicles are slightly more complicated, but from 2020 all newly licensed private hire vehicles <18 months old must be zero emission capable and have an electric range of at least 20 miles (requirements for PHVs older than 18 months come in 2023).

Ms. Jo Boyd Wallis agreed in her closing remarks that ULEZ can be a feasible way for cities to upscale green vehicles but there will be challenges that cities have to look carefully into. For example vehicles availability limits what is achievable and you have to find a balance between cost of compliance for the industry on one side and emission benefits on the other side. Public awareness and understanding is a decisive factor. Also the cost of new infrastructure is a decisive factor. One of TfL's main tasks now is how they can support new ZEV's and as Ms. Jo Boyd Wallis explains it:

"That is one of the main things we are doing now, getting ready for the ULEZ. Related to this we are aware to support those new vehicles such as the cabs, the private hire vehicles and so on to drive in electric mode as much as possible. We need to have a rapid charging network and to deploy a rapid charging network ready for 2018 is one of our most important tasks at the moment".

Interview, Jo Boyd Wallis, Principal Strategy Planner, Transport for London, 6/11 2015

The final remark from Ms. Jo Boyd Wallis was that upscaling of green vehicles not only require regulation but you also need investments in new technology and investments in specific areas such as London's "Neighborhoods of the future" schemes. London's boroughs are developing plans to develop these area-based schemes which can prioritise and showcase ZEVs, for example offering drivers of ZEVs free parking and priority access to loading bays for delivery vehicles, to encourage more people to buy greener vehicles.

SUPPORT AND DISCUSSION

Acting as "support" for the workshop session, Ms. Tanja Ballhorn, Project Leader from the City of Copenhagen, contributed after the inspirational presentation with examples from Copenhagen. Starting to contribute the City of London for showcasing a great example to strive after, Ms. Tanja Ballhorn explained that Copenhagen also has a LEZ regulating heavy vehicles and in 2011 a forum consisting of 16 municipalities near Copenhagen proposed a congestion charge. But after a period of immense negative public debate, leading politicians trashed the plans in 2012. The proposed congestion charge from the forum was similar as the congestion pricing in use in the London model to set up a boundary around downtown. The learnings from Copenhagen are that you'll need a legal framework in place, a fast process involving citizens and be prepared for scare tactics by opponents. Although political will could change in the future, for now a congestion price in Copenhagen has been shelved.

The Stockholm experience was mentioned as an interesting example because the congestion charge overcame fierce initial hostility and eventually gained broad support from the public when the tangible results when the effects from the congestion charge showed. Eventually the congestion charge in Stockholm was declared a "success story" but it also needed a strong political backbone to support the process. At first the congestion charge in Stockholm was implemented as a trial period for given the public a possibility to adapt to the new situation and realize the results.

Participants stated that cities risk big EU-fines if they aren't applying to air quality standards enacted by the European Commission. This will eventually be a driver for European cities implementing environmental zones or alternatively car free zones as the one in Copenhagen. Copenhagen has one of the largest and oldest car free zones in downtown called "Strøget", used heavily by pedestrians and tourists. Also the latest example from Copenhagen was highlighted as one of the high streets (Nørrebrogade) has been narrowed down from two to one car lane giving more space to expand the bike lane. Car free zones or the transition of existing streets is also a way to improve air quality. Initially shop owners were very pessimistic and expected many shops to close because of reduced car traffic but this hasn't been the case.

PROJECT DEVELOPMENT

The participants continued to develop the scope of the project through creative drawing processes and depicting a future roadmap ultimately forming a ULEZ. The outcomes from the exercise were finally drawn onto the project board seen from Annex 5: Development of Existing Environmental Zones

Below is a summarization of central points from the process on project development based on the project boards:

- The participants agreed that it's a long process and there are many steps leading to an ULEZ and certain preconditions have to be in place such as strong political support throughout the process. The involved CNCA cities should form a network group of cities helping cities to inspire each other in the process towards an ULEZ. Joint activities such as a mayor's summit on environmental zones and upscaling green vehicles can be held

creating the needed political commitment to kick-start the process.

- A starting point is to conduct a feasibility study providing a mapping of failures and successes from cities like London and Copenhagen and among other participating cities in the network group interested in developing ULEZ. Especially it will be necessary to collect convincing data and pointing out experiences and lessons learnt on the impacts of ULEZ. This should be developed into an inspiring catalog targeting politicians and civil servants explaining steps and stones for a ULEZ. In relation to this Ms. Tanja Ballhorn showed an example from an EU reference guide on Urban Vehicle Access Regulations (UVAR) on how specific cities have limited access of certain vehicles, both passenger and freight, to specific areas, an objective often driven by air quality targets but also by other strategic objectives such as reducing congestion, increasing the overall liveability of cities, etc. The documentation was afterwards sent to interested participants.
- A possibility mentioned is that dedicated network cities and partners can write a mutual manifesto that outline intentions, motivations and/or common views on ULEZ. The network should consist of partners other than CNCA cities such as car manufactures because change requires much more than just regulation. It's about understanding and we need the industry not only complying with emission norms but we need technology that redefines emission norms.
- The participants agreed on the necessity to change people's mindset in support of successful implementation of ULEZ. There are steps that can be followed to increase the likelihood that a different perspective will unfold. For example this can be events/campaigning on ca

Way forward

For establishing a ULEZ network, a coordinator is needed as an anchorage point to bring the network to live. But before that can happen, a project proposal has to be developed. Mr. Malcolm Shield, the City of Vancouver, has agreed to take the first step towards writing a proposal to the CNCA Fund (or others) involving the cities and partners who showed interested at the workshop.

Names	Organization
John A. Monacelli, Jr	City of Boston
Malcolm Shield	City of Vancouver
Nils Dullum	Clean Charge
Victoria Wallace	Nissan
Pierre Dodu	SymbioFCell
David Marc Gurewitsch	City of Copenhagen
Tanja Ballhorn Provstgaard	City of Copenhagen
Jo Boyd-Wallis	City of London
Jacob Teter	International Energy Agency
Guri Tøjet	City of Oslo
Eva Sunnerstedt	City of Stockholm

Figure 14: Interested cities and partners in project 3.

Scope of the project - project 4

Purchasing cooperatives can be set-up between cities and regions across borders, to agree to aggregate demand to get lower prices from selected suppliers to reduce costs of procurement. The ambition is to build a purchasing cooperative to be organized between countries and cities focusing on green vehicles procurements for purposes of public and private fleets, hereby buses, taxis, waste collection etc.

PROJECT 4: ESTABLISH PURCHASING COOPERATION ACROSS BORDERS

The workshop session about project four was opened by Ms. Eva Sunnerstedt who is in charge of the Clean Vehicles and Fuels programme in the City of Stockholm. The presentation dealt with vehicle procurement creating market demand for green vehicles and fuels.

Currently, green vehicles form a niche market but markets can be stimulated via innovative procurement. Eva encouraged cities and local authorities to use their procurement power in the following way:

1. Start with heavy vehicle fleets.
2. Demand clean vehicles in the city fleet.
3. Demand clean transport in ALL procurements where transport services are included.

