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Cleaner and better transport in cities

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D13.12

Clean Vehicles,
Clean Fuels,
Cleaner Cities

15th to 16th of June 2011
Donostia-San Sebastián

ARCHIMEDES Project Dissemination / City of Aalborg

September 2011

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

Technical Report on the Clean vehicles, clean fuels, cleaner cities Conference

Project no.	TREN/FP7TR/218940 ARCHIMEDES
Project Name	ARCHIMEDES (Achieving Real Change with Innovative Transport Measure Demonstrating Energy Savings)
Start date of the Project	15/09/2008
Duration:	48 months
Measure:	
Task:	
Deliverable:	D13.12 International Seminar Biofuels
Due date of Deliverable:	
Actual submission date:	15th August 2011
Dissemination Level	Public
Organisation Responsible	Aalborg Kommune
Author	Olivia Cahn
Quality Control	Gustav Friis
Version	1.0
Date last updated	15th September 2011

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1. DISCLAIMER

As part of the CIVITAS ARCHIMEDES Project, Task 13.5 Training Implementation – Site Level, the Public Transport Company in Donostia-San Sebastian, Dbus, has organised an international seminar on Biofuels.

The seminar took place the 15th of 16th of June 2011, and was joined by activities from two other projects, CIVITAS VANGUARD and the BIOSIRE project under the Intelligent Energy Europe programme.

This report summarizes the activities and results of the seminar. The purpose of the report is to provide practitioners in Europe, who were not able to attend the seminar with knowledge and inspiration on how to exploit results and processes gained through the ARCHIMEDES project and in other cities than involved in the ARCHIMEDES project.

The report, in that way, serves as an idea catalogue for the use of clean fuels and vehicles in cities and provides contact information for the practitioners already involved in these technologies.

An administrative evaluation of the event will be available as part of the ARCHIMEDES progress report in September 2011.

2. OPENING SPEECH

By the Mayor of Donostia-San Sebastián: Juan Carlos Izagirre

First of all, on behalf of the city of San Sebastian, I would like to extend a warm welcome to all the participants at this European Conference on clean fuels, clean vehicles and clean cities.

Today, we are very proud to welcome representatives from many European cities and I would like to express our desire to promote from here, Donostia, our collaboration with other cities in Europe and our participation in European projects such as CIVITAS ARCHIMEDES project. Along with the cities of Aalborg in Denmark, Brighton in England, Iasi in Romania, Monza in Italy and Usti in Czech Republic, we are working together in support of cities with more sustainable mobility and public transport. Today's conference and these projects allow us to share experiences, learn from what other cities are doing and also show what we are doing in our city.

This is one of my first public acts as mayor of San Sebastian and from the municipal government I am particularly pleased to convey our desire to strengthen our commitment for a city with more efficient mobility from an environmental point of view. Thus, we are firmly committed in our city, just as in the CIVITAS project to encouraging travel on foot, by bicycle and also public transport.

As part of the conference held today, there will be presentations on interesting experiences from different cities on the use of cleaner fuels. It is crucial that our cities continue along this path of promoting transportation with uses alternatives to fossil fuels. Between us all, we need to create awareness among citizens and we must also strive to achieve that the air in our cities and towns, and in the whole world, be cleaner and fit for human habitation.

Finally, I would like to mention Public Transport as a fundamental part of this conference. In our city, we are very proud of our network of buses which has some of the highest quality and usage rates in Europe. In my municipal government, we are committed to strengthening the leading position of buses and we will promote their use to our utmost ability as this is the greatest contribution we can make to the environment. Public transport has to be efficient and lanes or streets reserved for buses must give priority to the thousands of people who use it daily.

It is also essential that our buses be clean. For this reason, in San Sebastian, we have several ideas that will be revealed during this conference, such as the widespread use of used oil as a substitute for fossil fuels, or the introduction of the new generation hybrid bus that is already in use in some of our neighbourhood and which will soon be seen in most European cities.

Ultimately, I hope that at this conference, you will able to share experiences, learn first hand what measures we have adopted in Donostia and we too, can also learn what you are doing in your cities. I encourage you to get to know San Sebastian, to wander about, cycle or use our buses and enjoy our city and the friendliness of our citizens.

3. KEYNOTE SPEECHES

3.1- State of the art, use and projections of use of transport fuels across Europe *[see the PowerPoint presentation]*

Name: Tobias DENYS
Organisation & function: VITO, Project Manager Sustainable Mobility

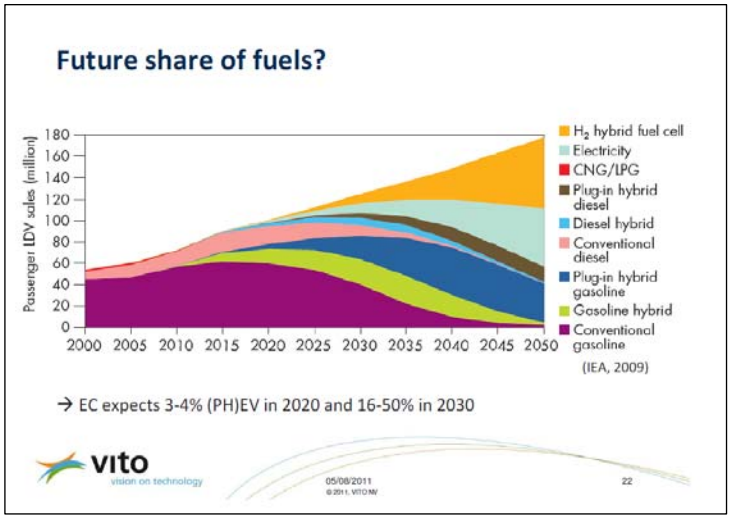
Contact: tobias.denys@vito.be / +32 14 335 862
Expertise in alternative vehicles & fuels, and driving & travel behaviour. Policy research on the introduction and promotion of clean vehicles. Several projects on board monitoring of vehicles (GPS & CAN data), with a focus on driving & travel behaviour.

Tobias DENYS explained that his company, VITO (Vision for Technology), works on materials, energy and environmental research topics to prepare the transition towards a more sustainable transport system. He added that the organisation coordinates the IEE FLEAT (Fleet Environmental Action and Assessment) project to make fleets more energy efficient.

The presentation detailed the state of the Art of conventional ICE[1] fuels from LPG and methane to 2nd generation of biofuels, highlighting their respective characteristics in terms of energy density, CO2 emissions savings, well-to-wheel balance, production and storage aspects... He also presented the system need to reach the Euro VI standard from a Euro V diesel engine.

About hybrid vehicles, **Tobias DENYS** gave the example of the Chevrolet Volt (for sale in US) which is fully electric but has an ICE as back-up and enables to use the energy of brakes to restore the battery. He underlined that the usage of the different vehicles and fuels heavily depends on the distance and the type of zone (urban, intercity, highways...).

For HDV to run long distance, one of the most recent alternatives (Volvo) is a mixture of diesel (which provides the ignition) and methane (up 50-75%) to reach higher energy efficiency although still using fossil diesel.



He also advised to be careful with the marketing of green cars, as in Belgium for instance, a green car has no CO_2 emissions but does not include the NO_x and PM emissions.

Tobias DENYS also presented the forecasted tendencies of the International Energy Agency, the conclusions of the EU Future Transport Fuels Expert Group and concluded on EU initiatives for clean fuels promotion (taxation, white paper).

