WINTER 2014

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Energy Efficiency in buildings

Smart cities

E-Mobility

Carbon Capture & Storage

Country profile

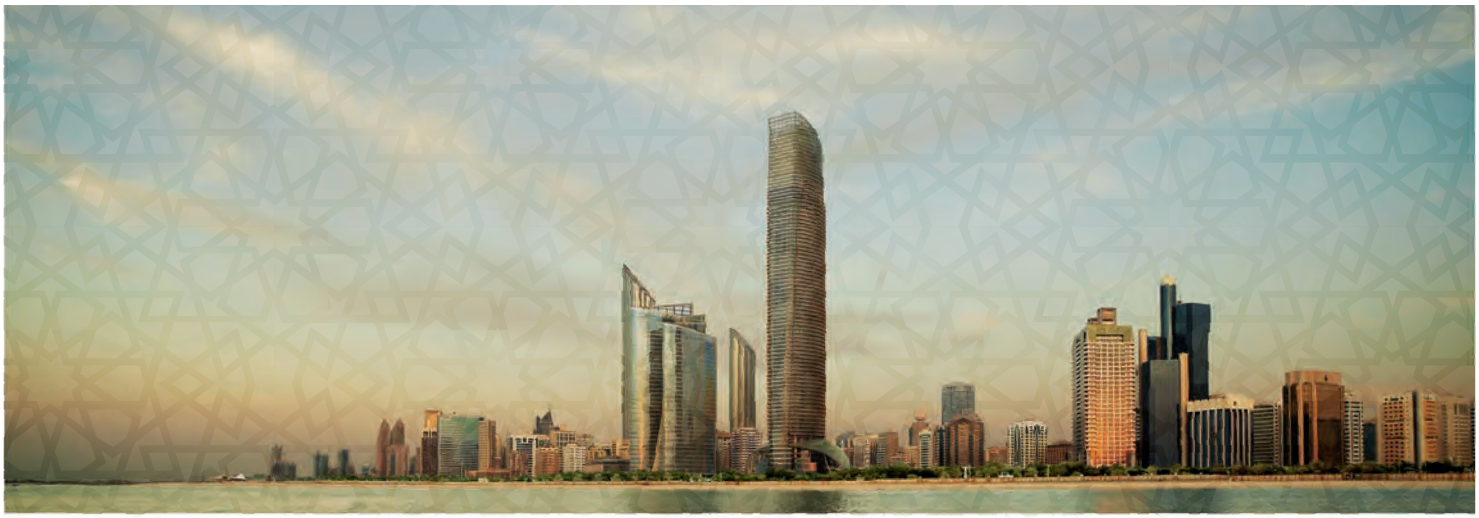
GREECE

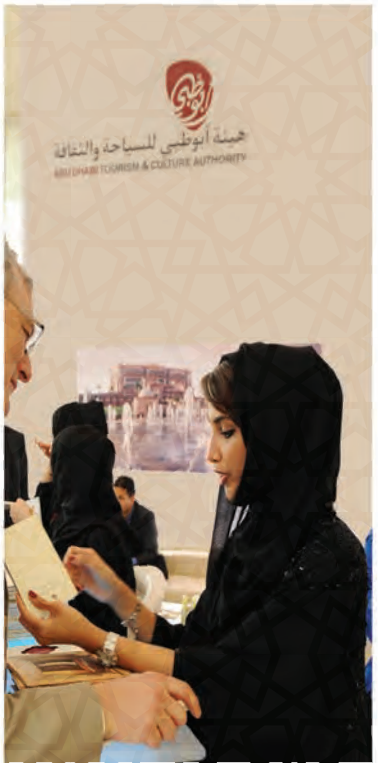
Includes editorial contributions from:

Michael Cramer MEP,
Chairman of the Committee for Transport and Tourism

Dominique Ristori
Director-General for Energy, European Commission

Didier Houssin
Director of Sustainable Energy Policy and Technology, IEA





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Foreword

Dark clouds seem to be gathering over Europe as 2014 draws to its uncertain close. Economic weakness; the collapse in oil prices; uncertainty over Greek austerity. Even shale gas seems to have received a setback in Texas. One seems darker than all the rest: standoff in Eastern Europe. So what have we in this issue to lighten the gloom?

We are delighted to feature an article by Dominique Ristori, Director General at DG ENER. Highlighting the importance of energy efficiency, he reviews the EU's ecodesign and energy labelling initiatives, the role of buildings and the potential for smart meters to improve consumer awareness of energy consumption. As he suggests, energy we do not use cannot pollute!

In his thought-provoking article, Michael Cramer, Chair of the TRAN Committee, points out that the growth in transport emissions since 1990 has nullified reductions in emissions elsewhere. Arguing for a radical change in transport policy, he points out that electric cars do not yet fully answer the problem, adding that it is a scandal that environmentally-friendly transport is more expensive than environmentally-harmful transport.

In our Greek focus, Eva Kaili MEP and member of the ITRE Committee, discusses the potential for renewable energy, noting the recent overhaul of the institutional and legislative framework and concluding with a plea that the Greek approach will be taken into account in EU energy strategy. Konstantinos Mathioudakis, Secretary General for Energy and Mineral Resources at the Ministry of Environment, Energy and Climate Change, reviews the "Energy Saving at Home" programme, based upon loans for energy-saving interventions. Although the majority of the applications concern H class buildings, he notes a startling 42% reduction in energy consumption.

Dana Popp of Euroheat and Power explores District Heating in Munich, Stockholm and Copenhagen. Its full potential remains untapped, she says, arguing that European cities must adapt their energy infrastructure. The BPIE sounds a note of caution about the Energy Efficiency Directive, with the EU as a whole arguably failing to recognise its benefits. Lot van Hooijdonk expresses her hopes for the new Compact of Mayors. As Deputy Mayor of Utrecht and chair of the EUROCITIES Environment Forum, she is well placed to communicate to the international community what can be achieved.

Didier Houssin, Director of Sustainable Energy Policy and Technology at the IEA, shows the potential for CCS. The SaskPower Boundary Dam produces 115MW and captures 95% of its CO_2 emissions and 100% of its SO_2. CCS, he writes, can be adapted to both gas and biomass-fired power and to other industrial sectors.

In our EV supplement, Aura Caramizaru shows how Smart Charging might improve the "rather hesitant uptake" of EVs in Europe. Better use of available capacity, she argues, allows electric cars to improve the power system. EURELECTRIC is working with its members on smart charging and will be presenting in a 'Talking smart grids' event in Brussels. Meanwhile, Alfons Westgeest of EUROBAT reviews the background to e-mobility and stresses the role of advanced lead-based batteries. He concludes that batteries have a fundamental role in the decarbonisation of the European transport sector.

We show how far Norway as a country, and Oslo, as a city, have embraced EVs: from complete replacement of the city's fleet of municipal cars to tax and parking initiatives, all supported by an RE infrastructure providing 99% of the country's electricity.

Dark clouds, yes, but much hope resides in the agreement struck at Lima. And there is much more for you to read inside…

Michael Edmund
Editor

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Energy Efficiency – a winning argument for Europe

By Dominique Ristori, Director-General for Energy, European Commission

The energy that is not consumed does not pollute and does not need to be imported - simple! Therefore, energy efficiency constitutes a priority action in the EU's 2030 energy and climate framework where EU leaders just committed to at least 27% energy savings by 2030, to be reviewed by 2020, having in mind a 30% target. But that's not all. Moderating energy demand, including through energy efficiency, is also central for all efforts to increase energy security and improve competitiveness, two other objectives that underpin the project of building a resilient Energy Union with a forward-looking climate change policy.

The EU's energy intensity has been steadily improving, making the EU one of the least energy-intensive economies in the world, e.g. the energy intensity in EU industry has decreased by almost 19% between 2001 and 2011. At the same time there remains a considerable cost-effective energy savings potential. Recognising this, the European Union has developed a comprehensive legislative framework in order to drive progress.

The Ecodesign and Energy Labelling directives ensure minimum energy efficiency standards, while contributing to transparency and informed choices by consumers. This legislation is having a positive effect: Recognition rates by European consumers are up to between 80 and 95%, and more importantly, surveys show that consumers mostly trust the label with a large majority using it in their purchasing decisions. Just to give one example: the share of refrigerators in the EU in the highest energy efficiency labelling classes (A and above) increased from less than 5% in 1995 to more than 90% in 2010.

Buildings are the largest contributor to energy use in the EU, and account for 40% of EU final energy demand, and 36 % of CO_2 emissions; they offer significant savings potential with 80% of the economic potential of energy efficiency in buildings still untapped. Addressing this potential can act as a boost to the EU's construction sector that represents around 9% of GDP and more than 3 million enterprises, mainly SMEs. Analysis shows that €1 of public investment in energy efficiency of buildings can bring up to €5 in additional budget revenue and that €1 million invested in energy efficiency measures can lead to the creation of 19 jobs.

European legislation will, if implemented properly as a whole, contribute to the goals of competitiveness and sustainability. The current framework for buildings sets, among other things, requirements for the standard of renovations when they have been decided as well as requires the Member States to produce long term building renovation plans. New private buildings in Europe have to be "nearly zero-energy buildings" by 2021, and two years later the same requirements will apply to public buildings. These ambitious targets will require a shift in skills in the building sector.

The future energy system will see great changes to the way the households consume energy. This applies to the buildings that people occupy, but also to how people will control their energy use. Technology and consumer awareness are key terms in this respect. Increasingly consumers will be given the means and the technology to reduce energy consumption in the household while maintaining and even increasing comfort and utility. They will be able to steer energy consumption over time, respond to price signals and act as an energy producer.

To achieve these ambitions, we need to ensure that the consumer has the tools such as smart meters and technologies for different forms of visualisation of consumption data in the home – which also ensure data protection. EU Member States have committed to rolling out close to 200 million smart meters for electricity and 45 million for gas by 2020. Increasingly we will move toward a future with smart homes including smart appliances that help monitoring and managing energy consumption. In the long term the markets for electricity and heating will need to be designed in a way that allows more active and informed consumer participation than today, and the entry into the market of new actors. The optimization of the energy system via the demand side will bring benefits to security of supply, will contribute towards Europe's climate objectives and will improve competitiveness.

Mobility from the electrical outlet?

Energy companies and car manufacturers are now belting on electric cars to shift to towards sustainable mobility. But that is not enough to make our transport more environmental friendly.

By Michael Cramer MEP, Chairman of the Committee for Transport and Tourism

The transport sector is responsible for 24% of all CO_2 emissions in the EU. The road sector alone accounts for 72% of transport emissions in Europe. Even worse: The emissions from private vehicles and trucks have increased since 1990 by 28%, while they were reduced by 32% in the industry and by 24% in private households in the same period. The transport sector nullifies all savings in other sectors, by investing billions of Euros of our taxpayers. These figures illustrate the need for a radical change in transport policy.

After the false hope in agrofuels, many put their expectations on electric vehicles now, which supposedly allow emission-free driving. But whether the overall environmental balance - including the production of such vehicles - is really better depends on the source of power. Renewable energy would be ideal. But due to the current energy mix of power, it is not available in a sufficient amount.

In France, the hype around the e-car is closely connected to the interests of the nuclear lobby. But it´s also visible in other countries: Energy companies and car manufacturers, two lobbies, which benefit from the threat of climate change, are now united in the struggle for E-Cars. Especially for the latter, it is just the simplest solution to change mobility by simply changing the way a car works. And to many consumers the idea seems to be attractive: One only shifts to a new car, rather than reconsidering their own automobile lifestyle. But it is not that simple to change to a more sustainable future of mobility.

TOO HEAVY, TOO SHORT OF BREATH

Moreover the e-car is also hardly competitive - if only because it costs more than 30,000€ compared to one with an internal combustion engine for 20,000 €. The main drawbacks are the heavy batteries and the limited distances. With 60 liters of diesel a new car has a range of about 800 kilometers. Currently, electric cars can travel at best 200 km with one battery load (that weighs around 150 kilograms)!