The City of Stockholm has many years of positive experiences with green vehicle procurements. Eva Sunnerstedt states in an interview, performed before the workshop, how the use of procurement power potentially can push providers in a more sustainable direction:

"We say household waste has to be collected by refuse trucks using renewable fuels. It is fairly easy to do it because they [the waste service company] work 100 % for us [the City of Stockholm]. In the beginning it was 5-10 % more expensive, but now the price is comparable to earlier because they have to do it else they will lose to competition by other companies". "

Interview, Eva Sunnerstedt 23/10 2015

The City of Stockholm participated in a national Swedish EV procurement in 2011, with a timeframe of four years, leading to six vehicle suppliers covering six passenger cars and three light transport vehicles. As a result 400 organizations (340 public and 60 private) have been involved in the procurement and in total almost 1.000 EV's and PHEV's are now in operation all over Sweden. The procurement activity helps break down a number of structural barriers such as higher purchase costs, lack of repair and maintenance, lack of infrastructure and lack of knowledge by fleet owners. For instance the Swedish procurement project got a discount from 4-13 % benefitting all of the involved organizations.

SUPPORT AND DISCUSSION

Mr Kåre Albrechtsen, from the Regional Secretariat for Electric Cars called Copenhagen Electric, supplemented the presentation on what have been achieved in Denmark by using public and private procurements. The process for preparing the procurements is usually that a fleet analysis is made beforehand involving both public and private organizations. The fleet analysis and procurements have so far resulted in the purchase of more than 900 new electric vehicles. In 2016 a new partnership for electric vehicles purchase is being planned with expected 870 electric vehicles for purchase. Compared to Sweden the procurement process in Denmark is legally difficult and there is no settlement concerning who is to pay the eventually extra costs for the demands regarding green vehicles agreed on in the procurement contracts.

Following the discussions after the presentation, it was also stated that it can be tough for a city council to push market demands towards green vehicles, it is therefore necessary to have ambitious politicians and a strong political framework as it affects possible demands that can be raised in procurements. The demands should be upraised every time a new procurement is being prepared so that the process of upscaling green vehicles is done gradually. If it happens all at once it is unrealistic for the providers to fulfill procurement demands.

Another thing is that in Sweden and Denmark the procurement was done in cooperation with

private companies which isn't always the best match because private companies procurements are much more flexible compared to the cities.

After the presentation, the support from Mr Kåre Albrechtsen and discussions, the group was split in two and asked to describe and draw how a future possible purchasing partnership/cooperative could look like. Then the groups were challenged with a negative brainstorming being asked why nothing has happened yet, even though it seems like an obvious good idea for collaboration between cities and regions across borders.

PROJECT DEVELOPMENT

The outcome of the workshop session can be seen from Annex 6: Establish Purchasing Cooperative Across Borders.

Below is a summary from the project development process:

- Differences in legislation and standards between the U.S and Northern Europe should result in a European and an American office.
- A collaborative project should take into account that participating cities have different levels of authority when it comes to public transport (busses) and other service providers (taxis, waste collection, courier service, disabled transport, school transports, sick transports, security services, moving, goods distribution etc.). Therefore there can be vehicles in the municipalities' own fleets that the cities can procure together and other vehicles like refuse trucks and so on that they cannot. In these cases the cities can share knowledge instead.
- It's essential to plan for a procurement manager who is responsible for tasks such as drawing up contracts and organizing people involved in the buying process. The procurement manager will be the backbone of the new purchasing cooperation between cities across borders.
- It's important to run a small scale pilot project first to get an idea of how the CNCA cities can procure together and analyze cities fleet potential for green vehicles.

Way forward

The City of Copenhagen will lead a project application for round 2 CNCA Innovation Fund Proposals in March 2016. It may be difficult to set up a purchasing cooperation between countries because of differences in implementing new legislation and systems for complaints. Therefore it may be more realistic that the cities help each other with guidelines for the development of tools to support purchasing of green vehicles and perform fleet analysis.

Names	Organization
Josefine Jørgensen	The Danish Partnership for Hydrogen and Fuel Cells
Victoria Wallace	Nissan
Eva Sunnerstedt	City of Stockholm
Joshua Cunningham	California Air Resources Board
Malcolm Shield	City of Vancouver
Ingrid Fish	City of Portland
Matthew Lehrman	City of Boulder
Kåre Albrechtsen	Copenhagen Electric
Guri Tajet	City of Oslo
John A. Monacelli, Jr	City of Boston
Jørgen Abildgaard	City of Copenhagen
Birte Thomsen	City of Copenhagen
David Marc Gurewitsch	City of Copenhagen
Kasper B. Isbrand	City of Copenhagen

Figure 15: Interested cities and partners in project 4.

FEEDBACK ON THE WORKSHOP FROM THE PARTICIPANTS

The participants were asked to evaluate the workshop on the final day using questionnaires. Each participant was asked to score questions (1= Strongly disagree, 2 = Disagree, 3= Neither agree nor disagree, 4 = Agree and 5=Strongly Agree) and to provide a written response to other evaluation questions. Additionally, the same six questions were repeatedly asked for each of the four workshop sessions.

In their responses, the majority of the participants expressed their satisfaction with the overall content, approach of the workshop sessions and the different contributions provided.

Figure 16 displays that 86 % answered "strongly agree" and "agree" to the statement "I was well informed about the goal of this workshop". Responses to the statement that "this workshop lived up to my expectations" indicate that 90 % "strongly agree" and "agree". To question 3, which states that "the content is relevant to my job", 91 % answered "strongly agree" and "agree".

The evaluations highlighted the value of utilizing case studies and practical group work. Many participants emphasized the importance of the workshop in terms of being able to learn from each other and learn about best practice from other cities. In general participants appreciated

networking and, as one participant expressed in response to the question "what is most valuable about this workshop?":

"New contacts. New learnings and experiences, good workshop method. I'm glad that I came and took part. Thanks for a well-organized event".

Anonymous, CNCA Workshop Participant 22/1 2016

In addition another participant replied to the question "what is least valuable about this workshop?":

"How can we ensure a fruitful follow-up? Worried how the results will end up as I'm not convinced whether we put enough effort into actually getting the new projects started".

Anonymous, CNCA Workshop Participant 22/1 2016

This concern will depend on how participants/cities/stakeholders are able to respond to the projects covered in the workshop. Some projects will need further developing and others are already underway. It is also worth noting that some participants wanted a higher degree of involvement from the industry whether as key-speakers or in the project groups.

The full evaluation can be read from Annex 7 Evaluation by Participants.