[1] Internal Combustion Engine

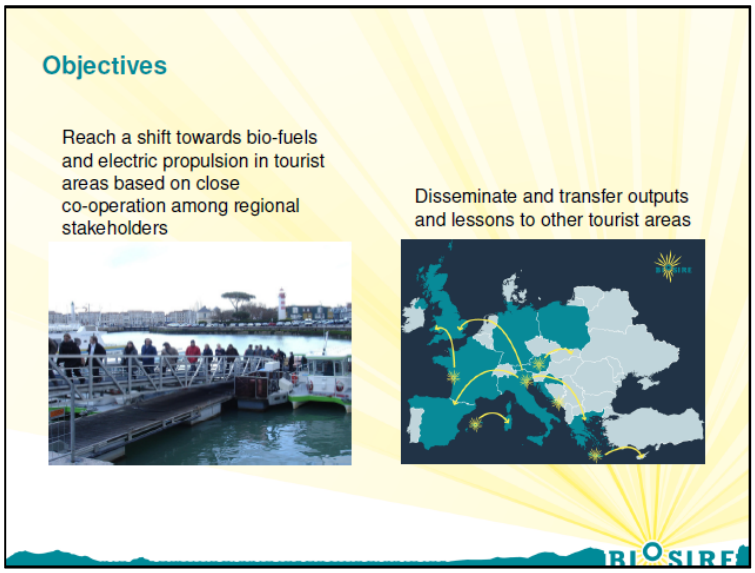
3.2- Presenting the BIOSIRE Project *[see the PowerPoint presentation]*

Name: Maarten VAN BEMMELEN
Organisation & function: CINESI Transport Consultancy, project manager

Contact: mvbemmelen@gea21.com / +34 971 775 296
Consultant in European projects and involved in CIVITAS ARCHIMEDES.

Maarten VAN BEMMELEN explained the IEE BIOSIRE project (from 2008 until August 2011) aims at establishing a shift towards bio-fuels and electric propulsion for fleets, ships and special vehicles in tourist areas: Croatia, Mallorca, Veneto Region, Austria, La Rochelle and Crete. Composed by local authorities, consultants, biodiesel plants, research institutes... the consortium has the correct scope to reach this shift towards bio-fuels and electric propulsion based on close co-operation among regional stakeholders. The other objective is to dissemination and transfer outputs and lessons to other tourist areas.

Maarten VAN BEMMELEN explained that the 6 regions followed the same steps to establish changes (local working groups with main actors, local workshops with all stakeholders) and detailed the measures implemented in each of the sites.



Common strengths identified for all partner regions are the high amount of Used Cooking Oils in tourist regions (hotels, restaurants) and the interest to use bio-fuels as part of Sustainable Tourism Strategy while the major common weakness is the reluctance of fleet operators to change to bio-fuels, which suffer from a bad image. Nevertheless, the EU 2020 objectives as well as some national strategies give a favourable floor to establish this shift although some legal conditions are still not very encouraging.

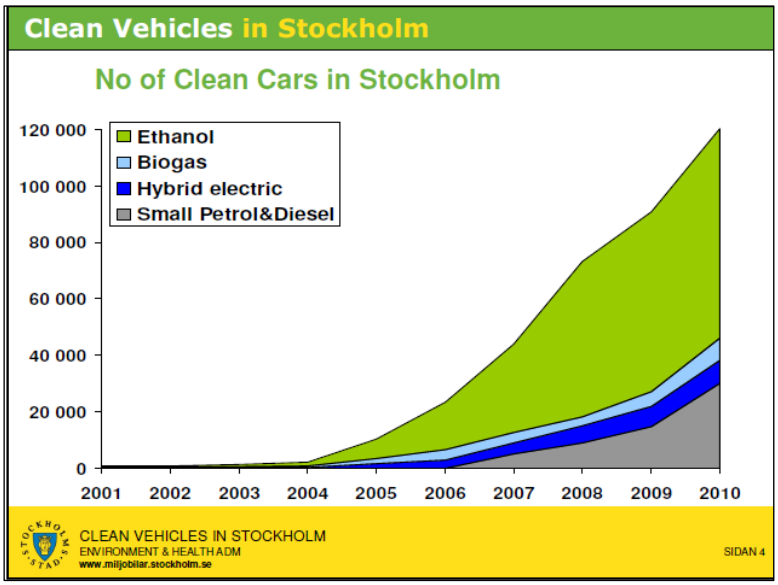
Currently, the project is working hard on the evaluation of the impacts of the project in each region and will focus on exploiting the results obtained through the various workshops organised. **Maarten VAN BEMMELEN** invited all participants to have a close look on the BIOSIRE website to the international workshops held about Used cooking oil collection, technical aspects of bio-fuels use, electric vehicles in tourist areas and sustainable transport as marketing element for tourist destinations. By now, the campaigns reached a lot of residents, tourists and fleet operators, and in particular, the participation of restaurants and hotels in oil collection schemes has been very high.

More detailed information about the BIOSIRE project and the measures implemented in the different sites will be provided along the conference.

3.3- Clean Fuels and vehicles in CIVITAS City Stockholm *[see the PowerPoint presentation]*

Name: Jonas ERICSON
Organisation & function: City of Stockholm, Project Manager

Contact: jonas.ericson@stockholm.se / + 46 8 508 28 946
Work experience in different areas for the Ministry of Environment and the Swedish government. He participated to CIVITAS I TRENDSETTER and is an expert of bio-ethanol and clean vehicles topics.



Jonas ERICSON explained that the City of Stockholm started working to get more clean vehicles on the streets about 15 years ago, beginning with 300 EV for the municipal fleet and is proud to say that in 2011, 40% of the new cars sold are clean, 12% of the global fleet are clean (120 000 vehicles) and 90% of gas stations offer biogas, ethanol and/or electricity (100% will be reached in 2011).
He explained that the first step has been to make these clean technologies and cars available on the market by gathering the interested people - thus raising the interest of vehicles manufacturers - and introducing battery leasing. Through these levers and joint procurements, the price of clean cars has been reduced by 10 to 50%. CIVITAS TRENDSETTER has played a great role in joint procurement issues and on making the technologies available to all.

Jonas ERICSON insisted on the importance for a local authority to start with its own municipal fleet, in order to acquire a proper and concrete experience. Objectives fixed by the Stockholm City Council for 2014 such as 8% of EV, 100% clean municipal fleet, 50% of clean vehicles sold are ambitious, but are addressed by working on local incentives e.g. taxi priority, access to restricted areas, possibility to use bus lanes, special parking places...
It is also crucial to work with the actors present in the city such as the big companies (Coca-cola, Scandic Hotels, IKEA...) and convince them to adopt the clean transport shift, and to target the different public with information campaigns, demonstration events, adverts...

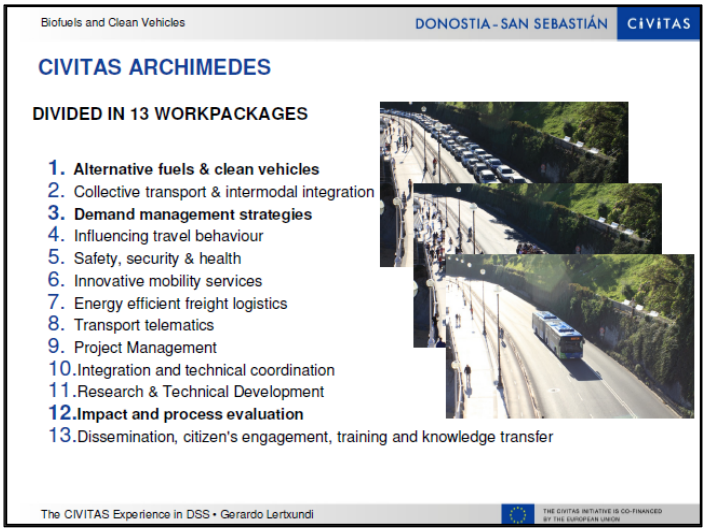
? Question: how do you circulate information about clean vehicles in a neutral way?
>> Through a web portal containing all available models in the market: http://www.miljofordon.se/in-english.aspx

Jonas ERICSON invited the participants to discover more of the Stockholm experience in the following sessions of the conference and stressed out the importance of what can be learnt from forerunners, exchanging know-how with experienced cities. He presented the CIVITAS CATALIST project which offers funding for site visits, study tours, feasibility plans, transfer studies...