Despite many unsolved problems, Germany has pushed for a programme, for one million electric cars on the streets in 2020. Set into the perspective of almost 50 million vehicles in the country, the contribution of these measures will be insufficient, although the subsidies amount to several billion euros. Let us take a look across the borders of Europe: During the last five years, the number of cars has doubled in Asia. In China there are about seven million cars more per year! If the Chinese use the car only half as much as we do, no one will be able to take the car in the future, because there is not enough oil, steel, lithium for the batteries and space on the streets.

COMPETITION WITH RAIL AND BUS

Due to its short range, the e-car primarily competes with more sustainable modes of transport, such as busses, trains and bikes. Especially in cities, the car literally is the motor that drives the decrease of the quality of life. Therefore, we do not need new automobile competitors to other short-range vehicles but rather an alternative to space-wasting cars - regardless of the engine.

The emissions are in fact only one of five problems of current car use, which can be solved by a switch to e-cars and their lifecycle has to be improved. Others are noise, which is influenced by the speed, the tyres and road surface, especially in densely populated regions. Third, car traffic is responsible for many accidents that kill 25,000 people per year in the EU. Fourth, the costs: Every car is subsidized € 1,600 per year, if the accident and climate costs are included. And this amount is paid for every taxpayer, even if he or she has no car. Fifth, land use: every day more than 100 hectares are covered by asphalt in Germany. The government only wants to reduce it to 30 ha in 2020! Electric cars would not change that a bit.

It is and remains a scandal that environmentally-friendly transport is more expensive in Europe than environmentally-harmful transportation. These problems can only be solved by other modes of e-mobility: E-bikes are booming right now without any subsidies.

INCREASING ENERGY DEMAND

To achieve the climate protection targets a fundamental change is needed in the transport sector. The Royal Academy of Sciences in the UK has calculated that electricity demand on the island would rise by 16 percent, if e-cars were introduced on a large scale. To increase the demand of energy is especially problematic - not least in light of the current problems with Russia.

A radical change in transport policy is needed. In cities the transport sector is responsible for 70% of all emissions, which are harmful to the climate. But in some places a change is already happening: London and Stockholm have made the car an unwanted guest in city centers by the introduction of congestion charges. On the other hand bicycle traffic increases everywhere, from Sevilla to Copenhagen. In German cities over 90 percent of all car trips are shorter than 6 kilometers: These are ideal distances to switch to bus, train, e-bike, bicycle and walking. Overall short-and long-distance rail and public transportation like trams are modes of e-mobility, which have already proved their success for a long time and have a renaissance worldwide, in Paris, London and New York. These are the approaches for the future of our mobility that we would like to see on a long run. MICHAEL CRAMER

Since 2004 Michael Cramer is a Member of the European Parliament (EP), working mainly on EU transport policy. After ten years as transport policy spokesman for the Green group, he was elected chairman of the Committee on Transport and Tourism (TRAN) in July 2014. Since 1979 he has been mobile without a car.

Falling film evaporation: The most efficient energy optimisation for exothermal processes

BACKGROUND

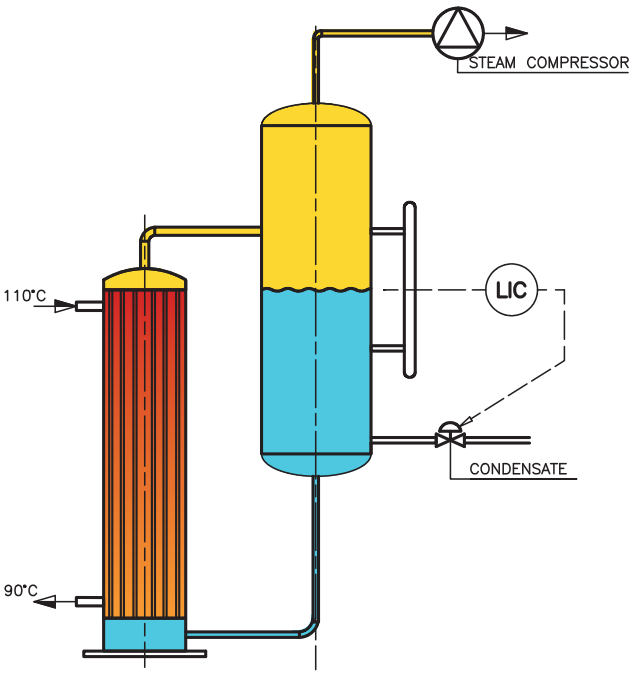
After its "old" factory was well past its service life, our customer decided to renew it. The plan was not to make the new factory a copy/paste of the old factory but to incorporate new understanding into the process technology. Moreover, the integral energy management had to be optimised. In the old factory, extra heat was added to the "production process" and cooled off in a cooling tower together with the exothermal heat from the process. However, the temperature of the released heat was simply too low to still be useful.

In the new factory, it was decided to raise the temperature of the process so that the released heat could be usefully applied, that heat now being used to create "vacuum steam". Steam compression then produces a higher pressure and temperature so that the steam can be incorporated in the process cycle. This reduces the process demand for external heat, and much less heat has to be removed by means of cooling towers.

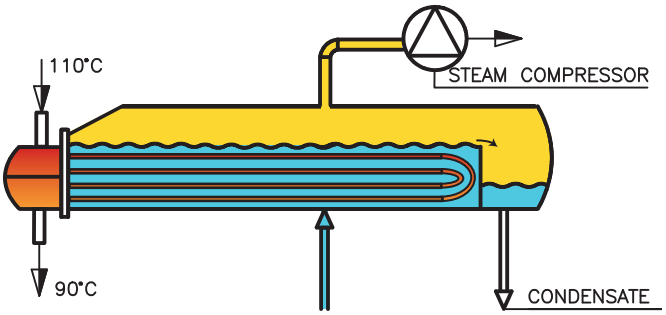
THE SITUATION

The product of the exothermal process enters at a temperature of 110°C and must be cooled down to 90°C. On the one hand, the steam pressure in the steam generator is set as high as possible to achieve the steam condition that requires the least possible driving power from the compressor. On the other hand, excessive steam pressure would produce too small a temperature

Thermosyphon reboiler



Kettle type reboiler



difference between the heat source and the steam, which would result in a much larger required heat transfer surface so that the heat exchangers would become too expensive. Moreover, the process medium has a high viscosity, which results in the wall heat transfer of this medium to be low. That is why it is important to find an evaporation temperature as close as possible to 90˚C, but with sufficient driving force to realise an efficient design in terms of size and price - the search for optimisation.

Three solutions were studied to establish how steam can be generated in the most efficient way.

1: THE THERMOSYPHON REBOILER

This is a vertical heat exchanger with the viscous process medium on the outside of the pipes, and the water/steam mixture inside ; see drawing.

Alongside the vertical heat exchanger there is also a separation tank. In that tank a water level is maintained that is replenished by a supply of fresh water, resulting in the separation of steam and water. The water level is kept above the top of the pipe plate of the steam generator, and because the tank and the heat exchanger function as communicating vessels the pipes are filled with water. The water in the pipes evaporates due to the heat supplied by the hot medium, so that the weight of the water column in the pipes reduces, causing it to rise. The mixture of steam and water flows into the separation tank, the water flows downward and the steam flows out through a connection at the top of the tank.

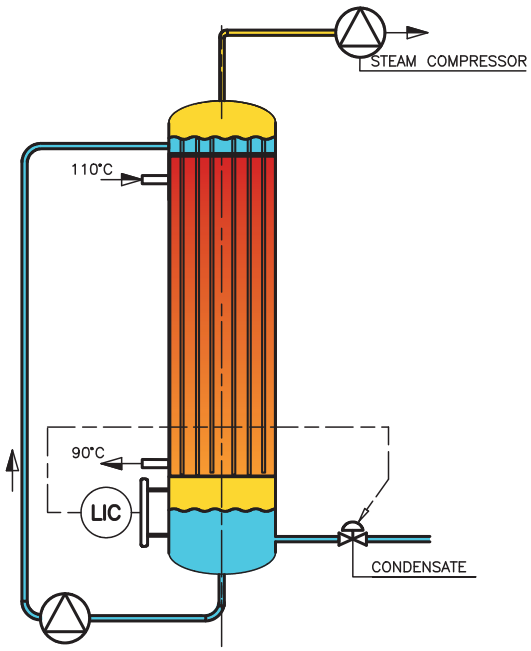
The big problem with this principle in this situation is “boiling point suppression”. For example, take an evaporation temperature of 84˚C with a corresponding evaporation pressure of 0.556 bar. The vertical pipe length is 6 metres. This 6 metres of extra water column produces a pressure at the bottom of the pipes of approx. 1.156 bar, with a corresponding evaporation temperature of 113˚C! As a consequence, the water does not boil in a large part of the pipes, but takes place only though a low heat transfer coefficient. This adverse boiling suppression gives rise to a far from optimal heat transfer process and eliminates this solution.

2: THE KETTLE TYPE REBOILER

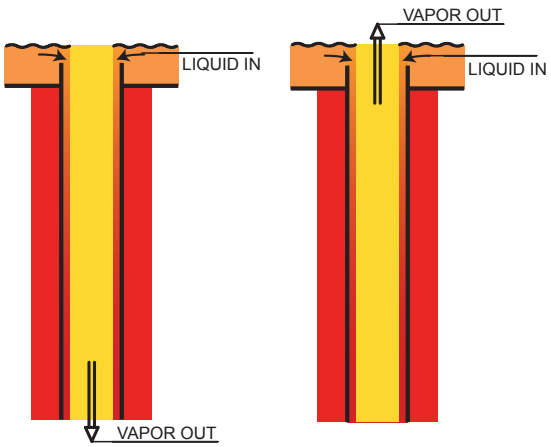
The advantage of this solution is that no individual separation tank is necessary; see drawing. The shell has a much larger diameter than the bundle (the diameter of this bundle is approximately 2 metres), creating an area of steam above the bundle with natural separation of steam and water. The horizontal body includes a water level that is maintained at a few centimetres above the pipe bundle.

Here, too, the consequence is boiling point suppression. Due to the level of liquid, the water pressure in the bottom pipes of the bundle is much higher than the 0.556 bar, with the result that the water here does not

Falling film



Falling film evaporators



evaporate, resulting in boiling suppression. The highly viscous medium now runs through the pipes and would lead to a very low heat transfer coefficient because of the low Reynolds number. The use of turbulence promoters in the pipes somewhat eases this problem. However, the adverse boiling suppression means that this solution must also be eliminated.

3 FALLING FILM EVAPORATION

This solution creates a situation in which no liquid level is maintained over the bundle and no boiling suppression can take place. This solution also involves a vertical heat exchanger with evaporating water in the pipes. This condensate flows downward from the top of the pipes as a thin film. On the way down, part of the water evaporates and is led upward as steam (against the current of the falling water). Due to the thin water film, the heat transfer coefficient to the water is very high! The non-evaporated water exits the pipes at the bottom and falls into the bottom tank. Replenishment condensate is also pumped into this tank. A fixed water level is maintained in the tank; this level controls the supply of fresh condensate. From this bottom tank, excess water is led to the top of the pipe plate, where a special header ensures that every pipe is supplied with sufficient water and that this water is evenly distributed over the pipe wall.

To compensate for the inferior heat transfer coefficient of the product, low-finned pipes are used on the outside of the pipes thus the heat-transfer surface is increased by roughly a factor of three by creating a threaded profile on the pipes.

The solution is a perfect example of simplicity and robustness. It is controlled by means of two quantities. One involves the level in the bottom tank: this level directly controls a valve for the supply of the fresh condensate, a simple and effective solution. In addition, it is important that enough water is sent to the top of the pipe plate but also that the water level is not too high. The pump is adjusted so that enough excess water is pumped upward. If the formation of steam reduces (for example, because the process is running on a lower capacity), an overflow pipe is installed in the top tank so that the level can never become too high.