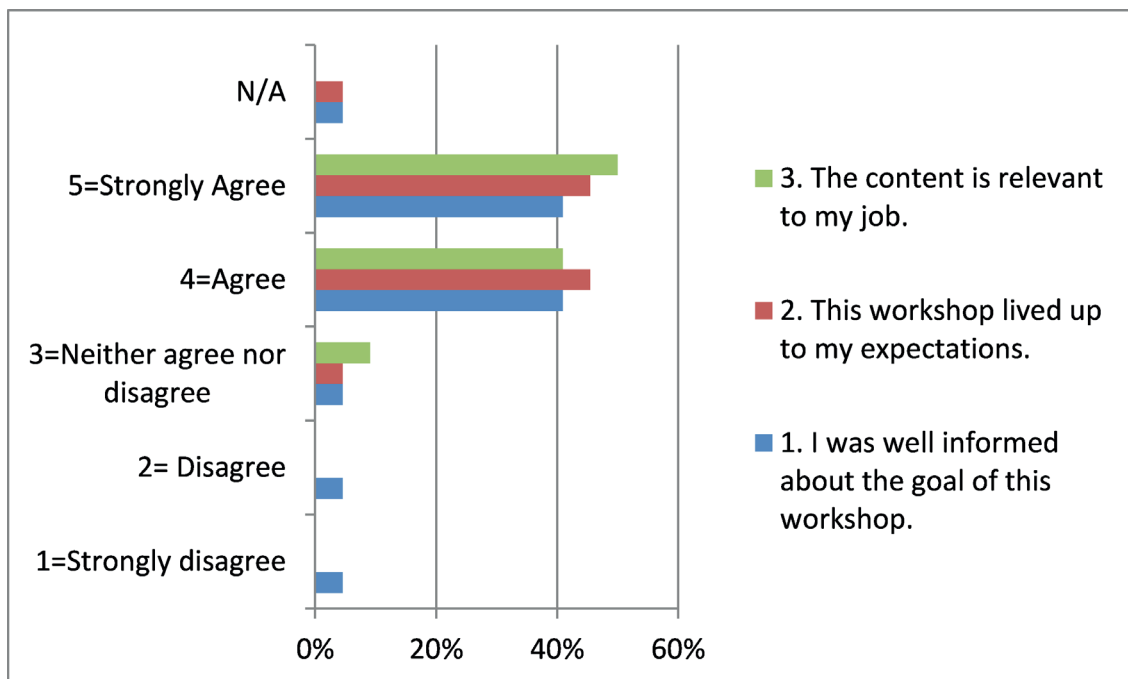


Figure 16: Workshop Content.

ANNEXES

ANNEX 1 WORKSHOP PROGRAM



DEAR CNCA CITIES AND EXCLUSIVELY INVITED

We are proud to present the program for the 2-day workshop in Copenhagen in January 21st and 22nd 2016: Up-scaling Green Vehicles in Northern Europe.

The project-oriented program

The workshop program has been developed from interviewing enthusiastic experts in CNCA cities in Northern Europe. From the interviews a program has been developed with project ideas to involve CNCA cities and other stakeholders in real projects regarding upscaling of green vehicles in Northern Europe. Some of the projects are supported by potential Horizon 2020 calls. The ambition at the workshop is to be a project incubator that helps cities and businesses to develop new projects by facilitated networking boost, creative workshop tools and inspirational presentations from visionary speakers. This will hopefully give the participants the best possibilities for discussions and development of new collaborative upscaling projects.

Open for registration and your choice of project(s)

With this invitation we hereby want you to attend the workshop. We already got positive feedback from several CNCA cities and we are now also involving car industry, energy companies, interest groups and mobility operators with a clear interest in upscaling green vehicles in Northern Europe.

There is set a maximum of 30 participants in the workshop so please give your feedback latest **11th January 2016** to Kenneth Jørgensen at Gate 21 for your registration: **Kenneth.joergensen@gate21.dk**.

When you contact Kenneth, please make a prioritized selection (1-4) among the following projects:

- Project 1: How can new disruptive business models like car sharing support upscaling of green vehicles?
- Project 2: How is interoperability between charging systems in cities and across borders possible?
- Project 3: How can we develop existing environmental zones in cities into Ultra-Low Emission Zones (ULEZ) or Zero-emission Emission Zones (ZEEZ) for future upscaling of green vehicles?
- Project 4: How can purchasing cooperatives between cities and companies create market demand for green vehicles?

Furthermore give us a notice if you want to join the Social Dining at Bio Mio on the first workshop day. In case your agenda does not allow you to attend this workshop we would appreciate if you can appoint one of your colleagues to represent your city or business in the workshop.

Get your mandate!

We will encourage you to get a clear mandate from home regarding involvement in one or several projects. This way you can get engaged from the beginning of the workshop in projects and decide on which projects is the best to remain with. Please be advised that participating in a project at the workshop in non-binding but will be an expression of interest that could lead to new projects.

We eagerly await your participation in the workshop. Please contact us if you have any questions.

Sincerely,

Jørgen Abildgaard

Executive Climate Project Director - City of Copenhagen - Z33R@mf.kk.dk

Our definition of a green vehicle

A green vehicle is a road motor vehicle that can be a car, truck or bus that produces less harmful impacts to the environment than comparable conventional internal combustion engine vehicles running on gasoline or diesel. Green vehicles are powered by alternative fuels and advanced vehicle technologies and include hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEV), range extended electric vehicles (REEV), hydrogen and fuel-cell vehicles (FCEV). We also consider gas vehicles (LNG/CNG) based on either natural gas or biogas for green vehicles.

Workshop location

The workshop will take place in the former meatpacking district in Copenhagen's vibrant Vesterbro neighborhood. Once this area was exclusive to butchers and wholesalers, but it has undergone a remarkable transition in recent years into creative clusters with trendy restaurants. The location of the workshop signals "change" because, as the world is changing so is transportation.

**Address: Flasketorvet 68,
1711 Copenhagen V**

The workshop is organized as a project under the CNCA Innovation Fund, aiming at exploring new collaborative possibilities between stakeholders to up-scale green vehicles. The workshop is held in Copenhagen and all participants are further invited to a joint dinner on the first day. All CNCA city members and next wave cities will get accommodation expenditures covered. For a limited number of non-EU CNCA city members, both accommodation and flights will be covered.

*For more information, please visit:
<http://usdn.org/public/page/13/CNCA>*



CITY OF COPENHAGEN

Workshop day 1

08:30 - 09:00 Registration and Breakfast

09:00 – 09:15 1st day opening and introduction to workshop

Executive Climate Director Jørgen Abildgaard will give an introduction to the workshop and introduce to the CNCA network and what we are here to achieve together in Copenhagen.

09:15 – 09:45 Networking Boost

The introduction will be followed by a networking boost that will keep CNCA cities and other participants connected from the beginning.

09:45 – 10:15 Potential strength and weaknesses of green vehicles Kim Winther, Danish Technological Institute, Transport and Electrical systems Questions being addressed:

- What are today's green powertrain technologies and how will it look like in the future?
- Strength and weaknesses of green transport technologies compared to today's conventional ICE?
- How will the future transport technology be mixed in an optimal way?

10:15 – 10:45 Status of Green Vehicles in Europe and globally – is up-scaling near?

Jacob Teter, Energy Analyst at International Energy Agency

Questions being addressed:

- What is the status of recent developments in green vehicles in (Northern) Europe and Globally?
- How far are green vehicles from a massive up-scaling?
- What factors will affect the rate of adoption of green vehicles?
- What does the research say about the effectiveness of local/regional/national policies in promoting green vehicles?
- What scale-up of EVs would be needed to achieve a two-degree scenario?
- How can the cities stand stronger together to up-scale green vehicles and what is the potential "next step"?