3.4- The CIVITAS experience: Donostia San Sebastian and the ARCHIMEDES project *[see the PowerPoint presentation]*

Name: Gerardo LERTXUNDI
Organisation & function: City Donostia San Sebastian, CIVITAS ARCHIMEDES Site Manager

Contact: glertxundi@dbus.es



Gerardo LERTXUNDI presented the CIVITAS ARCHIMEDES project in which Donostia San Sebastian participates along with Aalborg (DK), Brighton & Hove (UK), Monza (IT), Iasi (RO) and Usti Nad Labem (CZ). The aim of the global project is to develop clean, energy-efficient and sustainable urban transport through the setting up of innovative, integrated and ambitious strategies. The project is divided into 13 workpackages (working axis of transport policies) and DSS is the leader of the 'Alternative fuels and clean vehicles" one. In total, 18 different measures have been, are or will be implemented in DSS in the framework of the ARCHIMEDES project.

Gerardo LERTXUNDI presented CTSS – Dbus, the municipal bus company of DSS (157 travels per inhabitant and per year, one of the biggest ratios in Europe) and its role in the project in particular for the following measures: bus management system, bus traveller information and high quality bus corridors.

Eduardo Gonzales introduced the work undertaken for biofuels and clean vehicles in DSS, with the first step concerning the selection of the biofuel to be used in DSS, according the specificities of the territory and of the existing bus fleet: a 2nd generation biodiesel and ICE/electric combination best suited the short-medium terms situation. This biofuel comes from used cooking oils, collected in the city, taken to refineries and converted to biodiesel respecting a sustainable cycle. The 2nd step dealt with the initial barriers for end user and IVECO specifications, and after a testing period (6 biodiesel buses over 12 months), no potential damage to engine injection system was observed. A new fuel mixing pumping station has been purchased, in which the diesel and biodiesel are in separated tanks, which allows adapting easily the blend to the need. If in 2009, the use of B20 on 97 buses showed no mechanical problems, in 2010, the use of B30 led to overconsumption of 4.5%. In 2011, 70 buses are on B20 and, B100 is tested on 20 buses. He concluded saying that one year and a half before the end of the project, one major goal has already been achieved.

As a conclusion, **Eduardo Gonzales** explained that some improvements have to be made to reach a more significant increase in CO_2 savings, and announced that DSS will get the European serial MAN hybrid bus.

4. CLEANER FUELS EXPERIENCES IN PUBLIC TRANSPORT

4.1 - Second generation biofuels in a cold climate, the experience of Aalborg *[see the PowerPoint presentation]*

Name: Gustav FRIIS
Organisation & function: City of Aalborg, Leader of the 'Biofuel in Aalborg' measure of the ARCHIMEDES project

Contact: guf-teknik@aalborg.dk / 0045 9931 2335

Gustav FRIIS introduced the City of Aalborg and the specific corridor concerned by the ARCHIMEDES project measures. The demonstration measure, launched in October 2010, concerned 50 buses (half of the total fleet) running with a 2nd generation FAME (Fatty Acid Methyl Ester) biodiesel. The demonstration includes testing the National Postal service vehicles as well as cooperation with a private company.

One of the main challenges is to fix extra costs and responsibility for operating the buses through a tendering process. In 2009, the new tender for operating the city buses required operating half of the buses with a 10% AFME (Animal Fat Methyl Ester) biodiesel. The chosen model allowed including the expected extra costs in the tender and give full responsibility to the operator.

Gustav FRIIS also explained the technical issues related to the properties of the biofuel (blending, warranties...) and in particular the difficulties implied by the cold climate in Aalborg. Indeed, average temperatures reach below zero every day between December and March, and B100 biodiesel can appear cloudy. In these conditions, it is difficult to do a higher than 10% blend because of the biofuel instability in low temperatures.

3 fuelling stations have been implemented in Aalborg; in 2 stations, the biodiesel is directly blended at the location when fuelling, and in the third - dedicated for the Danish National Mail - the product is previously blended from 10 to 20% according to the weather.

Gustav FRIIS added that the evaluation process of the tests has just started, and includes a dynamometer test as well as PEMS (Portable Emissions Measurement System) test on the road. The first results show no particular problem, improved NOx emissions and a reduced opacity. He concluded on a hybrid bus (Volvo) received last summer which, inserted in normal routes, showed a big potential for saving fuels.

4.2 - Natural gas in Madrid *[see the PowerPoint presentation]*

Name: Juan Ángel TERRÓN
Organisation & function: Empresa Municipal de Transportes de Madrid, Director of engineering
Education: Dr. Industrial engineer
Contact: juanangel.terron@emtmadrid.es

Juan Ángel TERRÓN presented the need for accessible and sustainable urban mobility policies and stated the situation in terms of renewable and pollutant characteristics of all know fuels by now. He explained that CNG (Compressed Natural Gas) is one of the cleanest fuels, compatible with diesel technology, for which large reserves exist and with available know-how. The municipal transport company of Madrid has bet for it, although it is not a renewable fuel.

After having presented the transport company, **Juan Ángel TERRÓN** explained that CNG has been introduced in 1994 in one bus, that facilities such as the supplying plant for buses have been created to fuel 440 buses in 2010.

The results showed reduced CO_2, NOx and CO emissions, no solid particles emission and a lower level of noise and vibrations than diesel. As the extra cost compared to gasoil is 1.8%, CNG is seen to be the only viable alternative for the short and medium terms, as it is financially more competitive and less harmful for the environment. With regards to these results, the company decided that all thermal engines that will be incorporated into the fleet should be of gaseous fuel.

Juan Ángel TERRÓN detailed the existing installations for fuelling buses (fast and slow charging) as well as other types of vehicles.

He concluded the presentation with the comparison of hybrid vehicles in series or in parallel according to the objective of reducing the emissions or the consumption. He foresaw that no particular fuel will impose itself in the 30 coming years, that natural gas (liquefied for intercity use or compressed for urban usage) is the best identified alternative to diesel up to now.

4.3 - Biodiesel production and consumption in Mallorca *[see the PowerPoint presentation]*

Name: Carles PETIT
Organisation & function: CINESI Transport consultancy, consultant

Contact: cpetit@cinesi.es

Carles PETIT explained that Mallorca has had a failed experienced of large scale Biodiesel production mainly because of high dependency from imported feedstock, large initial investment and a lack of flexibility to adapt to the demand. Nevertheless, the city is successfully experiencing a small biodiesel production, exploiting the big potential of local feedstock while raising social awareness (problem of sewers contamination by oils) and benefiting from small investments that allow flexibility in its production. In total, 90% of the biodiesel produced is made from used cooking oil, and **Carles PETIT** showed and detailed the 2 different plants in Mallorca (Ecorecicling S.L. and Gen) and their production models. He insisted on the excessive price of the Gen plant (18 M€ for 33000Tn/year) which normally should cost twice less.

While the first model consisting of separated systems between UCO collection and the biodiesel plant allowed exporting to Cataluña for instance, the second model led to more expensive biodiesel produced by the Mallorca plant than the one sold by oil companies. The 3rd model has now led to the bankrupt of the plant, and the situation is uncertain for the future.

Carles PETIT then presented the main steps to consider in a strategy for developing the biofuels markets, including characterizing the feedstock (source and place), the consumption (clients and vehicle or heating device) and the production & distribution (in terms of plant design and logistics needs).

He highlighted the potential for tourist areas like Mallorca for UCO biodiesel especially where waste management is a real problem. Now, 47 on-street collection points are set up in Palma, 4 000 restaurants and 1 600 hotels participate as well as 40 schools. Thanks to the Biosire project, more kids have received a bottle to collect oils, and learnt how to make soap from it, raising their awareness that oils have to be reused.

Indeed, for an investment of 1500€, one school of 450 students collects 1320 litres of cooking oil per year.