CONCLUSION:

The decision to use steam generators based on the falling film principle results in equipment with the highest possible steam pressure and therefore a good investment. This is the best possible economic balance between CAPEX and OPEX. ●

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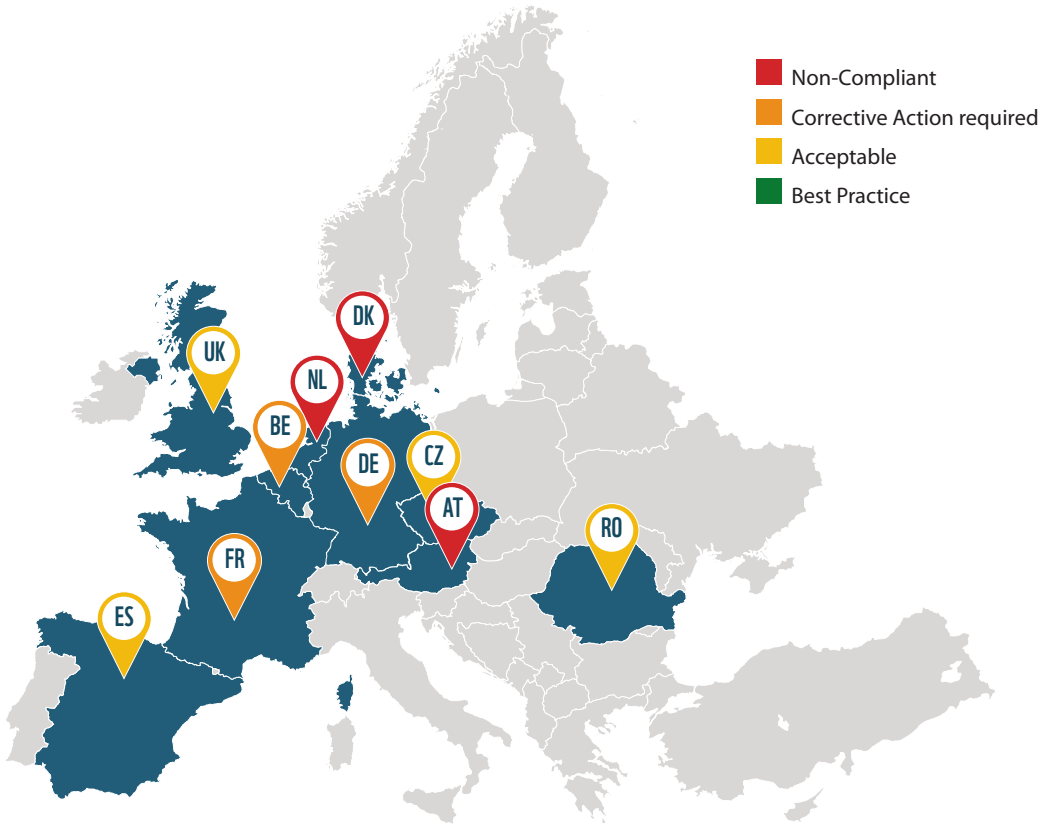
Looking for the frontrunners
EU countries falling behind on raising building standards

By the Buildings Performance Institute Europe (BPIE)

Europeans spend on average 90% of their time in buildings, thus making them a not-to-be-missed subject of both social and political debates. Most of us are aware of the potential that buildings hold to improve our lives, but we sometimes seem unable to fully exploit the opportunities that exist.

However, the EU acknowledges the importance of improving the building stock, as this brings social, economic and environmental benefits. As such, EU legislation has paved the way for the construction of increasingly energy efficient buildings, through the Energy Performance of Buildings Directive and the Energy Efficiency Directive. In a matter of years, all new buildings will have to comply with the nearly zero energy requirements. But the underlining problem remains existing buildings, the majority of which were constructed prior to the existence of any formalisation of energy performance requirements. Thus, Europe is facing a crucial dilemma of how to transform the huge stock of poorly performing existing buildings into energy efficient ones. Historically, deep renovation has never been a political priority.

To this end, the Energy Efficiency Directive-EED (2012/27/EU) is a crucial milestone towards addressing the challenge of existing buildings. Through Article 4, all Member States (MS) are required to develop long-term strategies to mobilise investment in the renovation of national building stocks. These strategies are meant to give a boost of confidence to building owners and others to invest in renovations and to the



COMPLIANCE WITH EED ARTICLE 4 REQUIREMENTS						
COUNTRY	Overview of building stock	Identification of cost-effective approaches to renovation	Policies to stimulate cost-effective renovation	Forward-looking perspective to guide investment decisions	Estimate of expected energy savings and wider benefits	OVERALL level of compliance with Article 4
Austria	3	2	1	0	1	28%
Brussels Capital Region	5	5	3	2	2	68%
Czech Republic	3	3	4	4	4	72%
Denmark	2	1	4	0	1	32%
France	4	4	4	2	2	64%
Germany	4	2	3	2	3	56%
The Netherlands	3	0	3	1	3	40%
Romania	3	3	4	4	4	72%
Spain	4	4	3	4	3	72%
The UK	5	4	3	3	3	72%
AVERAGE	3.6	2.8	3.2	2.2	2.6	58%

Table 1- Compliance with EED Article 4 requirements

market to invest in the supply chain. The existing European building stock is in dire need of support because at current rates of renovation, the full potential for cost-effective improvement will not be achieved before the end of the century, if at all.

As the situation stands now, EU countries are not on track to upgrade their building stocks and it could be argued that they fail to acknowledge the urgency of renovating and to recognise the multitude of benefits this could bring. Indeed, six countries have yet to publish their strategies, more than 6 months after the Commission's deadline (30th April 2014) and for those that have published strategies, there's an overall sense of lack of ambition. There are also serious deficiencies in terms of basic compliance with the European legislation, according to a recent study[1] by BPIE.

Renovation strategies of selected EU countries examines a cross section of building renovation strategies from 10 Member States (Austria, Belgium (Brussels Capital Region), Czech Republic, Denmark, France, Germany, the Netherlands, Romania, Spain and the UK), selected for their climate and building stock diversity. The report points to their overall shortcomings, to provide a suitable framework to build up confidence in this market. The study finds that many strategies lack boldness, determination and forward thinking.

While none of the strategies can be considered as best practice, some positive aspects stand out. And to put things into perspective, this was the first exercise of this sort for MS, so it can also be considered as part of a learning process. Member States can, indeed must, further improve their strategies as they will have to be updated in 3 years.

The report scores countries by using the 5 requirements from Article 4 of the EED, namely: overview of the national building stock, cost-effective approaches to renovations, policies and measures to stimulate cost-effective deep renovations, forward-looking perspective to guide investment decisions and evidence-based estimate of expected savings and wider benefits. Table 1 reflects the score of each country covered on compliance issues. Based on this analysis, 3 of the 10 strategies are found non-compliant (Austria, Denmark and The Netherlands), 3 are only partially compliant (France, Germany and Brussels Capital Region) and 4 are acceptable, but still show potential to improve (Czech Republic, Romania, Spain and the UK).

In addition to the compliance issues with Article 4, ambition levels were also considered, only to conclude that overall they don't rise to the occasion. Furthermore, only a few strategies include a comprehensive policy mix that could support the evolution of the market for building renovation.

But the intention behind undertaking this study was not only to critique the compliance aspects and ambition levels. The

1) BPIE, Renovation strategies of selected EU countries. A status report on compliance with Article 4 of the Energy Efficiency Directive, November 2014, http://www.bpie.eu/benchmark_renovation_strategies.html

Section	Best Practice example
Overview of national building stock	United Kingdom
Cost-effective approaches to renovations	Brussels Capital Region
Policies to stimulate deep renovation	Denmark
Forward-looking investment perspective	Spain
Energy savings and wider benefits	Romania

Table 2 – Best examples of compliance with Article 4, EED

aim was also to spot and highlight examples of good practice, which can be a learning point of reference as well as an inspiration for those Member States struggling with their strategies. These are exemplified in Table 2. The strongest point of most strategies was the characterisation of the building stock - the UK leading the group- followed by the policy description section. The most challenging aspect for MS was conveying a forward-looking perspective in their strategies – of the 10, the best example was given by Spain.

The report also gives MS some leads and suggestions on how to improve their strategies and establish a framework that can achieve the true potential of transforming Europe's built environment into a highly energy performing one with all the co-benefits it will bring. The recommendations cover several dimensions such as: stakeholder involvement, cost-effective approaches, recognition of building market dynamics, monitoring and so forth.

What all stakeholders must keep in mind is that achieving the full potential for cost-effective carbon emission reduction in buildings leads to a wide variety of other benefits - fuel poverty alleviation, improved indoor and outdoor air quality, increased comfort, increased property values, energy system benefits, as well as energy bill savings, thus answering some of the biggest challenges of our time. If Member States took this wide range of benefits into consideration, their renovation strategies would have a much higher political profile and urgency. Europe would then be well on its way to delivering a building stock which provides a comfortable, affordable and sustainable place for people to live and work.

There are several EU projects and initiatives that strive to raise awareness about the benefits of renovating, build up confidence in the market and provide a toolkit to homeowners to undertake such works. The EU project "Collaboration for housing nearly zero energy renovation" (COHERENO) makes a valuable contribution to achieving EU's energy efficiency targets. How? By aiming to improve the quality of construction measures, thus increasing customer confidence in renovation works.

COHERENO will develop proposals and concepts for promising cross-sector and company business models for high efficiency refurbishment of single-family houses to nearly zero-energy levels. The models will pave the way for refurbishment from a single source, also called one-stop-shop. From financing, consulting and planning, to implementation – all parties in the construction process will be involved.

Currently, the project partners are organising business collaboration events in the countries directly covered by the project (the Netherlands, Belgium, Austria, Norway, and Germany) aimed at defining collaboration structures and identifying barriers and opportunities. 25 to 30 one stop shops will be created by the end of the project in March 2016.

COHERENO
Collaboration for housing nZEB renovation

Two interesting reports have recently been added to the project's library. The report *Barriers and opportunities for business collaboration in the nZEB single-family housing renovation market*[2] analyses experiences from various supply-side actors who engaged in such collaboration structures. Key barriers and opportunities for collaboration and business model development in this market segment are listed.

The other report, *Customer segments and value propositions in the nZEB single-family housing renovation market*[3], analyses experiences from homeowners who recently renovated their house towards nZEB levels and proposes national customer segmentation for business modelling purposes.

For detailed information on the activities and results of this project please visit www.cohereno.eu

2) http://www.cohereno.eu/fileadmin/media/Dateien/COHERENO_Report_Collaboration.pdf
3) http://www.cohereno.eu/fileadmin/media/Dateien/COHERENO_Report_Customer_Segments.pdf

Photo: Skanska

Unique international cooperation on energy-efficient new buildings in different European climates

By Emma Karlsson, WSP Sweden

A number of energy-efficient new construction projects with very low energy consumption are under way around Europe. The city of Malmö in Sweden is running the EU project Buildsmart and cooperating with WSP, IVL Swedish Environmental Research Institute and Swedish building companies, as well as players in Spain and Ireland. The purpose of Buildmart is to demonstrate and mainstream cost-effective technologies and methods in the design of buildings with very low energy consumption in different European climates.

These technologies and solutions will be demonstrated in residential and other buildings in Sweden and Spain. All the demonstration projects are to have been in use for one year in 2016. But the focus is not just on the technology in these building projects, it is also on the opportunities of residents and users to understand and influence their energy use.

Background

Understanding energy performance in European buildings is a key factor in attaining the EU's climate target of a 20 % reduction in greenhouse gases and energy use by 2020. The building sector accounts for 40 % of total energy use, or 36 % of EU carbon dioxide emissions.

Photo: Skanska

Photo: Stefan Olsson

Buildsmart – energy-efficient solutions ready for market

There is an urgent need for buildings with very low energy consumption. The Buildsmart project, which is an international cooperation on low-energy buildings, is now in the construction phase. The demonstration buildings in Sweden and Spain will contain innovative technology and climate-smart solutions, such as:

- Renewable energy production
- New installations that minimise energy consumption
- Methods for heating and cooling of ventilation air
- Heat recovery systems
- Smart grids
- Solar hybrid technology and shading
- Waste management systems for maximum energy recovery

Energy-smart habits

The interaction between a building and its residents is a crucial element in total energy use. To reduce their energy consumption, people need to understand for themselves what impact they have on energy use. Both residents and users will be trained in how the buildings work before they move in, and will then be able continuously to see their energy use and how it changes based on their own behaviour.