10:45 – 11:05 EU and Urban Mobility

Dorothee Coucharriere, Policy Officer, DG mobility and Transport, European Commission

Questions being addressed:

- What projects are already supported by DG MOVE?
- How can DG MOVE support future urban mobility projects and up-scaling of green vehicles?

11:05 – 12:00 Plenum discussion of challenges and opportunities

We will follow-up on the presentations and discuss the opportunities and possibilities in relation to the participating CNCA cities. It will involve the interactive Dilemma Game.

12:00 – 13:00 Lunch

13:00 – 15:30 Two Project Sessions

15:30 – 16:15 Green City walk through central Copenhagen to House of Green

16:15 – 17:30 House of Green

17:30 – 19:30 Social Dinning at Bio Mio

Bio Mio is located in the new hot spot The Meatpacking District, in Vesterbro. The eatery is 100% organic and named CLIMATE+ restaurant and green café. You'll have an opportunity to have your lap-top etc. stored in a safe place. Read more at: www.biomio.dk

Workshop day 2

08:00 – 08:20 Transport for participants staying at WakeUp Hotel either using DriveNow or having a pleasant walk.

08:20 – 09:00 Breakfast + networking

09:00 – 09:30 Kick-start the day with the up-scaling barometer

Follow-up on the project workshops from day 1 and work with the up-scaling barometer to make the projects even better and discuss partners.

09:30 – 10:00 Public incentives as a driver for increasing market share of green vehicles

- The Norwegian experience of up-scaling green vehicles
- Guri Tajet, Project Manager Climate and Energy, City of Oslo

The government's policy involving financial incentives in Norway has influenced consumer's choice. There is also evidence that other than fiscal benefits can be effective in increasing

the popularity of electric vehicles. Such as use of bus lanes and access to restricted areas, preferential parking spaces and/or free or reduced parking rates.

10:00 – 10:30 Public incentives as a driver for increasing market share of green vehicles

- The Californian experience of up-scaling green vehicles

Joshua Cunningham, Branch Chief, Advanced Clean Cars Branch, California Air Resources Board

The Californian experience of electric vehicles suggests that the use of fiscal incentives, coupled with automaker mandates, is the best approach to increase market share of low emission vehicles.

10:30- 11:00 The presentation will be followed by a discussion evolving around the following questions:

- What is the experience from using policy initiatives for supporting the development of green vehicles? What will happen when the incentives end?
- How crucial are political incentives to succeed with a successful up-scaling of green vehicles?
- Are there any drawbacks concerning political incentives for up-scaling green vehicles?
- How can the experiences from frontrunners in EV uptake like Norway and California be adopted in other countries?

11:00 – 12:00 Lunch

12:00 – 14:30 Two Project Sessions

14.30 - 15.30 Project kick-off

ANNEX 2 LIST OF PARTICIPANTS

Name	Position	City/Organisation
Matthew Lehrman	Energy Strategy Coordinator	City of Boulder
Joe Castro	Facilities and Fleet Manager	City of Boulder
Benjamin Mandel	Renewable Energy Policy Advisor	City of New York
Ingrid Fish	Policy & Research Analyst	City of Portland
Hermann Bluemel	Principal Affairs of Transport Policy	City of Berlin
Christoph Steinkamp	Project Manager	City of Hamburg
Jo Boyd-Wallis	Principal Strategy Planner	City of London
Guri Tajet	Project Manager	City of Oslo
Øystein Ihler	Development Director	City of Oslo
Eva Sunnerstedt	Project manager Clean vehicles & fuels	City of Stockholm
Malcolm Shield	Climate Policy Manager	City of Vancouver
Jørgen Abildgaard	Executive Climate Project Director	City of Copenhagen
Kasper Brenøe Isbrand	Project Employee	City of Copenhagen
Louise Vinodini Sørensen	Specialkonsultant	City of Copenhagen
Birte Busch Thomsen	Project Leader	City of Copenhagen
David Marc Gurewitsch	Chief Consultant	City of Copenhagen
Tanja Ballhorn Provstgaard	Project Leader	City of Copenhagen
John A. Monacelli, Jr	Traffic Engineer at City of Boston	City of Boston
Filip Kjellgreen	Programme Manager	Vinnova
Dorotheé Coucharrière	Policy Officer	DG MOVE, EU Commission
Kim Winther	Senior Consultant, Transport and Electrical Systems	Danish Technological Institute
Kåre Albrechtsen	Head of a secretariat	Copenhagen Electric
Kathrine Fjendbo	Consultant	Copenhagen Electric
Mette Hoé	Consultant	Copenhagen Electric
Bruno Forget	Director Hydrogen Energy	Air Liquide Advanced Business
Louis Sentis	Development Manager	Air Liquide Advanced Business

Name	Position	City/Organisation
Josefine Jørgensen	Consultant	The Danish Partnership for Hydrogen and Fuel Cells
Tejs Laustsen Jensen	Director	The Danish Partnership for Hydrogen and fuels
Nils Dullum	CEO	Clean Charge
Joshua Cunningham	Branch Chief Advanced Clean Cars Branch	California Air Resources Board
Victoria Wallace	UK External & Government Affairs	Nissan
Pierre Dodu	Sales Director Northern Europe	SymbioFCCell
Jacob Teter	Energy Analyst	International Energy Agency
Kenneth Jørgensen	Project Consultant	Gate 21
Anna Thormann	Program Manager	Gate 21
Hanne Collin Eriksen	Student worker	Gate 21
Line Bram Pedersen	Facilitator	Go Green Copenhagen

ANNEX 3: DISRUPTIVE BUSINESS MODELS ON CAR SHARING

Project Board 1: Disruptive business models on car sharing.

Vision: Expand car sharing aggressively to improve environmental conditions	Main Challenges: Need political support Get car manufactures on board Business case	Activities in project: Best practices for incentives and strategies/policies Surveys for end-users potential interest Interoperability of booking Involve the cities fleet in car sharing Integration with public transport Develop common app in different cities and countries
Objectives: 1. Increase tenfold by 2020 2. Encourage EV use	Main Possibilities: Make a worldwide car-bnb (based on the principles in Airbnb) Main target group: Citizens, companies and providers	
Impact: Less congestion, less pollution, better usage and more liveable cities.		

Project Board 2: Disruptive business models on car sharing.