The Gen plant produces today 1.5Tn of biodiesel 12% cheaper than diesel which are used in 232 vehicles and transported 805 000 passengers on buses.

5. ELECTRIC VEHICLES

5.1 - Test an EV – the largest EV project in Europe *[see the PowerPoint presentation]*

Name: Ole ALM
Organisation & function: ChoosEV, Head of Development
Education: MSc, PhD
Contact: oa@chosev.com
He worked with low energy houses, energy consulting, planning, and all kinds of alternative and renewable energy production.

Ole ALM explained that his company, ChoosEV, the leading Danish electric mobility operator (*EMO*), works on the infrastructure building for EV together with shopping malls for instance and has a payment system with RFID cards. The ChoosEV-Project aims at getting 200 EV in Copenhagen. In order to show people that EVs are normal cars, a Citroen C1 has been built to EV. EVs raise a lot of questions from the potential buyers regarding the batteries, the financial conditions.
As the charge is quite quick (from 0 to 80 % in 20 minutes), **Ole ALM** indicated that the use of EV is a huge success and allows to get a good psychological security among the users.

Ole ALM introduced the TestEnElbike.dk project (from December 2010 to December 2013), involving 30 municipalities around the country and aiming at getting 300 EV on the road. The participants drive EV (C1, i-Miev, iON and in the future: Nissan Leaf and Renault Fluence) mainly during 3 months for free while learning the pro and cons about the EV. Through a successful campaign in newsletters, he underlined the good use of home charger with 3,8 kW.

The several events (in the press 5 times per week) lead to raise public attention towards the EVs.
The data results are gathered via questions by ChoosCom among the test drivers (before, during and after), blog on website, visits to families.

Regarding the project results, **Ole ALM** showed that the cars are mainly used for the work, then for the school and are charging mostly at home, once to twice a day. The charging time of the day impacting on power grids involves challenges for energy supplier. **Ole ALM** added that because of a quick charger, the size of the batteries could be smaller.

5.2 - Innovation and sustainable mobility, Electro-mobility services in La Rochelle *[see the PowerPoint presentation]*

Name: Matthieu GRAINDORGE
Organisation & function: La Rochelle Urban Community, European Projects manager

Education: Postgraduate in Political Science

Contact: matthieu.graindorge@agglo-larochelle.fr / +33 (0) 5 46 30 36 65

Matthieu GRAINDORGE explained that La Rochelle Urban Community started working to develop policies toward soft modes in 1976, beginning with the first Public transport bike rental service in France. La Rochelle's initiatives kept going on by implementing several soft transport modes (bus, boat...) gathered in one unique card, in order to make all modes of transport easier and more practical to use.

The story of the electro-mobility in La Rochelle began from 80's by testing the first EV. Then, La Rochelle went further towards the development of electro-mobility.

Matthieu GRAINDORGE detailed the electric boat mode provided by the city: the first Electric shuttle boat, functioning under an induction system and a charging by night and the Electro solar boat, able to seagoing and charging to the grid in the night (PV panels providing 20 % energy). Within the framework of the CIVITAS SUCCESS project, in which La Rochelle was the coordinator, a long term public-private partnership, the 1st Delegated management of public services in France on new electric and hybrid transport services (2006-2018), has been contracted between La Rochelle and the transport operator and involved 3 services: E-Car sharing, urban goods delivery using EVs and electric/hybrid-shuttle to Park-and-Ride.

Regarding the E-car sharing, launched after a call for tender, two EVs have been chosen regarding some criteria in December 2010 and implemented lately. The ELCIDIS (Electric City Distribution) aims at reorganizing deliveries by decreasing pollution and facilitating the traffic fluidity.

Finally, **Matthieu GRAINDORGE** added that current innovative experiments, the first in an open and public space, are being carried out on electric cybercars without any driver.

Matthieu GRAINDORGE underlined the significance of providing clear information about EV and exchanging with other cities and organisations about each other experiences.

5.3 - Hybrid bus experience in Barcelona *[see the PowerPoint presentation]*

Name: Joseph Maria ARMENGOL
Organisation & function: TMB, Director of engineering and development

Contact: jmarmengol@tmb.cat

Joseph Maria ARMENGOL explained that Transports Metropolitans de Barcelona (TMB) makes 41.4 % motorized daily trips with a commercial speed of 11,7 km/h, which represents 74.8 % of the public transport share. With 1080 buses (34,8 % of fleet operated with CNG) representing 0.72 millions daily trip and 210 millions passengers per year, it is expected to implement a new network in the end of 2011, with new buses (Biodiesel (B30), CNG, Hydrogen and Hybrids) and new infrastructures.

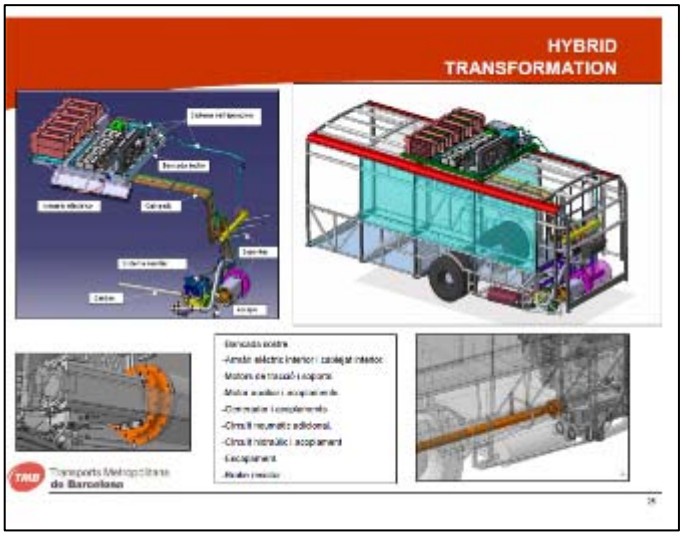
TMB is involved in the CUTE Project (Clean Urban Transport for Europe), aiming at introducing hydrogen buses into urban public transport systems.

Currently, TMB expects to get 4 Hybrid buses in its new fleet and convert 80 diesel buses in hybrids within the framework of Project “Retrofit”.

Regarding the Electric bus, **Joseph Maria ARMENGOL** indicated that TMB is facing on some issues such as the energy storage and the budget.

Joseph Maria ARMENGOL compared the different vehicles and showed that the fuel Cell H_2 has the highest Energetic consumption and GNG the highest CO_2 Emission.

In order to reduce more than 95% of particles and between 50%-60% emissions of NOx, TMB plans to implement 522 particles filters at the end of this year.



6. SAN SEBASTIAN IN DEPTH – DEBATE WITH RESPONSIBLE STAKEHOLDERS

6.1 - Biofuels technology in the Basque Country *[see the PowerPoint presentation]*

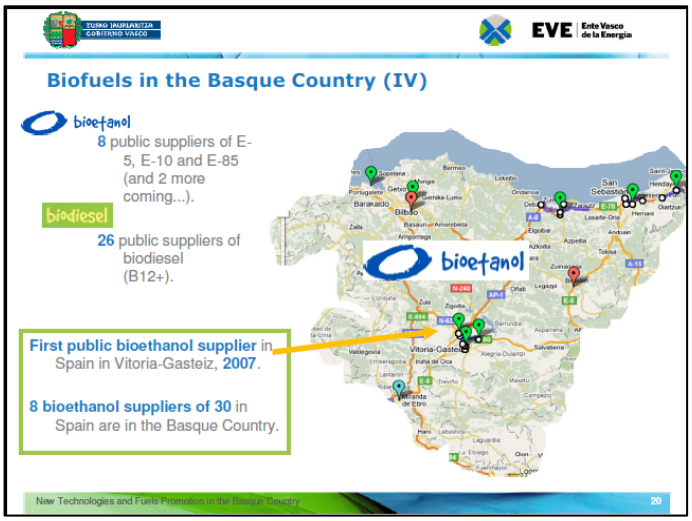
Name: Juan Manuel FERNÁNDEZ ETXANIZ
Organisation & function: Ente Vasco de la Energia (EVE), Head of Transport Unit

He worked in the Energy Agency for the Basque country for 11 years, developing studies and energetic certifications of buildings.Since 2010, he is in charge of the Transport Unit, working on energy efficiency and diversification in the field of mobility and transport, including promoting biofuels.