The construction phase

The various construction processes are in progress following extensive planning work. There will be a focus on documenting and evaluating how the technologies are implemented. This provides the parties involved with great opportunities for a unique exchange of experience on potential obstacles and solutions, to contribute to sustainable town planning.

The following international construction projects are in progress:

Sweden:

- Hotels and residential buildings in central Malmö.
- Homes and office premises in Hyllie, an area outside Malmö.

Spain:

- A residential building in Portugalete on the outskirts of Bilbao in the Basque Region.

The operational phase

Structural follow-up and evaluation will be performed in all buildings to enable a comparison to be made of the effects of the various energy technologies at different places. A follow-up and assessment will also be made of the effect of the continuously updated energy use and pattern of behaviour of residents and property maintenance staff.

International exchange of knowledge

The Buildsmart project provides unique opportunities for an international exchange of experience. Study visits and training courses will be offered to building companies, architects, developers, planners, local authorities and property owners/managers to avail of the new technology, the evaluation and the subsequent discussions.

EU project Buildsmart

The city of Malmö in Sweden is the project sponsor and coordinator. The consortium consists of:
Sweden: WSP, IVL, Skanska, Roth Fastigheter AB
Spain: Basque Region, Technalia, FCC
Ireland: Codema

Co-financed by the European Union
European Energy Programme for Recovery

BUILDSMART
Energy efficient solutions ready for market

Climate change: local action for global results

By Lot van Hooijdonk, deputy mayor of Utrecht for transport and mobility, energy and environment and chair of the EUROCITIES Environment Forum

As governments have just finished the latest round of negotiations on a new global climate deal in Lima, the minds of many Europeans are on energy security in Europe as much as on greenhouse gases. The only realistic solution to both challenges is to reduce our energy demand and source sustainable energy within the EU, as close to the consumer as possible.

Europe has just taken a step in the right direction by committing to a 40% reduction in greenhouse gases by 2030, with a target of increasing energy efficiency and the share of renewables by 27%. Cities are obvious partners for achieving these goals. It is in urban areas that 80% of Europe's energy is consumed and around three quarters of EU CO_2 emissions are generated. And while global negotiations continue, cities are already acting. Almost 6,000 municipalities have signed the Covenant of Mayors, committing to significant emission reductions. Cities

are also preparing to reduce emissions through another promising new initiative at global level, the Compact of Mayors. This is an opportunity to show the international community how much we do at local level. As new chair of the EUROCITIES Environment Forum, I would like to build on our network's engagement with the EU institutions. We will continue to provide them with examples of local climate action on the ground, and will support the development of sound energy and climate policies. By exchanging regularly on good city practices, we will help to share effective climate solutions between European cities, and feed local experiences into the development of an EU urban agenda.

Cities are important partners for national governments and the EU in fighting climate change. But citizens are our key partners when it comes to making climate action happen every day. City authorities can provide new and improved bicycle lanes and public transport, but it is up to citizens to use them. We can tell citizens about building insulation, but we must work together with them to install it. As the level of government closest to citizens, we must and we can create good, practical solutions with citizens.

In cities, climate action doesn't just benefit the climate. Climate action can improve citizens'

quality of life, and take on other issues at the same time. Transport is a good example. Making it more energy efficient not only lowers CO_2 emissions. If we do it right, it also improves air quality and reduces noise. Cycling, for instance, does all of this, and also improves your health. In Utrecht, cycling has become so successful that we are running out of parking space for bikes. That's why we are currently building what may be the world's largest bicycle parking facility, with space for some 12,500 bicycles, and investing in improving our bike lanes. Delivering goods is not always possible by bike, so we introduced the cargo hopper: goods are reloaded from conventional trucks at a hub outside the city and then delivered to the centre on smaller, electric trucks.

Lot van Hooijdonk, deputy mayor of Utrecht for transport and mobility, energy and environment and chair of the EUROCITIES Environment Forum

Solutions such as these can result in 'smarter cities' through smart management. ICT can help, for instance by facilitating the management of energy demand and supply. We will be most successful if we integrate these new solutions into urban planning, be it for reducing CO_2, cleaning up the air or making our streets less congested.

Greening the economy can also create green jobs, linked to renewable energy, retrofitting of buildings, green vehicles and improved public transport. Many of our cities are working to ensure that these green jobs also benefit those who otherwise find it difficult to access the labour market. Later this year, we will publish a EUROCITIES collection of good practice examples from cities supporting these 'green jobs for social inclusion'.

As much as greening is an economic opportunity, financing climate action remains a major issue. The EU and member states need to continue work on financial instruments, such as easily applicable revolving funds. Cities must have direct access to these instruments, in collaboration with the relevant managing authorities. We also need to further roll out instruments making it possible for energy efficiency measures to be paid for with the energy cost savings they generate, notably energy performance contracts. Member states need to adjust their national taxation frameworks to promote more environmentally-friendly solutions, such as renewable energy, and switching to more sustainable transport modes. Taxation should help promote clean vehicles, discourage company cars, and incentivise less-polluting fuels for road vehicles, to reduce not only CO_2 emissions but also air pollution.

While we need change, decisions on tax policies must be carefully considered and stable in the longer term to boost investments in sustainable solutions. For instance, unstable renewables subsidies in the Netherlands have made investments in these technologies too uncertain in recent years.

While we have to continue mitigating climate change, we know already that we can't avoid it entirely. We will have to adapt to extreme weather phenomena, be it cloudbursts, storms, heat waves or droughts. Cities, with their dense populations and 'urban heat island' effect of densely built-up areas, face particular challenges. We will continue to develop solutions that make our cities better places to live, such as designing green areas that not only absorb rainwater and help cool the city down, but are also great recreation spaces.

It is true that climate change is a threat, and tackling it needs substantial efforts and investments. But it is also true that if we tackle it the right way, it can be an opportunity. Cities are ready to seize it.

Life-cycle meters for buildings – the solution for sustainable property management

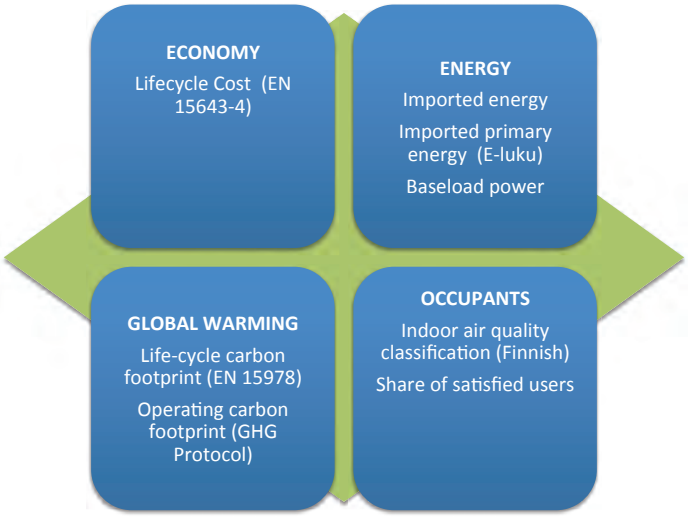
By Jessica Karhu M.Sc., Project Manager, Green Building Council Finland

The Life-cycle meters for buildings measure the environmental and energy efficiency of buildings, their life-cycle costs, and also occupant well-being.

The Life-cycle meters for buildings reveal true building performance with simple, easy-to-read key indicators that can be used to support your organization's strategy, operations management, and public relations.

Thanks to these meters, which have been developed with experts in the field, there is now a transparent, coherent way of assessing the environmental efficiency of a property and ensuring that working methods truly follow sustainable development principles. These new meters can also be used as a guideline for future building legislation, which seldomly takes a stance on carbon footprints. To ensure the best results with previous work, the meters are compatible with many existing, statutory and voluntary tools for assessing environmental efficiency.

The Life-cycle meters for buildings are a suitable tool for a building's pre-design and occupancy phases, offering a consistent approach to measuring, managing, and developing properties. Their practicality, helpfulness, and quality have already been tested on several projects and buildings, with great user satisfaction. These eight meters were developed in Green Building Council Finland with broad cooperation with actors in the real estate and construction industries and they are based on the European CEN/TC 350 family of standards. The meters are suitable for anyone working in the industry and are free to use by all.



WHAT YOU MEASURE, YOU CAN MANAGE AND DEVELOP

National building legislations rarely take a stance on the carbon footprints of buildings or define the maximum energy consumption permitted - despite the fact that it is recognized that in developed countries, buildings and real estate constitute about 40% of our energy consumption and 35% of our emissions. It has been proven that following sustainable development principles brings in savings in maintenance costs, boosts worker efficiency, and increases profits from rent for the property owners. However, achieving these benefits is not always straightforward and in some cases it can be hard to connect profits specifically to a sustainably developed project. This is why the planning of sustainable solutions needs to start as early in the project as possible.

At this moment, there are over 250 different meters and classification systems that measure the environmental impact of buildings in the world. The greatest problem with these meters and systems is that the results are not compatible with each other, which is a consequence of different national initiatives and measuring methods without any common, agreed-upon standards.

THE BUILDING PASSPORT – ALL YOU NEED IN ONE PLACE

The key indicators measured by the Life-cycle meters for buildings can easily be presented in the Building Passport, either for the pre-design or occupancy phase. The Passport is an accessible, visual tool that presents the key indicators in environmental efficiency, along with images and the basic facts of the property. This convenient information package can be used to support decision-making in sustainable development projects.

Read more on figbc.fi/en/gbc-finland/

Successful smart technology starts with smart consumers

In the coming decade, our entire energy system will change drastically. Especially from the consumer's perspective, much will change. Our energy system will function (best) on the assumption that the consumer participated in the market, they may own and operate generation capacity, and use smart technology to manage their consumption. This in turn can result in a reduction on their electricity bills, a reduction in the cost of network operations, and increased energy efficiency. If we want to reach Europe's Energy Efficiency targets set for 2020 and 2030, we need consumers to engage in the new energy system. Not an easy task.

We do not have the illusion the consumer will care too much about the meter itself. The smart meter is not a solution in itself, but a central part of an infrastructure that offers various smart grid-related functionalities to various stakeholders to gain insight in energy data and usage. The consumer does care about a warm house, sufficient electricity in peak times, lower bills, comfort and being in control. An obstacle is that many consumers have been confronted with smart meter infrastructure technologies and related costs without sufficient understanding of how that technology might assist to manage their energy consumption.

What needs to be done, soon!

INFORM

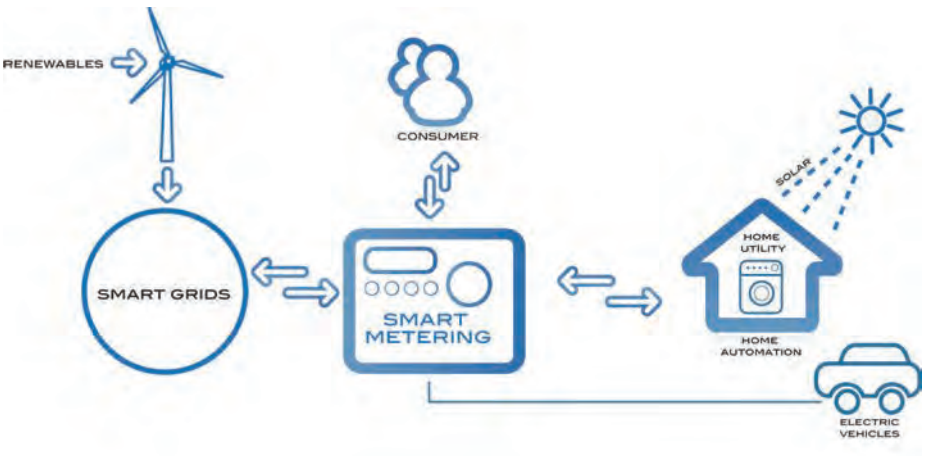
The VaasaETT Report Empower Demand II[1], authorized by ESMIG, indicates 10 steps to generate consumer awareness, involvement and engagement. Generally, any type of consumer information and education tool should be simple, uncluttered, and modern. It should be offered, not sought after. The inter-play of outstanding pre-offering, pre-technology education, especially from independent sources is an extremely important way to prepare consumers for the program to come. As a first step, a consumer must see the bigger picture, the reason why the utility is embarking on this action, why the customer should be interested and why the community should be working together. Only then should technology be introduced. It is after all, not the technology that is the objective; it is only a means to an end.