Partners (Who work together and how?) <ul style="list-style-type: none"> - Cities - Car sharing companies - Electric utility companies - Transit companies (bus, train, metro) - Car manufactures - IT services 	Resources and funding: <ul style="list-style-type: none"> - Partnerships - The city can support with reduced/free parking fees and maybe own cars - Involve transit companies - Involve and use existing charging infrastructure in city 	Next practical step starts with... <ul style="list-style-type: none"> - 19th July 2016: Portland EV Roadmap – CNCA follow-up on car sharing. Home work: meet with local suppliers. - 1-2 webinars beforehand.
How do the cities cooperate?	What makes this project fun to engage in?	This person takes the first action: Joe Castro, City of Boulder → CNCA program.
Timeline: 		

ANNEX 4: IMPROVING INTEROPERABILITY BETWEEN CHARGING SYSTEMS

Project Board 3: Improving interoperability between charging systems


<p>Vision: Seamless and Easy-to-use charging experience for the EV-user in a defined transport corridor</p>	<p>Main Challenges: Poor business case Anti-competitive Different jurisdictions Variety of access (plugs, identification, payment)</p>	<p>Activities in project: Find and create case studies Field trips Team-building sessions Recruit stakeholders (incl. service providers, CPO's, customers etc.)</p>
<p>Objectives: Harmonize framework Exchange of innovations and best practices Define interoperability</p>	<p>Main Possibilities: Open Charge Point Protocol (OCPP) A direction for standardization Testing innovation in different cities. Involving the private sector in the green transition</p>	<p>Identify options for payments, mobility services. Access transferability Identify common features of various frameworks</p>
<p>Impact: More interconnected and open network Set guidelines for projects to expand EV adoption in and between cities</p>		

ANNEX 5: DEVELOPMENT OF EXISTING ENVIRONMENTAL ZONES

Project Board 4: Development of existing environmental zones in cities.

<p>Vision:</p> <ul style="list-style-type: none"> - Barrier removal for zero emission zones 	<p>Main Challenges:</p> <ul style="list-style-type: none"> - Political mandate - Political timeframe - Jurisdiction/legal framework - Missing standards - Political leadership 	<p>Activities in project:</p> <ul style="list-style-type: none"> - Case study development - Mayors summit - Research on outcomes - Development roadmap - Staff meeting - Linking to manifesto - Technology standards development - Feasibility study - Change people's mindset - Events/public engagement campaign
<p>Objectives:</p> <ol style="list-style-type: none"> 1. Promote participation 2. Clear process 3. Reference cases 4. Best instruments/approaches/practices 	<p>Main Possibilities:</p> <ul style="list-style-type: none"> - Clean air - Less noise - Economic strength 	
	<p>Main target group:</p> <ul style="list-style-type: none"> - Political leaders - Municipalities (staff) 	
<p>Impact:</p> <ul style="list-style-type: none"> - Accelerated deployment of zero emissions zones - Increased knowledge/awareness - Speedier development of clean transport technologies 		

Project Board 5: Development of existing environmental zones in cities.

<p>Partners (Who work together and how?)</p> <ul style="list-style-type: none"> - University partnerships - Commerce boards/commissions - Planning commission - City networks - Manufacturers/tech suppliers - Infrastructure - Transit/public transport - Regional representation 	<p>Resources and funding:</p> <ul style="list-style-type: none"> - Collaboration initiative funds - Investment Bank, group procurement - Third party feasibility study - CNCA - Horizon 2020 - ELENA program - Manufacturers 	<p>Next practical step starts with...</p> <ul style="list-style-type: none"> - Find a coordinator - Develop project proposal
<p>How do the cities cooperate?</p> <ul style="list-style-type: none"> - Data/research sharing - Case studies - Improving communication (meetings/workshops) <p>Interested cities/partners:</p> <ul style="list-style-type: none"> - Vancouver - London - Berlin - Boston - Oslo (?) - Copenhagen - Nissan - Copenhagen Electric 	<p>What makes this project fun to engage in?</p> <ul style="list-style-type: none"> - Transformative 	<p>This person takes the first action:</p> <ul style="list-style-type: none"> - The city of Vancouver develops CNCA proposal
<p>Timeline:</p> 		

ANNEX 6: ENHANCING PURCHASING COOPERATIVES ACROSS BORDERS

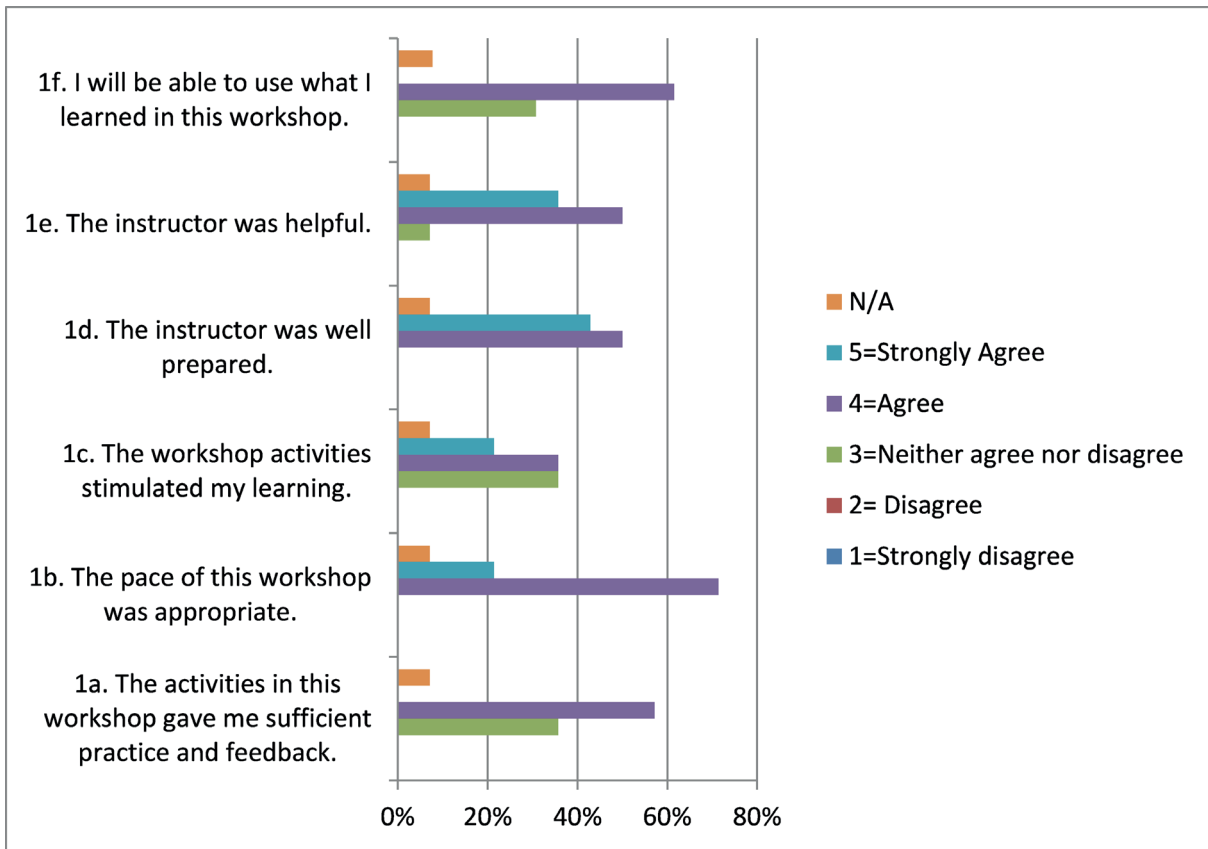
Project Board 6: Enhancing purchasing cooperatives across borders.