Juan Manuel FERNÁNDEZ ETXANIZ described the funding of the Energy Agency for the Basque Country in the early 80's to set up the basis for an energy policy in the region in all relevant fields: buildings, industry and of course transport, which is the fastest growing sector in terms of energy consumption. He insisted on the need to diversify energy sources (97% of energy consumption come from oil), in particular to reach the 10% target of renewable energy by 2010 of the EC.

The goal in the Basque Country is that 10% of the vehicles sold in 2020 will be electric (pure or plug-in hybrids. Indeed, the Basque Government set up an agreement with Mercedes-Benz to begin manufacturing the E-Vito electric vehicle from 2010 in Vitoria-Gasteiz and carry out common projects with the automotive industry. Moreover, a special company, IBIL, has been created by EVE and Repsol for the construction and operation of a network of recharging points, which is currently emerging.

In terms of biofuels, **Juan Manuel FERNÁNDEZ ETXANIZ** explained that EVE has participated in the European project BEST (BioEthanol for Sustainable Transport) to run 200 FFVs (Flexible Fuel Vehicles), distribute E10 and build 4 E-85 public supply pumps. This successful project has led to the "Ecomovil" program to help creating distribution infrastructure, reaching the consumer critical mass and raising awareness. Currently, 8 public suppliers of E-5, E-10 and E-85 are set up, as well as 26 suppliers of biodiesel (B12+) for public use.



Although the Basque government offers a 2.200 € subsidy for vehicle purchase, an important trade barrier is that manufacturers do not offer their Flexible-fuel vehicles in the Spanish market. A technological barrier is also impacting the promotion of these biofuels: manufacturers don't guarantee their diesel vehicles to run on B30...

6.2 - Development from experimentation to mass-production *[see the PowerPoint presentation & the video]*

Name: Benedict NEUGEBAUER

Organisation & function: Sales Engineering Bus & Coach, MAN Truck & Bus AG

Benedict NEUGEBAUER presented the history of the MAN Lion's City Hybrid bus and its technical improvements from 1975 up to now and showed an animation film explained the mechanism of the bus.

There is no gear box in the car, but a combustion engine is driving the generator: when braking, it brings the energy in the ultra capacitors on the top of the bus and when accelerating again, the power of the hydro capacitors is giving the energy back. This system allows up to 30% energy saving and MAN is the only manufacturer that offers the "stop and go" function, which allows to save fuel consumption and noise pollution when the diesel engine is off e.g. 40% of the time in city operations. He added that the savings depends on the product line and on the use which is made of the bus, as it makes no sense to run a hybrid bus up and down hills.

Benedict NEUGEBAUER then explained the differences between different energy capacitors (Li-ion batteries, Nickel-metal hybrid batteries and MAN ultracaps) and justified the choice of ultracaps mainly because their life expectancy is over 1 million charge/discharge cycles, they have a high power density, provide high levels of safety and efficiency and are recyclable.

He added that it takes time to prove the efficiency of this technology we don't have much concrete experience. That is the reason why MAN has tested since 2009 some prototypes in various cities such as Paris, and in real driving conditions in Vienna, Munich, and Barcelona with promising results (23% energy saving in Munich compared to a standard EV bus working 21 hours a day).

Benedict NEUGEBAUER specified that MAN also delivers full range of technical and drivers' training through training sessions.

? Question: what blends are possible to do in the Lion's City Hybrid?
>> MAN engines can be used up to 100% biodiesel.

6.3 - From UCO to UCOME *[see the PowerPoint presentation]*

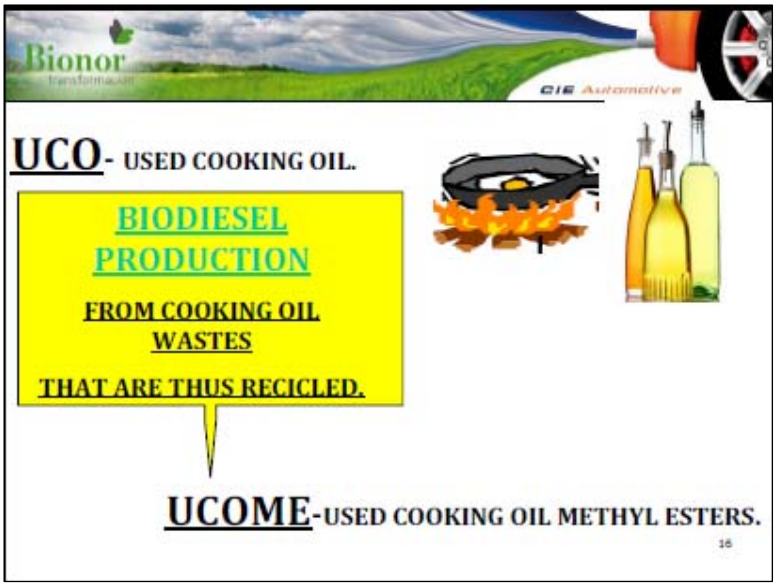
Name: Zenón VAZQUEZ

Organisation & function: CEO, Bionor

Zenón VAZQUEZ defined what biodiesel is and the characteristics of 2nd generation biofuels being a biofuel that can be produced sustainably by using residual non-food crops like agricultural wastes and other remainders. He added that it is a sensitive product, which as its kind of own life. He reminded that before diesel was a standardized product, it has to come through a learning process which is now the case for biofuels.

Zenón VAZQUEZ then introduced his company, Bionor, which is an industrial group in the biofuel market, seeking to be the national reference in biodiesel production and product knowledge with a focus on 2nd generation biodiesel. He presented the 4 business units of Bionor and its 3 production facilities, including Bionor Berantevilla which is the leader in terms of 2nd generation biodiesel production (annual capacity of 50 000m3). He reminded that some time ago companies paid people to get rid of their used oils, and now companies such as Bionor are buying these oils. He insisted on the importance to pay attention that the type of biodiesel chosen is the right product for the territory.

A lot of different raw materials (soy, palm...) can be treated to be biofuels and Bionor is currently investing in genetic mixture of jatropha to find a cheaper product.



Zenón VAZQUEZ reminded that UCO are a dangerous waste, responsible for environment, water and air pollution. Today, in Spain, 98% of the UCO are used for combustion versus only 5.6% in 1990.
Donostia San Sebastian City Council is strongly promoting the UCO collection process with clean points, containers and vans picking up the oils once a week.

After reminding the European objectives in terms of energy savings and the regulatory framework of UCOMEs, Zenón VAZQUEZ noticed that the product is a real concrete alternative and is beginning to expand in Spain thanks to municipal fleets using it such as San Sebastian but also Madrid, Bilbao, Huelva, Malaga, Barcelona...