ESMIG is, together with EDSO for Smart Grids, developing "My Smart Energy": a portal targeting European consumers explaining how consumers will be able to manage their bills, make a more sustainable future environment and rely on energy supply with the help of smart meters and smart grids.

PROTECT

For public acceptance of smart metering and use of energy management services, suitable privacy and data protection safeguards need to be in place so that consumers are assured their data is treated securely and their privacy is not infringed.

Figure 1: The Smart Energy System (ESMIG)



1 http://esmig.eu/sites/default/files/final_empower_2_demand_report_final_distr2.pdf

The Smart Metering Infrastructure should therefore be developed in such a way that distinct information flows for different stakeholders can be identified, implemented and controlled. The information collected by the organization responsible for allocation of the energy consumed or produced (in the context of his legal task) is one information flow that can be regarded as the legal basis for (Smart) Metering. This information has typically a low time resolution, such as bi-monthly consumption readings and power quality data, but also covers alarms from the metering system such as tampering. Because of its nature this information flow has low privacy sensitivity, but should still be sufficiently protected.

To give consumers the possibility to get more detailed insight in their energy consumption and/or production, additional information flows are generated by the meter. This information has typically a high time resolution, such as 1-10 seconds time base, so consumption/production patterns can be generated that can give insight in the energy profile households and specific in-home devices. In a majority of the EU member states, the consumer will be able to decide if this information is generated, where this information goes and by whom it can be used.

By making this distinction in information flows, not only consumers have better insight and control regarding the type of data and its destination, but it is also possible to take the appropriate measures for

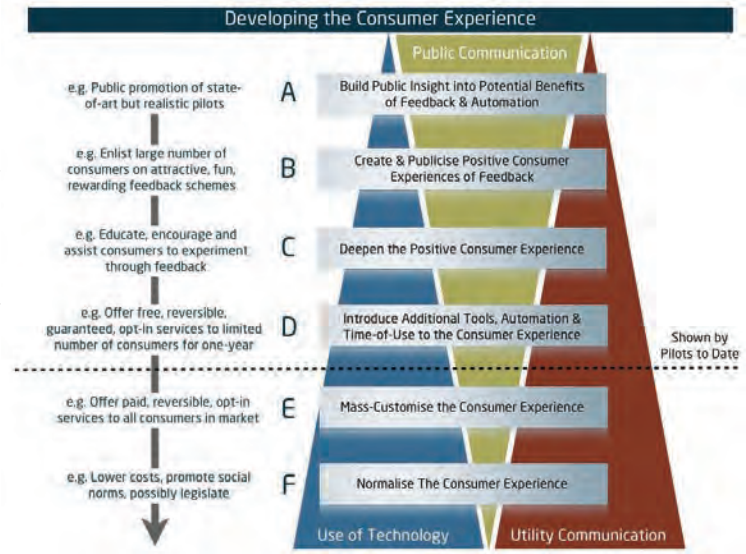


Figure 2: Stages of Optimal Consumer Experience Development (Empower Demand II)

provided directly from the interface of customer's choice to the customer and any third party designated by the consumer are strongly recommended since they are the key to running demand response services, taking 'online' energy-saving decisions and effective integration of distributed energy resources. Also, smart metering systems should include advance tariff structures, time-of-use registers and remote tariff control. This will help consumers and network operators to achieve energy efficiencies and save costs by reducing the peaks in energy demand. The Council of European Energy Regulators (CEER) has defined the characteristics "Reliable, Affordable, Simple and Protected" in order to make these services attractive to consumers.

To make consumers smart, it is absolutely crucial that governments, regulators, different players in the energy market and industry assume their responsibility in informing, protecting and empowering consumers.

Nicolle Raven graduated in European Law and Politics, with a Master's degree in European Public Affairs. She worked as a public affairs consultant for over 3 years in the energy and healthcare sector. After working for the European Commission on education and culture in 2010-2012, she returned to the EU energy sector, as EU Affairs manager for ESMIG and as an Adviser on Energy Policy with the Orgalime Partnership.

Schwenk Mortar Company

Research and development of energy efficiency systems for the building material production – assisted by the European Union

PREAMBLE

Thermal insulations are indisputably necessary for saving energy in the construction industry.

The type of thermal insulation system being used is determined by the existing materials and economical aspects.

In addition, the type of thermal insulation used must be adjusted according to the characteristics of the building (new buildings, old buildings, structure of the buildings, historical buildings, geographical place etc.)

STATUS QUO

The most well-known and least expensive material on the insulation market is the expanded polystyrene in boards and grains form which has advantages as well as drawbacks.

Mineral based materials for building insulation have been in existence for thousands of years. The properties of those materials (higher thermal conductivity, friability, water absorption, price etc.) give them a wrong image compared to the polystyrene.

RESEARCH AND DEVELOPMENT

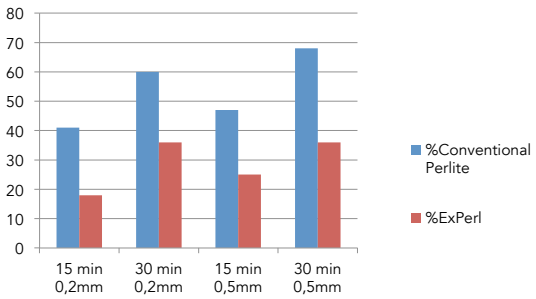
Schwenk, as a mineral mortar producer, took the opportunity to research and develop, together with other European companies and institutes, new mineral based insulating materials for the building industry.

The initial problem was to find out how to produce and modify a classic lightweight material such as perlite in order to eliminate its technical inadequacies by keeping the production costs within an affordable range for the customer, compared to expensive high tech materials.

The technological solution was achieved through the European project "Ex-Perl", by changing the expansion through a controlled heat flow process used in glass technology.

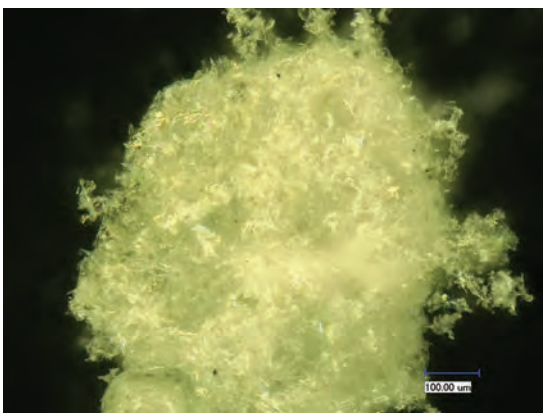
Schwenk's part in this project was the investigation of new perlite for building materials and its implementation for regular production.

The reduction of abrasion in the new perlite, which was analyzed through a test developed by Schwenk in several pilot

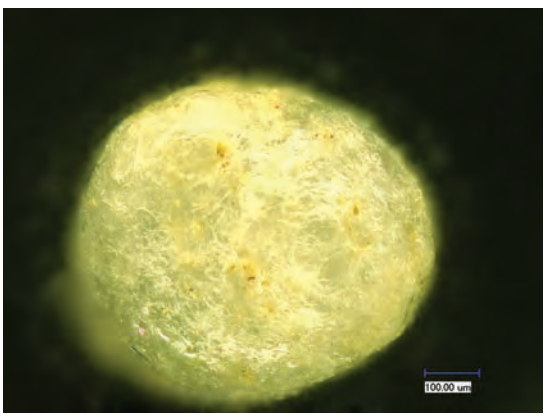


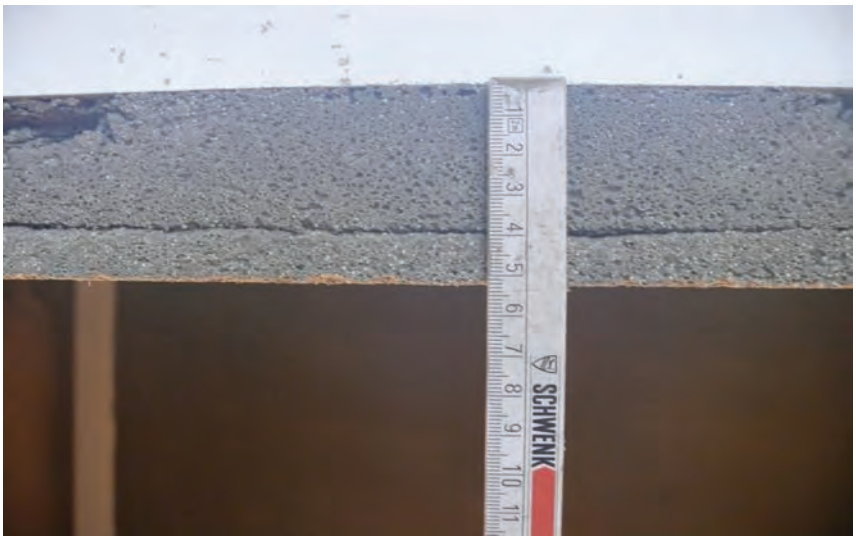
Abrasion of the new perlite (Ex-Perl) compared to the classic perlite

Classic perlite



New process perlite





The way from the laboratory and the pilot scale to the building site

experiments, shows that we are on the right track to achieve good results for the production of a constantly high quality light mortar. A new beginning for mineral based products was set.

By using this new light weight mineral and an adjusting the formulation with modern air activators, we were able to increase the efficiency of special mortars. As a result we developed, in a second EU project, a mineral based mortar with a porosity of 45% and a λ value of 0,055 W/mK.

Those mortars are characterized by high insulation values without using expanded polystyrene as light component. We have therefore developed an affordable, new mineral based construction material by excluding the organic oil based component polystyrene.

HOW COULD IT CONTINUE?

The Schwenk Company is interested in the development of new technologies to save energy and to protect the environment. To achieve this goal we try to use more and more regenerating natural resources through collaboration with other companies and institutes. To achieve this goal we have started to co-operate with the company *Lisbonis Chaux Grasses* from France to search for new ecological possibilities for a new generation of mortar.

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Delivering an efficient EU energy system to benefit industry, commerce and homes

By Fiona Riddoch, COGEN Europe

As winter approaches, EU policymakers are focusing their attention on ensuring Europe's heat and power amid current geopolitical concerns over the security of the EU's energy supplies from the East. In the discussions around securing the supply of energy, European policymakers are becoming more interested in how the imported energy is actually used and how efficient that use is. Hence the European Commission has begun to talk more consistently about the role of heat in Europe's overall energy demand. The efficiency of supply and use of both heat and electricity will be themes of upcoming energy debates.

Embracing CHP delivers energy savings to the power system, boosts asset utilisation and supports the EU's overall climate and energy objectives to 2030. Today, cogeneration is already providing 11% of Europe's electricity (amounting to 109 GW electrical capacity) and 15% of its heat, and it could do more. Significant energy wastage through heat venting continues across the electricity network today, while high heat demand in all sectors is still largely provided by local heat-only sources.

Moreover, as the most efficient form of schedulable generation on the networks, a wider role for CHP in the various services and balancing markets improves the overall grid efficiency. CHP is used across the economy in a diverse range of applications. The smallest capacity of under 100kW meets the heat needs of local smaller commercial or public buildings and smaller heat demands, while at the other end of the capacity range the larger (above 10 MW) plants are providing heat for larger industrial processes and some very large industrial complexes. In between are universities, hospitals, smaller processing and manufacturing industries and local area heat networks, which all use cogeneration to provide high efficiency heat and power for their customers and clients.

Moreover, there is enormous potential for new investments in CHP to help boost the efficiency of existing heat networks in Central and Eastern EU member states. Cogeneration plants generate almost ¾ of the thermal energy needed in district heating and cooling networks (DHCNs). The growth potential of DHCNs in urban areas is significant, while in less dense zones, micro-cogeneration devices are ideal low carbon and energy efficient solutions.

ECONOMIC RECOVERY REQUIRES LINKING TOGETHER EU ENERGY AND INDUSTRIAL POLICY

The European Union has limited energy resources and its labour costs are reflective of a developed economy. The health and competitiveness of Europe's economy in the global market therefore requires Europe to use its resources effectively. Energy is a key resource across the whole economy.