<p>Vision:</p> <ul style="list-style-type: none"> - More (EV's/Green vehicles) in City Fleets - Decrease Carbon Dioxide in urban transport 	<p>Main Challenges:</p> <ul style="list-style-type: none"> - Organization B. A. U. - Jurisdiction - Specifications and standards - National differences 	<p>Activities in project:</p> <p>Knowledge sharing/gathering</p> <ul style="list-style-type: none"> - Vehicles - Fuels - Charging - Infrastructure - Services - Criteria's in procurement - Collaborations - City exchange - Translation <p>Centralized project management</p> <p>Sales pitch; structured rationale</p> <p>Run small scale pilot project</p> <p>"Know your fleet".</p>
<p>Objectives:</p> <ol style="list-style-type: none"> 1. Fossil fuel free in 2050 2. Security of supply 3. Uptake of EV's/Green Vehicles 4. Economic vitality 5. City Cooperation – replicability 	<p>Main Possibilities:</p> <ul style="list-style-type: none"> - Process knowledge - Regional/National partnerships <p>Main target group:</p> <ul style="list-style-type: none"> - Procurement office - Fleet management - Supply chain management 	
<p>Impact:</p> <p>Reduction Carbon Dioxide, increase good air quality, reduce noise reductions, better costs, initiate manufacturing of new technology, new solutions proven, repeatable, replicable business model and process.</p>		

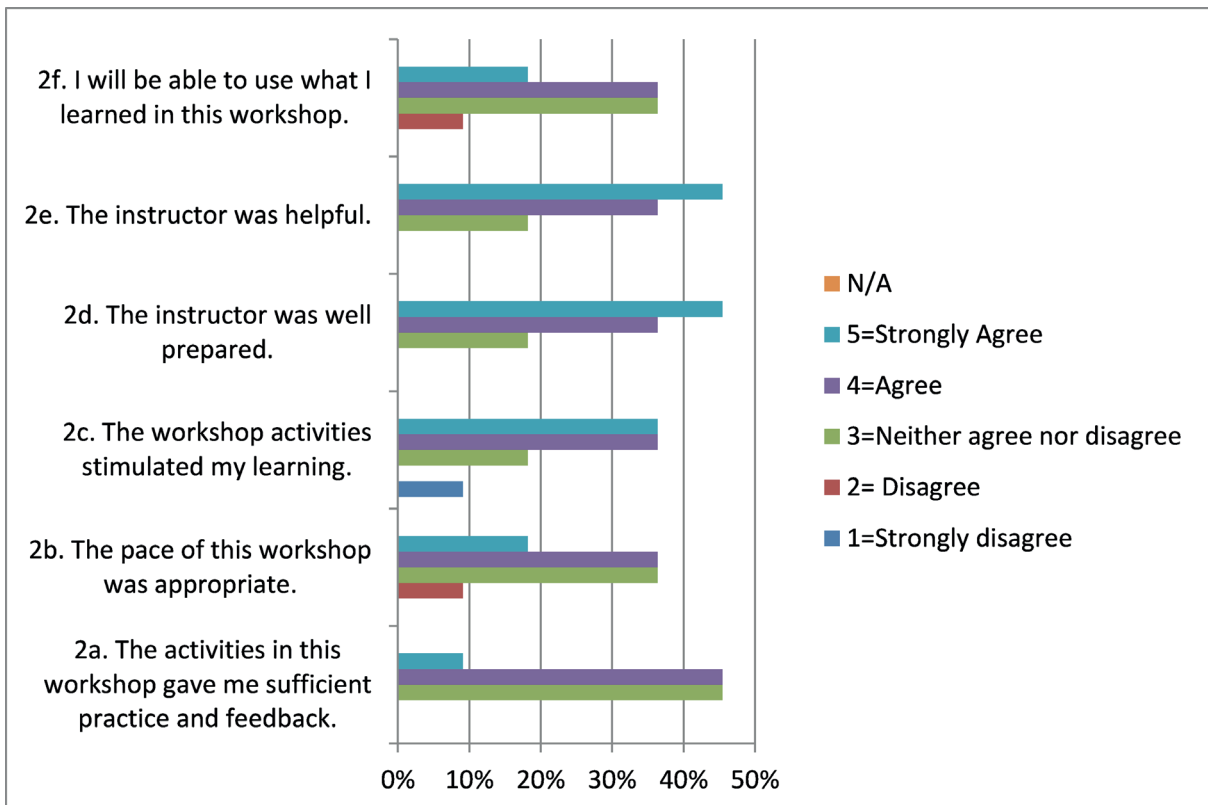
Project Board 7: Enhancing purchasing cooperatives across borders.

<p>Partners (Who work together and how?)</p> <ul style="list-style-type: none"> - Municipalities - Vehicle suppliers - Third party project management - infrastructure supply 	<p>Resources and funding:</p> <ul style="list-style-type: none"> - EU - ICLEI - CNCA - USDN - Philanthropic - Specific business entities (corporations, cooperatives, partnerships etc.) <p>Need: Project management Sharing platform</p>	<p>Next practical step starts with...</p> <ul style="list-style-type: none"> - Call for Round 2 CNCA Innovation Fund Proposals
<p>How do the cities cooperate?</p> <ul style="list-style-type: none"> - Should build on regional clusters - Portland, Vancouver and others - Oslo - Stockholm - Copenhagen <p>All partner cities: find new criteria's and use them in procurement and evaluate the outcome.</p>	<p>What makes this project fun to engage in?</p> <ul style="list-style-type: none"> - Collaboration and in person meeting - Real results - "test driving". 	<p>This person takes the first action:</p> <ul style="list-style-type: none"> - City of Copenhagen (David Marc Gurewitsch and Louise Vinodini Sørensen).
<p>Timeline:</p>		