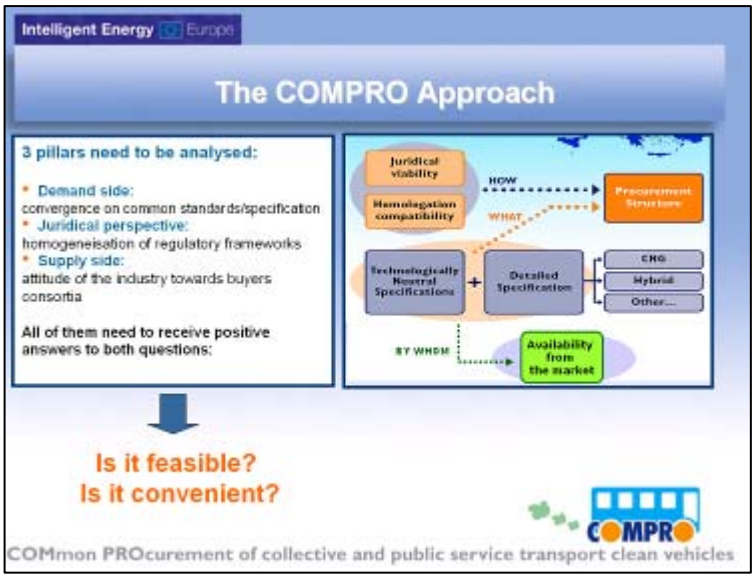
7. PROCURING CLEAN VEHICLES AND FUELS

7.1 - Experiences from the COMPRO project *[see the PowerPoint presentation]*

Name: Silvia GAGGI
Organisation & function: ISIS, COMPRO Project Co-ordinator
Education: International and Diplomatic Science and post graduate degree in European Studies
Contact: sgaggi@isis-it.com / xxx
She coordinated the network Access/Eurocities, promoting sustainable urban transport among local authorities, acquiring a strong experience in policy influencing both at European and local level.

Silvia GAGGI presented the COMPRO Project (Common Procurement of collective and public service transport clean vehicles) from 2007 to 2009 aiming at analyzing the feasibility of a common procurement of clean buses (CNG and hybrid) at the European scale and gathering 4 European local authorities (Nantes Métropole, City state of Bremen, Emilia Romagna Region and Gatubolaget).

The project is born in a rich European context in terms of innovative and green procurement scheme for public transport vehicles. **Silvia GAGGI** showed that the implementation seemed to be more difficult than expected. In order to reach the objectives, the COMPRO approach involved a participatory process with follower cities and influential groups and was split into 3 pillars, which are the demand side, the juridical perspective and the supply side.



A series of studies (analysis of the collective transport vehicles market in Europe, for instance), technical documents (draft of a call for tender) and draft of position papers (recommendations in transnational common procurement, common position on the clean vehicles market) has been produced at the end of the project.

The main conclusions of the project highlighted the idea that common procurement of buses is possible without any real obstacles. Nevertheless, due to a weak market and a lack in legislation, **Silvia GAGGI** indicated that a high level of compromise remains and a strong political will is required.

7.2 - Procuring clean vehicles, the Stockholm experience *[see the PowerPoint presentation]*

Jonas ERICSON *(see identity page 9)* introduced the procurement system of the City of Stockholm (900 clean cars for the own municipal vehicle). Three procurements followed: the Clio procurement (1992-1997), the Berlingo procurement (1997-1999), and the focus procurement (1998-2002) with medium sized E85 vehicle and fulfil Euro 4-standard.

Jonas ERICSON showed the increase in the number of clean cars in Stockholm, in particular, in the number of ethanol car. This raise has to be related to the increase in the filling stations for E85 in Sweden.

In order to setup procurement, the rules depends on the nature of procurers either public or private procurers. The buyers for one or several EVs are mainly public entities.

7.3 - Rotterdam and Dutch Clean Vehicle Procurement experiences *[see the PowerPoint presentation]*

Name: Lode Messemaker
Organisation & function: City of Rotterdam, MSc Project Manager
Education: Human Geography and Urban Planning
Contact: l.messemaker@gw.rotterdam.n / + 46 8 508 28 946
His professional experience includes project management at the City of Rotterdam, the City of Utrecht and Utrecht University, the founding of a web design company and various functions at organizations such as the Ministry of Foreign Affairs, the Dutch Consumer Association and the Royal Dutch Geographical Society.

Lode MESSEMAKER introduced the positive and negative aspects of the previous EV experiences and described procurement examples in the City of Rotterdam. The aim of the procurement is focused on getting 25% of vehicle fleet full-electric or hybrid by 2014. The investment in public charging infrastructure aims at promoting and alleviates the EV procurement by external stakeholders.

Lode MESSEMAKER indicated that one of the main goals is to maintain the leading position of Netherlands in the electric mobility fields. At the end of the project, no vehicles was procured because of different will from the public or private participants, the legal issues and the withdrawal of important stakeholder. After the project, the large firms and the public institutions kept going on but not together anymore.

Lode MESSEMAKER explained that the Public Transport is currently the cleanest public transport in the Netherlands and will be, probably, depending in the future on a regional concession.

Lode MESSEMAKER described the EV Experience Center, located in the brand-new central train station aiming at doing test-drive and providing information center for the public.

8. TOWARDS THE IDEAL MIX OF DIFFERENT TECHNOLOGIES AVAILABLE: BALANCE, SYNERGIES AND COMPETITION

Panelists members: Fidel ANGULO, Jonas ERICSON, Benedict NEUGEBAUER and Gerardo LERTXUNDI

Name: Fidel ANGULO
Organisation & function: ATUC, National Urban Transport Association

Education: Industrial engineer, general secretary

Fidel ANGULO presented ATUC as the major association of urban transport operators and one of the most important actors for sustainable mobility in Spain.
He first stated that the transport sector is a highly endogamous one and suggested to open to all the actors concerned by mobility e.g. the society, authorities, operators, operators' staff, consultants, constructors, civil society…especially when talking about alternative fuels because it is vain to do things alone. He added that collective transport is the less consumer and polluter mode and needs a collective answer.

MODOS	MADRID	BARCELONA	BILBAO	VITORIA	OVIEDO	BURGOS	DONOSTIA-SS
PÚBLICO	49	42	26	7	13	23	26
PRIVADO	23	30	13	31	34	27	22
A PIE	26	24	60	55	50	45	44
OTROS	2	4	1	7	4	5	8

About technology choices, he explained that a lot of decisions are made by political mimicry, without considering that a good solution in one place is not necessarily the good one for another place. Of course, the political decisions are subject to the political life which is regulated by the different electoral periods.

Fidel ANGULO stated that a lot of different pressures are on the transport system and operators such as the new technologies, market fluctuations, economical and social contexts, demand's requirements, European legislation…Moreover, there is no entity at the national level to coordinate the systems and the legislative project is currently led by the authority which does not have the transport competency. He added that it is necessary to seek for economical sustainability to reach the environmental one.

If the current debate is about cleaner fuels in collective transport, it is of crucial importance to keep high quality services in terms of travel time and reliability (regularity and frequency) so that the people keep using PT. Also, **Fidel ANGULO** mentioned that we sometimes buy things we don't need (for instance some cities keen on tramway) which leads to an over quality not profitable at the end for anyone. Moreover, 30% of the time is spent on traffic jam and **Fidel ANGULO** believes that

this should be a priority because the operator is a victim of the increases in private vehicles fleets. The commercial speed has to be improved and the key is to rationalize street usages to efficiently share the space between buses (specific lanes) and cars.

To conclude, **Fidel ANGULO** stated that mobility is the main challenge of the XXI century, and that it undergoes pressures from a lot of actors, being captive of technology progresses and a good organization.

Gerardo LERTXUNDI concluded on 3 main conclusions of the day:

- it is of crucial importance to keep using public transport, and thus to work on efficient PT systems for better and cleaner cities,
- it is necessary to share the lessons and experiences between different cities to gain knowledge and time on new projects
- there is not just one solution but a lot of possibility for each context, and it is not a competition between them when the best solution is a mix of the different technologies.

Jonas ERICSON added that public transport fleet is needed to experiment biofuels and commented that a major issue in Stockholm is the narrow spaces, allowing an 18km/hour commercial speed. He advised to invest more and get into a bigger scale.

Benedict NEUGEBAUER shared his concerns about cities being frightened to take decisions that could in the future appear to be wrong ones, because at the moment there is no magical solution. He also advised not to set up too high targets, which could be contra productive and very disappointing.

? Question: How do you think should be promoted biofuels vehicles?