Economic benefits can accrue from combining heat generation and electricity generation. Increasing the CHP base in European industry can improve a company's competitiveness and thus contributes to the industrial renaissance powering Europe's economic recovery. It can also improve the efficiency and reduce the total cost of the whole electricity system.

Industry uses large amounts of high temperature heat in industrial processes, making it an attractive location for high-efficiency cogeneration. Instead of simply burning energy to produce heat, an industry can decide to use combined heat and power on site to gain greater control over its energy costs, boost productivity, and demonstrably reduce its carbon footprint. Economy-wide, Europe's SMEs – which form an essential part of the industrial supply chain – can also benefit considerably from making appropriate use of CHP.

Of the 106 GWe of cumulative CHP electrical capacity in the EU, around half is embedded in industry – saving the EU 15 Mtoe of fuel imports per annum and

delivering 38 Mt of CO_2 emission savings every year. Industry uses 2,500 TWh of energy, which is 43% of Europe's heat demand. Member states themselves have estimated that a doubling of the overall CHP sector out to 2030 is economically possible (100 GW electrical capacity), and would translate into additional reductions of fuel imports by 25 Mtoe and a further CO_2 reduction of 55 Mt.

WHERE TO NEXT?

Wider adoption of cogeneration in a suitable policy framework can therefore boost the productivity and competitiveness of European industrial sites and improve the overall efficiency of the electricity system. Cogeneration is the most efficient use of fuel for heat and power. The EU framework in which it operates must clearly recognise its advantages in terms of energy efficiency, CO2 reduction and economic advantages, both now and in the 2030 time horizon.

Policymakers must design EU energy, climate and industrial policies that work in harmony to harness the potential of cogeneration to deliver the energy that industry needs. However, there are pressing issues in a number of countries where industrial CHPs deserve immediate attention. The implementation of the Energy Efficiency Directive provides a valuable legislative tool for member states to make the policy framework changes necessary for industrial CHP to grow. The removal of barriers to existing CHPs taking part in the new services market is also centrally important.

Within a suitable energy services market, industries that adopt CHP have much to offer electricity networks as they incorporate new higher levels of renewables on the power system. CHP plants offer firm capacity and their supply of electricity is predictable and reliably available. On average, the size of CHP plants is modest compared to central generation plants, allowing industrial CHP plants to offer a range of services through the aggregation of their capabilities. This trend, based on new modular CHP designs featuring heat buffers, is emerging against the backdrop of increased demand for more flexibility in the energy system.

EU policymakers must pay greater attention to reducing primary energy consumption through increased efficiency across the EU energy networks. Swift and forward-thinking implementation of the Energy Efficiency Directive – and particularly its supply side chapter – has the potential to significantly improve the energy security records of many industrial and commercial sites, and thereby of the EU as a whole. We urge the EU institutions to look more closely at measures to address ongoing losses in the energy supply sector, including the potential for cogeneration to play a greater role in the 2030 timeframe.


Fiona Riddoch, COGEN Europe

First "ECO-EPDs" awarded

A milestone has been reached regarding mutual cross-border recognition of EPDs in Europe.

The ECO Platform, umbrella organisation comprising various (national) EPD programme operators in Europe, has come closer to mutual cross-border recognition of Environmental Product Declarations (EPDs) in Europe. The ECO Platform promotes the creation of a European Core EPD system according to the European standard EN 15804. During its first official annual conference on 16 October 2014 in Brussels, the launch of a new EPD logo was announced. The various programme operators commit themselves to specific minimum requirements with regard to quality management and the verification process. The new logo visualises these commitments. EPDs issued with the ECO Platform EPD trademark and logo guarantee the best possible standardised comparability of construction products in Europe. The previously agreed specific minimum requirements including quality management and the verification process, which participating EPD programme operators of the ECO platform are committed to, describe the basic requirements for a future, mutual cross- border recognition of EPDs in Europe. Currently, the ECO Platform participants are working on possible approaches, which should be available at the end of this year.

In the course of announcing the introduction of the new EPD logo The first "ECO-EPDs" were already awarded to declaration owners of the various programmes – among them several members of Institut Bauen und Umwelt e.V.: German Aluminium Association (GDA), European Association for Panels and Profiles, Knauf Insulation, Uzin Utz, Vector Foiltec, Rheinzink, Deutsche Rockwool, as well as EPPA – the European PVC Window Profile and Related Building Products Association and German Quality Association of Plastic Products (QKE).

Awarding of the first ECO-EPDs to IBU members

Focusing on details.
Seeing the big picture.

Institut Bauen und Umwelt e.V.

STATEMENTS OF THE IBU MEMBERS:

Gesamtverband der Deutschen Aluminiumindustrie (GDA):

"We are very pleased that our EPDs have been listed on the website of the ECO Platform. The internationalisation of markets requires cross-border recognition of environmental product declarations. This is the only way a widespread acceptance can be ensured." (Jörg H. Schäfer, Head of Recycling & Sustainability GDA).

Knauf Insulation:

"Knauf Insulation is a global insulation company with manufacturing plants in Europe, US and Middle East. Part of our commitment to sustainability is to make information on the environmental impact of products available to the market, specifically EPD's. The launch of the Eco Platform EPD is an important step in the right direction, as it contributes to further harmonizing the process and facilitating the proliferation of EPD's across Europe. We fully support the efforts, in cooperation with their industry partners, of the ECO Platform going forwards." (Vincent Briard, Head of Sustainability, Products & Buildings Knauf Insulation)

Qualitätsverband Kunststofferzeugnisse (QKE) & European PVC Window Profiles and related Building Products Associationatform (EPPA):

"The European PVC Window Profile and Related Building Products Association, EPPA aisbl, can be seen as a pioneer, offering Association EPDs for window manufacturers, planners and architects. Initially, we wanted to create an external reference document for our sector, but very soon we realized the enormous benefit a European solution would bring about. Congratulations to the founders of the ECO Platform. They have prepared the ground to overcome national restrictions regarding EPDs and have therefore reduced bureaucracy. We are very proud to be among the first owners of Eco-EPDs." (Gerald Feigenbutz, EPPA & QKE)

SIKA Deutschland:

"As a global supplier of systems and products for the construction sector, sustainability is a key component of Sika's business. Regarding communication, the importance of EPDs is increasing worldwide. The multitude of frameworks and formats can be confusing and costly, so ECO Platform's paving the way to mutual recognition on a European level is very welcomed." (Clara Fiúza, Sika Services AG)

The initiative to found the ECO Platform and to create the basis for mutual recognition across borders is very well received by the industry, since it fosters efforts to reduce trade barriers regarding product related environmental communication.

The founding members of the ECO Platform were the Institut Bauen und Umwelt as a programme operator in Germany and also the European construction material association "Construction Products Europe".

In future, every "ECO-EPD" from the various programmes will be registered on the ECO Platform website (www.eco-platform.org).

Find further information on:
www.eco-platform.org; www.bau-umwelt.com

Contact:

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South-East Europe on the path towards sustainable development

Despite the progress in South-East Europe, which has been observed during the past decade, the countries from the Region are still facing many challenges related to the resource effi¬ciency, high energy intensity, energy independence and security, CO_2 emissions. These issues will influence the choice of technologies and policies. The Region has great potential for a diversification of energy mix by the utilization of the renewable energy sources.

The process of 'Smarting up' the cities is at its early stage. Governments are going to stimulate their developments with an aim to transform them into more resilient systems which will meet economic, environmental and human requirements.

The new programming period (2014-2020) provides the state members from South-East Europe with funding opportunities. Also the targets for low carbon economy and higher resource efficiency will encourage all stakeholders to speed their investments.

Responding to the necessity for climate change mitigation and to the increasing market demand of economically-driven and environmentally-friendly innovations, the 11th Exhibitions and Conference 'Energy Efficiency & Renewables' and 'Smart Cities' are a timely event for South-East Europe. It will be organized by Via Expo from the 11th until 13th of March 2015 in Sofia, Bulgaria. Foreign and local companies will have the opportunity to develop their activity through knowledge transfer and wider promotion of their products. The event will provoke a strong interest of businesses operating in different sectors, municipalities, branch associations and scientific centers.

Leading companies will use the exhibition platform to showcase their latest technologies and equipment. Austrian Pavilion will be realized for the 6th year in a row. The exhibition scope includes energy efficient solutions for heating, ventilating and air conditioning (HVAC), lighting, low-energy buildings, renewables, energy storage, smart grids, resource recovery, waste-to-energy, information and communications technologies, building management systems (BMS), building automation systems (BAS), telephony & CATV, urban planning, e-mobility and transport, etc.

The speakers in the parallel Conference will focus on the politics, financing instruments and strategies and will expose new outlook in the relevant sectors in South-East Europe. Via Expo presents an impressive line-up of speakers from Austria, Belgium, Bulgaria, Germany, France, Estonia, Norway, Spain and the UK. A representative of the International Battery and Energy Storage Alliance will speak about the latest renewable energy storage technologies and how they could be implemented in today's cities. Jacques Bonifay from Transatel Mobile will pay attention to outsourcing M2M operations under MVNO-like model.

'The Future of District Heating & Cooling in Europe' is the topic of the Euroheat & Power session. The speakers will summarize the current trends and will explore the role of municipalities to improve the efficiency and renewable energy use. Experts from the European Investment Bank will debate the financing refurbishment - barriers at the market of South-East Europe, it's potential and financing possibilities.

Real case studies on the financing options available for the smart cities projects across EU, nearly zero energy districts (nZED), the trends in the insulation sector, etc. are some of the other highlights.

Organizer: Via Expo - www.viaexpo.com
Parallel Events: 'Save the Planet' (waste management) and 'Save the Life' (emergency, rescue- and safety control)

EPLACE

EPLACE is a pioneering project that seeks to demonstrate the importance of innovative ICT solutions in order to reduce energy consumption in public buildings. Bringing together 10 partners throughout Europe, EPLACE has three main objectives; to test and validate ICT solutions for energy efficiency, to present this information on a specific public platform to promote knowledge-sharing through EU collaboration and finally, to combine the first two objectives to show actual energy savings achieved in targeted buildings.

Seven pilot buildings have been selected across Spain, Bulgaria and Ireland and already these buildings are showing impressive results; Dublin partner Codema has reported a 22% electricity saving in Tallaght Library between March – August 2014.

These buildings are being monitored via WeSave and WeLight smart meters, two of the smart solutions designed by Wellness Telecom. WeSave is an energy control and management system that centralises energy data and monitors changes in consumption due to user behaviour. Users can create an energy account simply by visiting **www.enerplace.eu**.

WeLight is a smart monitoring and control system for street lighting which provides real-time information and aims to cut down on unnecessary energy use.

The EPLACE platform also provides recommendations based on data introduced by users relating to their home or buildings characteristics and it presents a great opportunity for EU-wide collaboration through the WeTalk forum function which allows users and experts to form partnerships and exchange mutually-beneficial information.

EPLACE is funded under the Competitiveness and Innovation Framework Programme.

For more information on the project, visit **www.eplaceproject.eu**.

Sustainable heat for our sustainable cities

By Dana Popp, External Relations and Communications Manager, Euroheat & Power

The debate on the energy transition and decarbonisation of our energy system has been around for many years. Two key aspects and their intrinsic link have however just managed to rise at the forefront as key to future action. Cities and heat. Having been taken for granted or just simply out of focus, the fear of potential gas and electricity shortages suddenly brought things down to earth: would Europeans freeze in their homes this winter? Yet, whatever solution cannot not concern only this winter, as energy crises will come and go. How are we going to heat our cities in an efficient, independent (from external suppliers or single energy sources) and sustainable manner?

Cities account for over 70% of global energy consumption, as well as 40-50% of greenhouse gas emissions worldwide. With transport and industry generally holding the headlines, it is actually heating and cooling where more than half of cities' energy is used for.

When it comes to heating our cities, modern low-carbon district energy is the ideal fit in the heart of a green urban community. In dense city environments, with high heat demand, district heating and cooling networks offer the ideal means of exploiting locally available energy sources as well as surplus heat. By integrating renewable energy sources such as biomass, geothermal and solar thermal energy, as well as using the heat generated from waste-to-energy and combined heat and power plants, district heating becomes one of the most carbon efficient and flexible ways to produce and supply heat locally. Any better way to cut imported fossil fuel reliance and electricity peaks altogether?