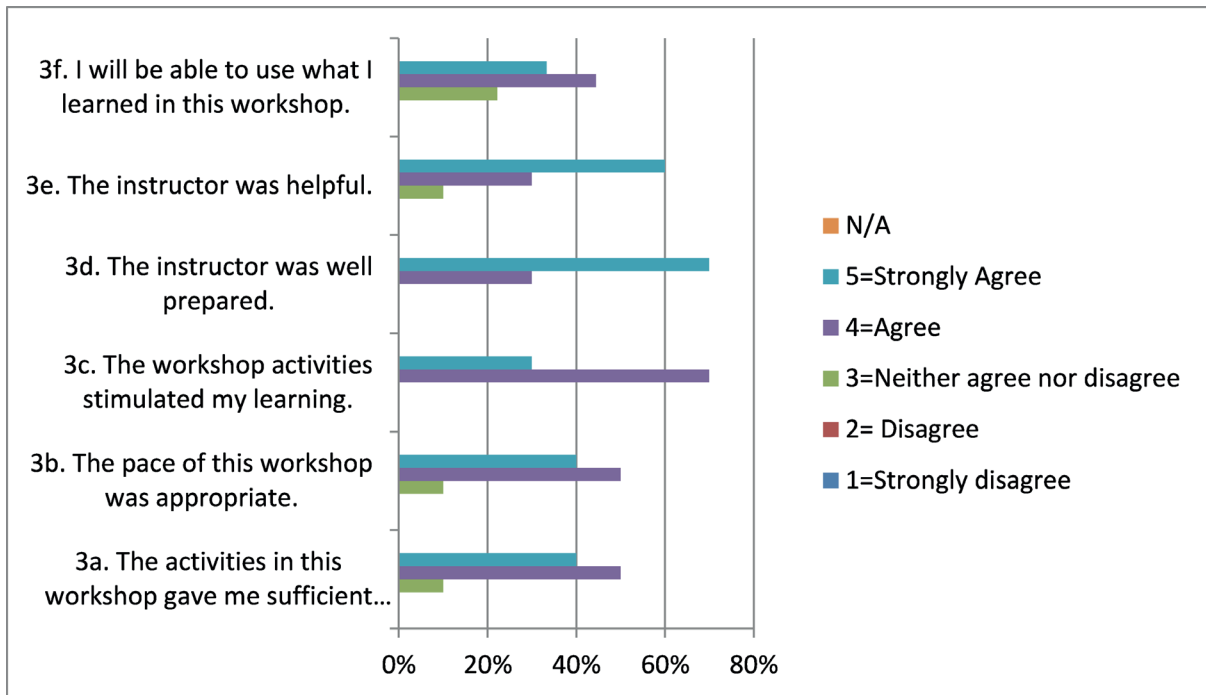
ANNEX 7 EVALUATION BY PARTICIPANTS



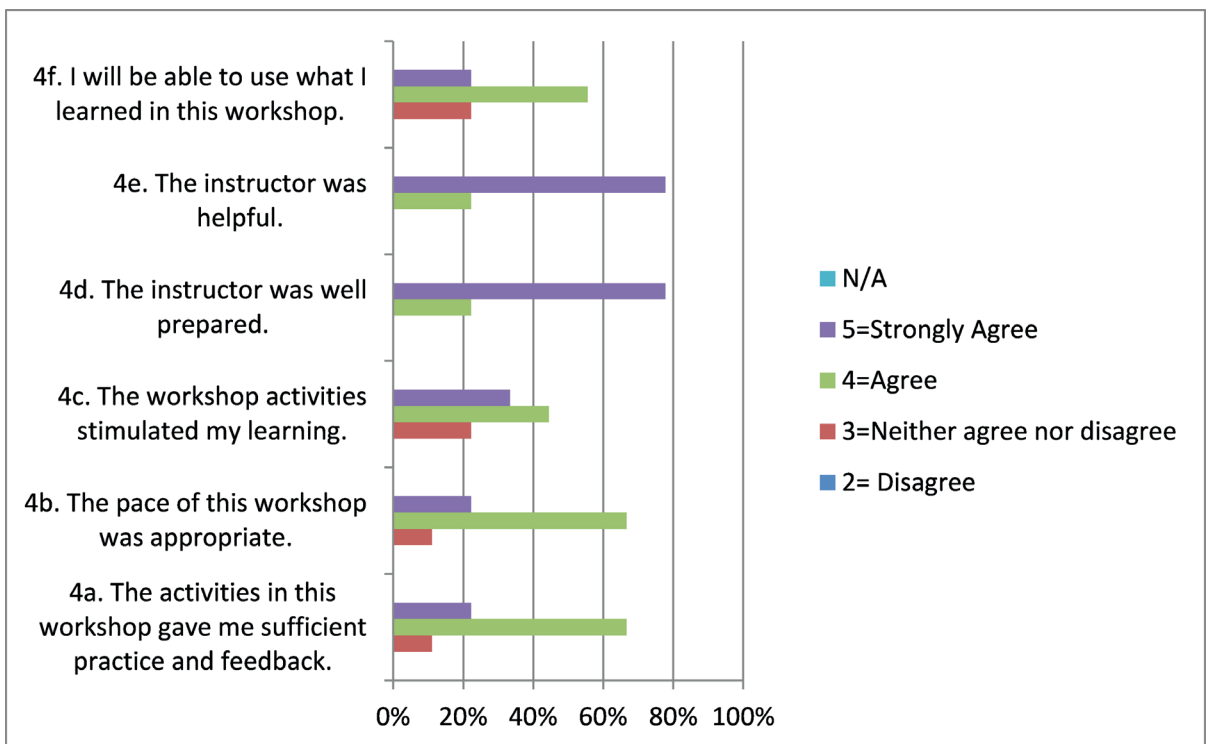
PROJECT 1: Car Sharing and Mobility as a Service



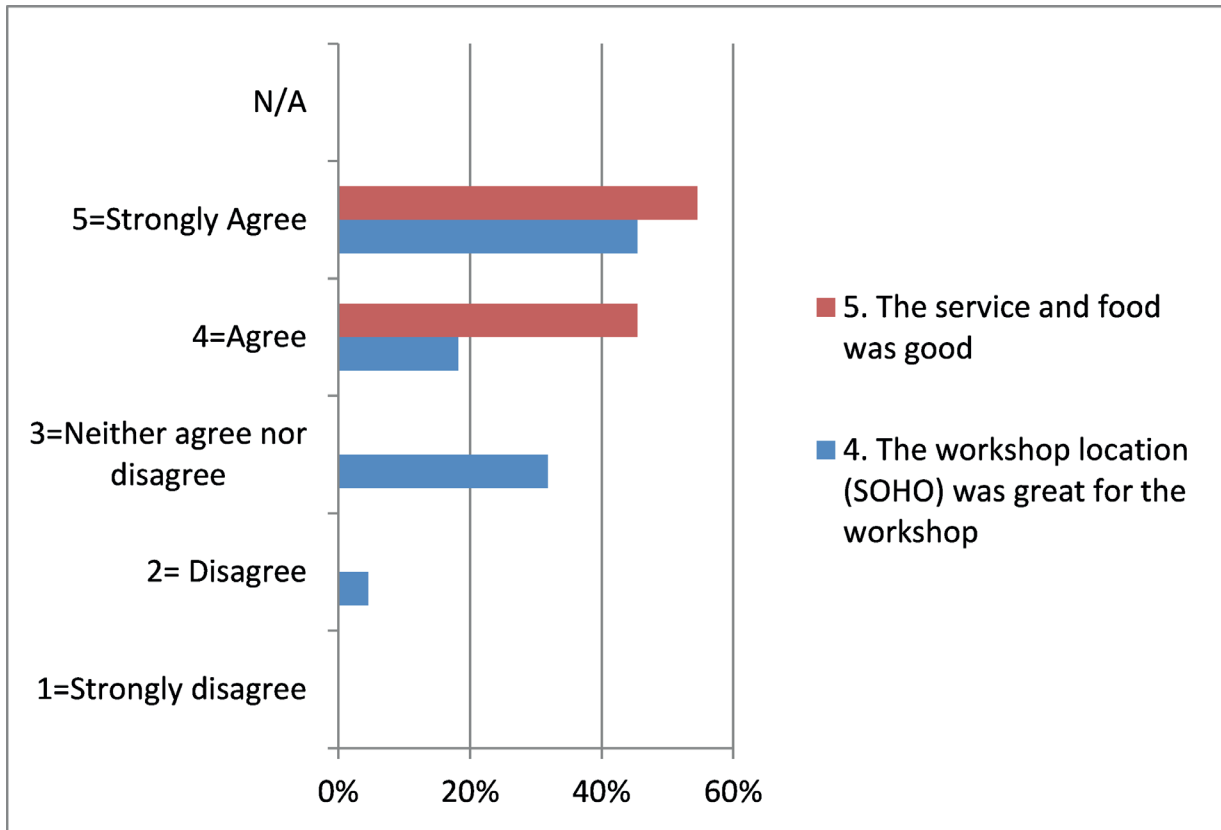
PROJECT 2: Interoperability between charging systems