Fidel ANGULO answered that being fueled with diesel or biodiesel, the vehicle is the vehicle, and it stays 30% of the time in traffic jams leading to contamination and loss of time. He advises that taxation is the best lever to promote them.
Gerardo **LERTXUNDI** agreed that the goal is not to have more vehicles in the city but to substitute the fossil fuels for biodiesel.
Jonas ERICSON added that probably some people will move from PT to private electric cars, which will be an important negative side effect of clean vehicles promotion, when the aim is to substitute the cars that still need to be (taxis, ambulances) with greener alternatives.

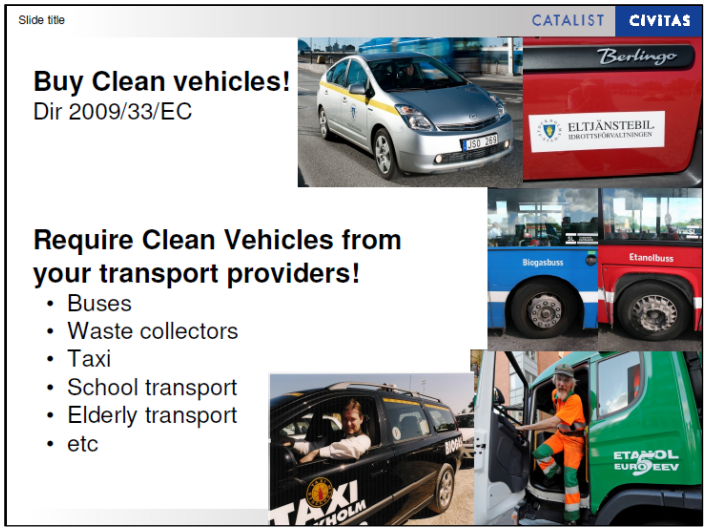
? Question: How could the contradictory decisions between elected people and technicians could be handled?
Fidel ANGULO explained that it is mainly a question of pedagogy and culture and technicians need to be very pedagogical! Transport is a political issue, and you will learn more when travelling than when managing. A real change of behavior is to be sought to break the valuable image of the car, including for young people.

9. HANDS ON: PROCURING CLEAN VEHICLES

▪ Procurement of clean vehicles in Stockholm, Jonas ERICSON

(see Identity page 9) *[see the PowerPoint presentation]*

Jonas ERICSON presented the clean vehicles procurement options in Stockholm explaining first that buses management is a regional competence outsourced to private operators. As all maintenance operations are privatized, the city doesn't want charging vehicles. After describing the municipal fleet, he stated that 3 alternatives exist for procurements: introduce the vehicles on the market, buy your own fleet or make other buy, and that Stockholm goes for the last one. Often, Swedish cities use the common joint procurement system led by the national organization for cities, which looks for straightforward lines and as few exceptions as possible to get the lowest price. In 2005, a special clause was introduced into the contract requiring only clean vehicles. Cities had a bad opinion on this, feeling it was too special and too expensive (which led Stockholm to pay 100 000 € extra) but in the end more cities joined and 5000 vehicles were sold within this contract.



In 2009, the discussion finally concluded to reach national agreement about the definition of a clean vehicle and cities' awareness about these was high. If the price was not the best one that could have been because there were too many options available in the contract, the results were still good. In 2012, **Jonas ERICSON** explained that there should be less options available (better price) but he mentioned that Stockholm would probably not join the common procurement and make its own.

To conclude, **Jonas ERICSON** recommended that cities require clean vehicles from their transport providers, to count climate change impact (WTW) and not tailpipe, to put requirements on all fuels in terms of traceability, GHG performance…and to urge the government to equalize taxes.

▪ Procurement of clean vehicles in Rotterdam, Lode MESSEMAKER

(see Identity page 22) *[see the PowerPoint presentation]*

Lode MESSEMAKER mentioned different procurement examples in Rotterdam (e.g. clean vehicles fleet, charging infrastructure, Dutch Consortium for the Tender of Electric cars…) and insisted that it is great to have your own experimental garden to test what you want.

About the national market, he explained that cars are on average 8.6 years old (mainly due to a very large second hand market) i.e. they have a longer life than the average in Europe, and thus it takes more time to clean the fleet.

Sales by fuel type (76% gasoline and 20% diesel) show that the fleet is not clean at all for the moment and electric are not even measurable.

He added that national incentives on clean vehicles included no PBM tax (25%) and no regular tax (19%) on the purchase of the vehicle, no monthly road tax (20 to 100 € p/m) and lease tax (100 to 200 € p/m) which is a real incentive for Toyota Prius. These apply to clean vehicles according to their weight and not to their emissions and this needs more work.

Lode MESSEMAKER described the main issues related to the national procurement context: the longer the vehicles are used, the longer it takes to clean them so fleet lifetime and budgets influence the procurement options; public tender legislation is also limiting the speed of cleaning fleets through 4 years contracts; the main risk is that procurement becomes more legally driven instead of policy and practice driven; the bottom-up (users and fields managers) and the top-down (political) approaches are both needed…
He concluded saying that Rotterdam's fleet is currently the cleanest in the Netherlands, but this may change in the coming years and we should not be looking so much at what the others do and just do things.

▪ Some conclusions of the Round table session

- A difficulty is that each department buys their own cars, and there is no common sharing of their needs and requirements in Donostia San Sebastian
- The electric vehicles are beginning to be part of the climate strategies of cities such as for the Covenant of Mayors
- Cities should buy electric vehicles to clean conscience in the city as well as to start a market development
- There is a gap between the political will and the actual procurer who may not be prepared to take big risks
- Public procurement badly suits for innovation as the more tested and cheaper vehicles are often chosen
- To join forces in a common procurement means to make compromises

▪ The EU clean vehicle directive *[see the PowerPoint presentation]*

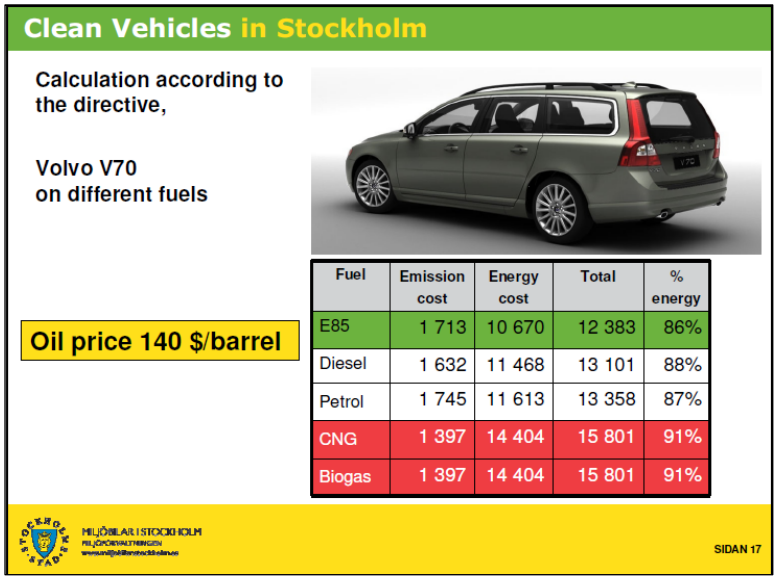
Jonas ERICSON (see Identity page 9) explained that the directive on procurement of CV started in 2002 and should have been implemented last year in Member states. It states that all public entities need to calculate energy and emission costs (energy use, CO_2 emissions, NO_x, NMHC and particles) for all vehicles they buy. They want to use the power of common procurement to reduce the costs of these alternative technologies. Cities should always choose the cleanest technologies within the economical limits they have.

Cities can choose the directive way i.e. translate emissions into costs for the whole lifetime of the vehicle (200 000 km) based on the real cost of energy, the current cost of CO_2 in the emission trading system and the real life cost for NOx, NMHC and particles, or find out their own way.