It comes then as no surprise that some of the greenest and most environmentally ambitious municipalities in Europe have in common their choice for efficient district heating.

Munich, the financial centre of southern Germany, is a living example of tacking climate issues for several decades, having introduced many green initiatives to reduce waste and make better use of its energy infrastructure, including renewables. The city's municipal utilities company aims to supply every customer with renewable energy by 2025, reduce CO_2 emissions by 50% by 2030 and become the first German city to have district heating that relies solely on renewable sources by 2040.

In 2010 Stockholm was selected as the first European Green Capital. Ambitious mitigation goals include cutting CO_2 emissions by 44% by as early as 2015 and being 100% powered by renewables by 2050. With more than 60% of the city heat demand covered by district heating, all coal and fossil-fuel powered public and private heating will be gradually phased out to reach these goals.

The Danish Capital Copenhagen with its 550.000 inhabitants seeks to become the first carbon neutral capital in the world by 2025. An estimated 75% of the CO_2 reductions will come from initiatives in relation to the city's energy system mainly involving an increase in the share of renewable energy in the city's district heating. And yes, Copenhagen is the 2014 Green Capital.

The examples could fortunately continue. Not only in Europe – the international community is also putting cities and heat hand in hand. During the September 2014 Climate Summit in New York, cities and energy have been regarded as priority action areas.

Moreover, under the global initiative "Sustainable Energy for All" (SE4ALL), the UN Environment Programme in collaboration with private sector, local authorities

and various stakeholders, recently launched the "District Energy in Cities Initiative". A detailed study on ways to unlock the full potential of efficiency and renewables in district energy is expected before the end of the year. An advanced summary notes the increasing trend for district energy in those countries or cities that aim to replace fossil fuels in space heating, hot water and cooling. Shares are significant and growing – more than 12% of heat demand covered by district energy in Europe, 23% in China and 50% in Russia.

It is now given that any solution for the climate and energy transition must explicitly address sustainable urban heating and cooling. Even with many cities around the world maximising the benefits of district energy, its full potential remains largely untapped. With its ambitious policy objectives and urban success stories, it is the EU who can and should lead the way in making sustainable cities a reality. European cities must adapt and prepare their energy infrastructure for the future. Heating our cities sustainably is not a matter of seasonal choice, but a long-term commitment to tackle the energy challenges ahead. ●

ResilieNtWEB, innovate for a sustainable business: Indoor Farming

ResilieNtWEB is a free strategic support programme for SMEs, designed to help them increase their resilience, i.e. their ability to anticipate market changes, adjust to them and learn from the process.

ResilieNtWEB brings together the expertise of organisations from the south of England, the north of France, Belgium and Luxembourg. It is backed by the European Interreg IVb NWE programme. The EU ResilieNtWEB programme supports eco-innovative solutions for SMEs with a special focus on the construction sector. One of the innovations promoted by ResilieNtWEB and the Brussels Region is the integration of greenhouses into buildings for various purposes (local fresh food production, interior urban green spaces, building resource efficiency, etc.).

Conventional rooftops can be colonised by green roofs or solar panels – or left bare. A great many rooftops remain available in Brussels and can be used to integrate an indoor farming activity. Integrated Indoor Farms can be established in a variety of structures (from industrial farming facilities to multifunctional living and working places) and a wide range of types (schools, factories, office buildings, hospitals, event spaces, residential buildings, etc.).

That's why the Brussels Region is currently testing the pre-feasibility study with a view to integrating greenhouses into retrofitted buildings or new buildings and promoting the concept of "closing the loop" for various materials (heat storage and heat exchange, rain water use, water treatment, CO_2 exchanges and materials recovery). Four different types of buildings are being analysed in order to define the most effective energy and water management strategy while integrating the two different functions (building and greenhouse).

One of these pilot projects, "Choux de Bruxelles" (www.chouxdebruxelles.be), is a 1,200 m² building designed for events (business, marketing, weddings, etc.), surrounded by 1,500 m² of productive greenhouse space.

Initial results show energy saving potential of up to 40% by boosting the exchange between the two spaces and implementing additional passive measures (thermal screens, etc.). The use of harvested rainwater for irrigation could lead to drinking water savings of up to 36%. Even though positive results are expected, the biggest challenge remains the economic viability of these relative small greenhouses compared to conventional large greenhouse areas.

ResilieNtWeb also fosters a collaborative approach between companies. A new cluster of companies has been created, comprising 16 companies in the construction sector from across the value chain. They are now involved in this project to help solve technical problems encountered when integrating greenhouses into buildings.

More information: www.resilientweb.eu/
Contacts at Bruxelles Environnement : Etienne Aulotte, eaulotte@environnement.irisnet.be – Hélène Dekker, hdekker@environnement.irisnet.be
The programme is scheduled to end in June 2015; a final brochure containing case studies and practical results will then be made available.

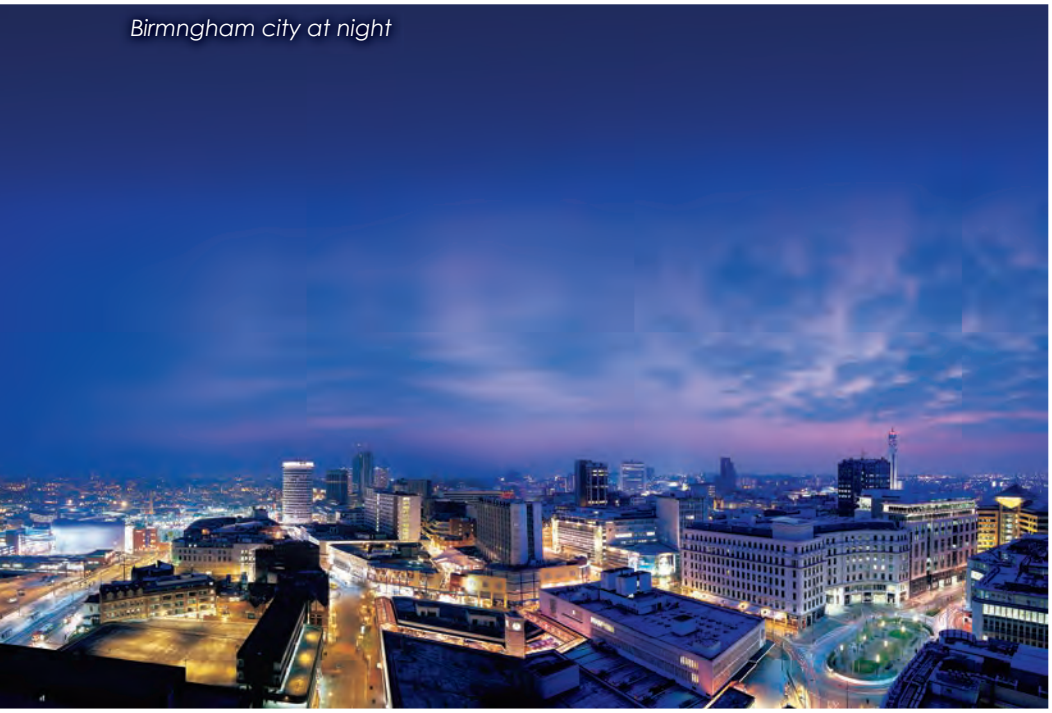
Smart Procurement European Allianze (SPEA) Project

Horizon 2020, largest research and innovation programme worldwide support public procurement that promotes research and innovation. In this frame, the European Commission's Directorate-General for Enterprise and Industry supports pilot projects on energy efficiency. The Smart Procurement European Alliance, SPEA, is one of them.

The Smart Procurement European Alliance, SPEA, is a project to implement a public procurement of innovative solutions in the area of energy efficiency in municipal buildings in the partner cities: Barcelona (the coordinator) Eindhoven and Birmingham, increasing, thereby the demand for innovation in this field and enhancing innovation of public services in relation to the improvement in quality/efficiency of public services, providing opportunities to SMEs to get involved in public procurement as direct beneficiary/client of a purchasing authority. It began in August of 2012 and now the project is developing the procurement phase. For more information consult the website: www.speaproject.eu

Currently two of the three procurement processes are ongoing; Barcelona with a Contest - Negotiation and Eindhoven a Competitive Dialogue process for their municipal buildings identified. Birmingham will initiate the process soon.

The object of the Barcelona process, encouraging the participation of SMEs, is the purchase of services on ENERGY EFFICIENCY MEASURES WITH INNOVATION IN 10 MUNICIPAL BUILDINGS. These services include the implementation of activities to improve energy efficiency and energy management with guaranteed savings, thus Barcelona City Council ensures operational efficiency and optimal energy systems in its 10 libraries. The awarding will be in February 2015. Barcelona CC expects a return on investment within five to six years.


Birmngham city at night


Kick off meeting SPEA project (2012)

www.bcn.cat (Contract profile)

The strategy of the Municipality of Eindhoven is based on the improvement, during a series of phases, of sustainability in 7 - 9 municipal buildings which it owns. One crucial aspect of this tender is an "intelligent but innovative strategy", which makes it possible for Eindhoven City Council to achieve its objectives as far as it is able, not only in relation to sustainability, but in terms of building management operation and construction, the role of the Municipality in getting an example, improvement in the quality of life in the city centre, etc. The tender process developed by Eindhoven is Competitive Dialogue. More information available at www.sustainablebuildings.eu and www.eindhoven.nl

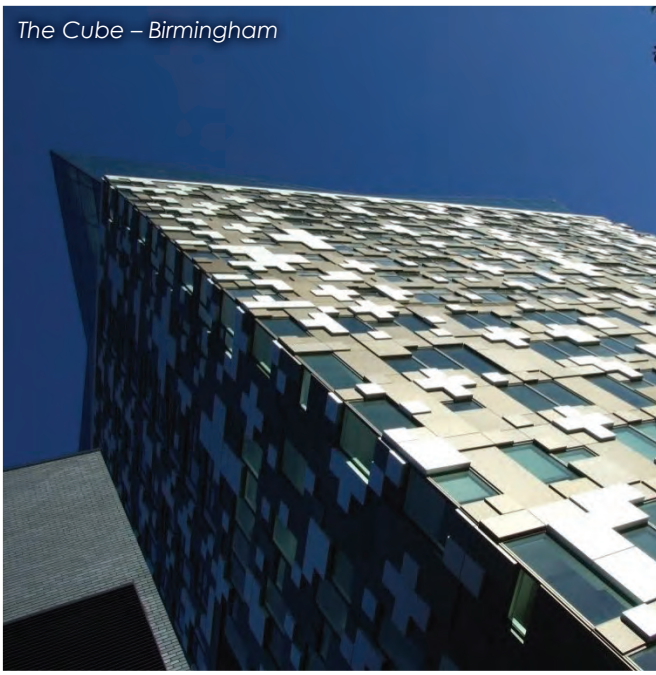
The strategy of the City of Birmingham is aimed at improving energy efficiency in their buildings previously identified. The procurement process is not expected to start earlier than December 2014.

The implementation of SPEA is coordinated jointly with the member cities, Eindhoven Barcelona and Birmingham. This coordination consists of adapting the acquisition method, contributions by experts in evaluating or valuing the bids and with respect to the bidders, the creation of opportunities for the international exchange of know-how and the creation of opportunities for companies to submit bids with innovative solutions.

This coordination will generate the "visibility" of the solutions applied in energy efficiency management services and in particular, the supervision of energy consumption.


Eindhoven Towers


Brainport Eindhoven


The Cube – Birmingham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District heating on the way towards a carbon neutral future

By Jari Kostama, Director, District Heating & CHP, Finnish Energy Industries

Finland is the European Union's coldest country. Because of this, the heating has always been central to the lives of Finns. Without heating, it has been and it is impossible to live in Finland. District heating was introduced to Finland already in the 1930s. At that time, the first district heating network was built for the Olympic Village, which was intended for the year 1940 planned Olympic Games. Well, then all that happened, which happened, and the Second World War took place. And the Olympic Games in Helsinki took place not before than in 1952.