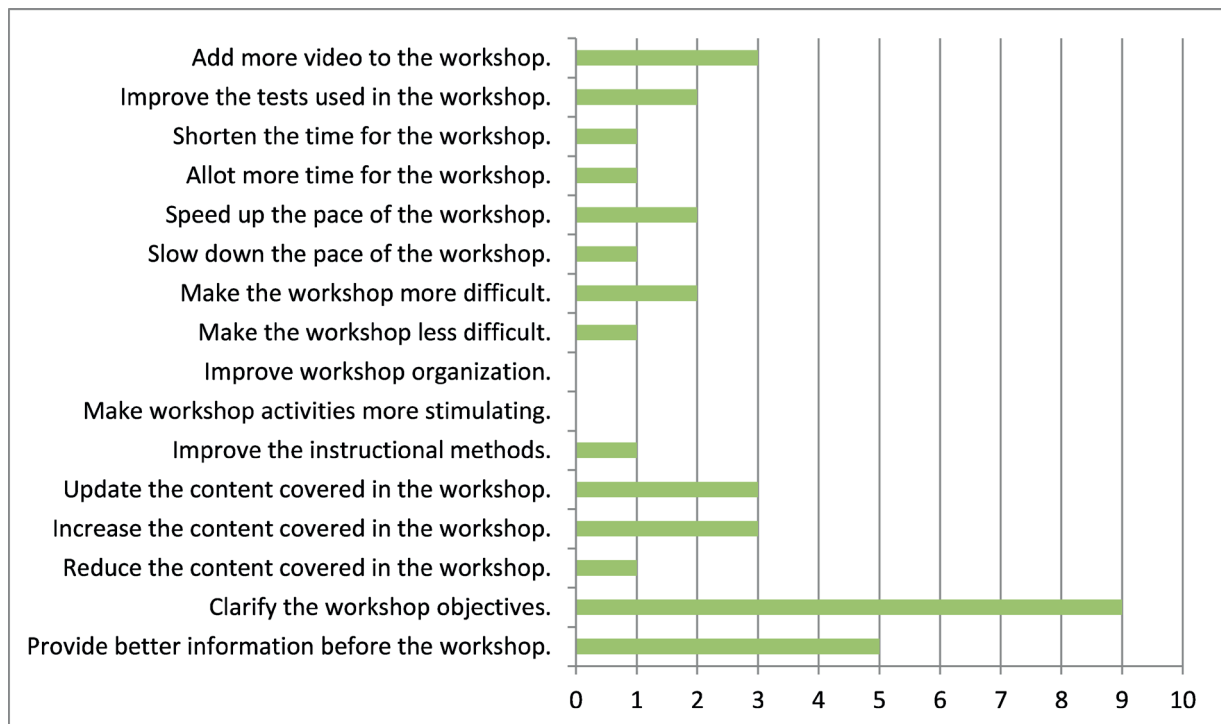
PROJECT 3: Environmental Zones



PROJECT 4: Purchasing Cooperatives Cross Cities and Borders



Workshop location and social dinner



How would you improve this workshop?

What other improvements would you recommend in this workshop?
(Unsorted written responses)

- Don't be afraid of mentioning commercial models
- A bit more chance to hear from other cities that didn't present, maybe across the two days through representatives giving quick introductions at the start of each session.
- Instruct participants to commit on a project and identify clear expectations of commitment.
- Invite some guest speakers from the industry on relevant topics we are discussing.
- It didn't seem that the interoperability groups were balanced equally from all sectors. Side conversations + lack of diverse voices contributed to detrimental delays in projects groups.
- Make sure the speakers are the right one...more inspiring...maybe two speakers x 10 min instead of one speaker 20 min.
- Expand to more cities and groups outside EU + US to add more news.
- More facilitating would improve end result (project 1). The exercise with the "dream scenario" made it hard to be realistic and specific.
- More networking time, more non-structured time for cities to discuss issues in small groups.
- The presentation in workshop 1 - car sharing was not spot-on. The presentator talked about a lot of activities on mobility and covered car-sharing only slightly at the end.
- The facilitator in workshop 1 was a little too passiv. The group worked very slow and would have needed more pushing from the facilitator.
- More case study presentations rather than market summaries.
- More directed/less generic project work.
- More free from /hot programmes networking time and more structured project development sessions.
- Other partners than cities, also including private partners.

What is least valuable about this workshop? (Unsorted written responses)

- As an industry the contents of the projects were a bit far from my business perspective.
- The workshop groups felt a little rushed
- The emphasis on the project was not clear, perhaps preparation could be asked of participants prior to the conference.
- A workshop where my knowledge and interest was low
- State of Green visit
- How can we secure a fruitful follow-up? Worried what the results will end up as I'm not convinced whether we put enough effort into actually get the new projects started.
- Project work that is not relevant for my city.
- Presentations interesting but a little vague.

What is most valuable about this workshop? (Unsorted written responses)

- As an industry understand what are the difficulties and targets for the city.
- Networking - brainstorming - competence - social time (evening)
- The quality of the delegates - learnings from Oslo + California in particular has been great. Also the US cities as they don't often attend meetings (the facilitator was excellent too - thank you!).
- Seeing/hearing what others are doing and meeting them.
- Very good - process - pace and time.
- Networking, ideas and exchange of experiences in different contexts.
- Knowledge sharing, best practices and networking
- Collaboration between representatives from various countries, perspectives + sectors. Very interesting topics + studies. Networking with contacts.
- International relevant networking.
- Network and new ideas.
- Great workshop - really valuable. The size and make up of delegates was great (a lot of cities from different areas) plus some private industry experience.

- Networking and having ideas of what works in other cities and countries.
- New network and new project ideas.
- Great networking, competent people arranging the workshop and great city.
- Got a feeling on what's going on in different cities and what the obstacles and successes are.
- The workshop was well organized, well facilitated and full of useful information. It was a productive and a good use of my time. I look forward using the information I learned from other cities and contacting participants to work on joint efforts in the future.
- New contacts, new learnings and experiences, good workshop method. I'm glad that I came and took part. Thanks for a well-organized event.
- Interaction among participants
- Big picture/visionary thinking exercises.
- Personal contacts.