For CNG and CBG (compresses biogas) which are the worst in terms of energy use, the calculation method does not advise to buy them.

If you want alternative fuels, **Jonas ERICSON** advised to use the option of “setting technical specifications” i.e. set a maximum value for all energy and emissions costs. He added that Sweden has chosen this way and that it is very simple for Swedish cities to procure. **Jonas ERICSON** made clear that it is a requirement to include all the compulsory criteria but you can set up their maximum values. Although the calculations may be vague as most of the data come from the manufacturers, this solutions demonstrates that you comply with the criteria. The directive is somehow pushing a way to get emissions per kilometer.

He also added that it will be very hard to buy CNG by the default way, but the directive will not affect the procurements for CNG of Madrid as they are already done. He finally advised to include the noise into the procurement.



Fuel	Emission cost	Energy cost	Total	% energy
E85	1 713	10 670	12 383	86%
Diesel	1 632	11 468	13 101	88%
Petrol	1 745	11 613	13 358	87%
CNG	1 397	14 404	15 801	91%
Biogas	1 397	14 404	15 801	91%

10. ARCHIMEDES KNOWLEDGE TRANSFER

10.1 Experience of biodiesel fleets (1st generation vs. 2nd generation biodiesel) *[see the PowerPoint presentation]*

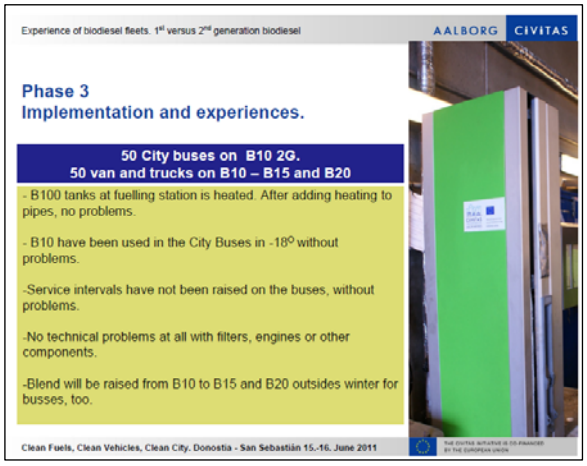
Name: Jens MOGENSEN

Organisation & function: City of Aalborg (Denmark), Site Manager of the ARCHIMEDES project in Aalborg

Contact: jms-teknik@aalborg.dk / +45 9931 2335

After having presented briefly the city of Aalborg, **Jens MOGENSEN** explained that the city faces rising congestion problems on main roads and in the inner-city, a fast increase of the peak hour times, and a high level of car dependency. He added that the city has a tradition in sustainability (at least one European project in sustainability during the last 20 years) and the more recent principle is to "reduce energy consumption and emissions". In particular, the objective which is going well beyond the EU-RTFO (Renewable Transport Fuel Obligation) requirements is to have biofuels in 50 city buses and 50 vehicles at Danish Mail.

Jens MOGENSEN explained that the first phase for choosing the best fuel option is to consider theoretical aspects: the security of energy supply, the CO_2 displacement and the ethical dimension. He added that although electricity and hydrogen have limitations, they may be possibilities, but in the CIVITAS ARCHIMEDES project it is about biofuel experimentations.
Comparing the security of energy supply of 1st and 2nd generation biofuels, he concluded that 1st generation fuels can only be seen as complementary to 2nd generation which represents a big potential. Moreover, the efficiency of diesel engine is improving at the same time that hybrid technology enables to reuse energy and this, combined to 20% of fossil fuel replaced by 2nd generation biofuel could lead to only 20% of fossil fuel remaining.



Jens MOGENSEN described 4 recent Danish experiences with hybrid buses (e.g. Shutlebus Aalborg, 3 buses on Line 12 in Copenhagen…) and explained that the results of fuel savings are between 25% and 38% with greater results in the city (not inter cities). Comparing CO_2 displacement, it appears that fossil fuels have to be avoided while 1st G emissions (in particular NO_2) could be worse than fossil fuels ones and that the production process of 2nd G causes emissions of CO_2. Finally, the ethical dimension goes for "turning waste into a resource" is acceptable whereas "burning food" is to be excluded. 2nd G biofuel appears to be the only viable solution. In the practical possibilities of 2G biofuel is a FAME produced from slaughterhouse and dead animals wastes, which can be used in wintertime at B10 or B15. Different blends of this FAME have been testes on city buses, vans and trucks, and after finding out that it was necessary to heat the tanks, there were no other problems.

? Question: considering that 1G is the only option to one extent for the world for now, what would you recommend?

Jens MOGENSEN agreed that 2G biofuels are not sustainable for now, and that we need to take very strong positions on sustainability and ethical criteria before we take a strong position for 2G.

10.2 – How awareness raising campaigns can complement alternative fuel projects: electric Vehicle Charging Points in Brighton & Hove

[see the PowerPoint presentation]

Name: David LOW
Organisation & function: Brighton & Hove City Council, Project Manager of the ARCHIMEDES project

Contact: david.low@brighton-hove.gov.uk

After a brief introduction about the CIVITAS ARCHIMEDES project, **David LOW** explained that in this framework, B&H has been the first (outside London) city to have on-street charging points.
The main aims were to promote the use of electric vehicles in the city, make improvement to air quality and measure the difference induced by the installation of city centre charging points. For budget reasons, only 8 on 10 charging points have been implemented.
In order to encourage uptake and usage, it is important to realize an awareness raising campaign of electric vehicles and charging points and explain the benefits for individuals. It appears that communicating about money savings has a major impact than talking about preserving the environment.

A lot of promotion actions through different took place, giving information about how many points have been installed and where (a neighboring effect), explaining how they work and thus educate about new technologies so that they become to be part of the everyday life.
Among the media used, the B&H City Council produced a special video broadcasted on Youtube especially targeted to business communities, published a lot of press articles including a press launch event, a Network map of charging points location on the web and through a number of scheme information (download pdf registration form, ask questions, who is eligible…). The charging points have also been used by others such as for a video of the Peugeot electric vehicle iOn and for a report by France3. They have also been used in some recent high profile media

events such as the Brighton Speed Trials, the Brighton to London Eco challenge and the Future Car Challenge.

To encourage their use, a number of incentives have been set up: free registration to the scheme (until the end of the project i.e. September 2012), no cost for the electricity or for parking when the vehicles is recharging and no cost for using cables or access keys to connect to the charging point. Other national incentives are also running such as a grant of up to £5,000 for the purchase of a new vehicle, no road tax… **David LOW** added that the results so far show that CO_2 was saved, the majority of users registered are from outside Brighton and the networks counts with 20 members now (versus 2 the first month) and experiments a steady growth.

? Question: What information do you have on the users of the Electric Charging Point Network?

David LOW answered that there are technology enthusiastic but the mainstream is wealthy families buying the EV as their 2nd vehicle. This is a main concern of the attendees, who recalled that the aim is to reduce traffic and not to have more vehicles on the streets! **David LOW** specified that EV are too expensive for now and people have already a car, but when it will be cheaper, he hopes that people will directly buy an EV as their first and only car. **Jens MOGENSEN** added that for the families who own an EV as their second car, they can end up using only this one.

? Question: About the priceless services, what are the plans for after the end of the CIVITAS ARCHIMEDES project?

David LOW explained that sooner of later EV will be more popular and the City will have to charge for electricity and to offer different alternatives to people in terms of electricity providers. Little by little, it will be commonly accepted that these services have a price which is still much lower than a thermal car. Moreover, the City will only buy 100% green electricity.
Jens MOGENSEN specified that charging points in Aalborg are not for daily use, but only for security.

? Question: Have you been approached by companies to find other uses of this network such as a sight seeing services on a rental basis of EVs?

David LOW answered that a company was seeking to provide electric scooters and the City Council will help them with the charging point's structure.