After the war, the district heating spread to more and more places, so that now almost all the Finnish cities and municipalities with more than 5 000 inhabitants have a district heating network. There are about 500 district heating networks in Finland and the total length of them is more than 14 000 km. Last year about half of the country's population (over 2.7 million people) lived in district heated apartments. District heating is still growing while population concentrates in growth centers and the new ways of using district heating are developed.

Finnish Energy Industries announced about a year ago a strategy for the district heating sector. One of the corner stones of the strategy is sectors commitment to a carbon-neutral future. The target may be challenging, but it is possible to reach. The sector has already done a lot. For example, during the first 14 years of this century the sector built over 40 CHP

A waste-to-energy plant in Vantaa, Finland produces annually about 900 GWh district heat and 600 GWh electricity. Source: Vantaan Energia, photographer Olli-Pekka Orpo

plants and about 350 heat-only boilers mainly using biomass or waste.

Today the share of wood and other biomass in district heating is close to 30 per cent. It is actually the first time that the use of biomass is larger than any other energy source in district heating production. And the trend continues. According to calculations of Finnish Energy Industries, wood and other biomass based district heat production can be even 50 per cent in the year 2020. In this case, the district heating would have well fulfilled in the Finnish renewable energy obligation, which for 2020 is 38 per cent.

In Finland, the biomass means mainly wood, which is industrial by-products such as sawdust, bark and wood chips and wood, which comes directly from the forest in a form of chips. In particular, the use of forest chips has been growing fast and tenfold in the past ten years. Biomass also includes biodegradable part of municipal waste.

All the preconditions for significant increase in the use of renewable energy sources in the Finnish district heating production exist. The required capacity is already there or is planned to be in use in the next few years. The sector has invested a lot. In the last seven years, the district heating companies have invested approximately EUR 2.6 billion for wood and waste fires district heating plants. Finnish Energy Industries estimates that even before 2020, additional investments of around EUR 2.4 billion will be used for wood and waste fired plants.

However, market entry for energy wood is still to be encouraged by promoting wood supply chains and logistics as well as by reducing the transport costs of wood. These measures include, inter alia, the development of rail transport for energy wood supplies, safeguarding the conditions of the road network and developing a chain of regional terminals for the forest energy supply. In addition, the wood market needs to be developed, for example with up-to-date and transparent price information data and by the introduction of an open and comprehensive electronic wood market.

Renewable energy deployment on a large scale in district heat production in Finland also requires that European legislation does not impose unnecessary barriers to the use of growth. For example, the much spoken solid biomass sustainability criteria issue could be difficult for development of energy use of wood. If the criteria are being drawn up, they should be based on existing, for example, economic forest certification systems. The use of biomass in combustion plants should be remained carbon neutral. Furthermore, the Commission in the summer of 2014 published its package of circulation economy with 6 proposals to amended waste-related directives. In the worst case the package may compromise the energy efficient and cost-effectively rational utilization of the energy content of the waste. The Finnish experience with the waste-to-energy plants shows that the waste going to landfill has decreased radically and energy use of waste has contributed to the waste sorting and recovery.

The district heating sector actively participates in developing technological solutions and especially those enabling of carbon-neutral production. For example, Helsinki Energy has developed the so-called SunZeb concept, in which apartment buildings also serve as a kind of solar thermal collectors. Collected heat is then transferred via district cooling to district heating for domestic hot water production. In the summer of 2014 the solar energy collected was already approximately 40 GWh. This corresponds to annual heat demand of approximately 20 000 new high-rise apartments. Moreover, Fortum and St1 have announced to begin the exploitation of geothermal energy for district heating production in Espoo. In the past, general assumption has been that geothermal energy is not economically exploitable in Finland. However, these two companies are planning a 40 MW district heating plant construction in Espoo, Finland. ●

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District Heating in Finland

By Kari Sipilä, Principal Scientist, VTT, Finland

DISTRICT HEATING IN THE EU

District heating started in Europe at the beginning of the 19th century. Consumption in the EU27 countries together with the three accession countries is about 1.7 EJ/a (472 TWh/a), which is about 10 % of the total heating demand. More than 100 million people live in district heated houses in the EU. The world's district heating load is about 10 times that of Europe, and so is about the same as the total heating demand for the whole of the EU. The total length of the district heating pipeline is 155 000 km in EU and more than 400 000 km in the world or about 10 times round the globe.

DISTRICT HEATING IN FINLAND

District heating started in the Helsinki city region at the beginning of the 1950s.

Nowadays approximately half of the building stock is connected to district heating. In the largest cities the proportion is more than 90 %. More than 75 % of district heating is produced by combined heat and power (CHP) plants.

DISTRICT HEATING SYSTEM

CHP production units are connected through a heat exchanger to the DH-network. Heat only boilers are connected directly to the network while consumers are linked to network substations . In this way the oxygen content of the district heating water as well as the pressure variation can be kept under control. For buildings the hot tap water is heated in a heat exchanger.

Boiler plants are delivered to the network complete with operational units and all necessary components and functions. Boiler plants are gas, oil or biomass fuel fired. Burnable community waste is also used. The maximum temperature can be selected between 90 - 120 °C. Three-pass shell boilers are the most used boiler configuration. This reliable and popular technology achieves a thermal efficiency of 90 % without economisers.Water treatment and high quality control ensure boiler plant reliability and a long service life for the pipelines and auxiliaries.

A DH-pipeline is a closed 2-pipeline system in which has the water flow is regulated by pumps. The network is mostly located underground, while in some cases, for special reasons, an above ground site is required. Water is the medium, because it is cheap, easy to handle and not corrosive or toxic. Supply temperature of outgoing water varies between 75 – 120 °C and is cooled down to 40 – 70 °C by the consumers. The representative planning pressure is 1.0 – 1.6 Mpa in the pipeline. Regional low heating networks can work in the temperatures of 60 – 70 °C.

The pipes can be separated or insulated in the same lining. Industrially produced pipe elements, made of steel or plastic, are insulated in rigid foam and plastic lining. The necessary water flow in the district heating network is created by pressure generated by circulation pumps

which are installed at the heating plant. In addition booster pump stations installed along the network can be used along the pipeline systems.

Consumers are connected to the main district heating system via a ready to install heat exchanger substation. It is also recommended to connect the hot tap water system (55-58 c) to the DH network so that oxygen inhibitors can be used to ensure a good flow through the district heating pipeline system. The main substation components are easy to use, reliable, efficient and economical.

They guarantee the required needed thermal effect and temperature for the consumers.

District heating system consists of heat production, transfer and consumer subsystems. All the subsystems consist of modules. They have their own information system providing measurements, data collection, alarm, control and regulation. The subsystems work in series from the supply network to the consumer and vice versa. In future the subsystems will be connected to one main information system which will allow a two-way information transfer between the different subsystems. As a result, the controlling and forecasting functions of the district heating system will be faster and more accurate.

DISTRICT HEATING IN THE FUTURE

As heat producers district heating systems must be able to adjust to low energy systems in zero-energy buildings as well as to heat positive buildings. In regional heating systems an, operator such as an electricity distributor, is required. Because of low energy buildings, higher construction will be required in towns and cities and tighter building groups in suburbs.

Future district heating systems will be driven at a lower temperature (60 °C or even lower) . This will make it possible to plan for new types of CHP plants with higher power to heat ratio. These will be more suitable for society's energy consumption profile.

Solar energy will make a substantial contribution to district heating systems. The roofs of buildings can be used for solar panels which can be connected to the DH-system. Solar CHP plants will be base load units. In this way the storage of electricity and heat energy can provide an effective and economically sound solution.

Pipelines should be made of recycled material such as plastic or metal, while recycled plastic foam or natural materials can be used for insulation. Heat transfer media could be some regenerative chemical or two phase process, which provides a high heat transfer capacity, low transfer temperature and low friction.

Advanced control, information and communication systems will be needed to produce a highly effective central DH system connected to the buildings subsystems.

DISTRICT COOLING

A district cooling system is analogical to the district heating system, but the buildings are cooled by the system. The cooling medium is normally water at a temperature of 6 - 10 °C and a temperature rise of about 10 °C for consumer side. Cooling energy is produced by compressor machines using electricity or by absorption machines using district heat from CHP plant.

Integration of district cooling and heating systems is taking place in Helsinki and Turku . District cooling makes also possible to prolong the utilisation maximum load period of CHP plants. Solar absorption technology and PV panels connected to compressors will assist cooling production. Cooling capacity will be at its highest when cooling demand in buildings is also at its peak.

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Carbon Capture and Storage: The Train is Moving

By Didier Houssin , Director of Sustainable Energy Policy and Technology, IEA

On 2 October 2014, the SaskPower Boundary Dam CCS project was officially inaugurated in Saskatchewan, Canada. The launch was a momentous point, not only for the project itself, but for CCS as a whole. The Boundary Dam unit 3 is the world's first large-scale power unit equipped with CO_2 capture. It operates on continuous mode, producing 115MW of power to the grid, and capturing 95% of the CO_2 emissions (and 100% of the SO_2) of the lignite-fired power unit.

The launch of Boundary Dam underscores the importance to act. The world's appetite for fossil fuels is expanding: the use of fossil fuels has increased significantly more than renewable energy in the past 10-15 years. As fossil fuel consumption is expected to continue for decades, deployment of carbon capture and storage (CCS) is essential. CCS is the only known technology that will enable us to continue to use fossil fuels and also decarbonise the energy sector.

While CCS progress in Europe has had its ups and downs, it is encouraging to note that CCS is moving forward on global scale. There are now more projects than there were five or ten years ago. We know the technology better. And we are starting to see important moves by key players such as the US and China. Going forward the wish list for CCS is short: better technology with lower costs and more ambitious policy.

Capturing and storing carbon dioxide is no longer science-fiction. Actually 2014 and 2015 are developing into good years for CCS. Large-scale CCS projects are entering construction and operation. For example, Southern Company's Kemper gasifier and capture unit will come online during the first half of 2015 in Mississippi, US. The NRG Petra Nova project has also recently entered construction in Texas. The large LNG-related Gorgon project in Australia is under construction, driven by Chevron, Shell, ExxonMobil and their partners; the world's largest CCS project, it should begin injecting CO_2 in a deep saline formation next year. And of course we hope that a number of further projects will take final investment decisions during 2015.

But the progress of CCS is not only measured with large projects. We also know technology better than we did before. There has been significant progress in R&D and pilot installations across the world, in various sectors: power, steel, cement, bio-CCS and so forth. Just as an example of progress: the energy requirements to separate and compress a tonne of CO_2 have been cut in less than half in the past 25 years. We have also observed an increasing number of patent applications and granted patents. And it's not only about capture technology. Characterising, engineering and operating underground CO_2 storage sites have also greatly improved in recent years.

But more is obviously needed, as technology development cannot stand still. We need better and more cost-effective technology to ensure significant deployment of CCS in the future. Adding CO_2 capture on a power plant would today still be prohibitively costly without some form of public incentive. For example, no one can state that Boundary Dam 3 came cheap. At 1.2 billion USD it is certainly an expensive piece of kit, even if a large share of this cost was to modernise the plant itself, not only to build a capture unit. But the good news is that the project owners now believe that they could build a second plant 25-30% cheaper. Going forward, cutting cost and improving technology needs to accelerate. This can be done by research, by duplication and by exploiting economies of scale.

We must also put to the forefront the versatility of CCS. Most often we tend to think of coal-fired power when we talk about CCS. But this is only one part of the story: CCS can be adapted to both gas and biomass-fired power. Another key advantage

of CCS is that it can provide solutions for several industrial sectors, such as cement, steel, chemicals and refining. Indeed, the significance of CCS for these sectors is even higher than for power. In these industries, there is simply no other known technology that can achieve significant emission reductions. So CCS is not only a coal story. It is very much more than that.

In addition to technology innovation, CCS would definitely also benefit from policy innovation. Right here in Europe, in fact, the UK offers a textbook example of comprehensive CCS policy making. In addition to pursuing a research and development policy, the UK offers a strong policy push for demonstration and early deployment. The UK CCS commercialisation programme with the associated capital grants and the reforms of the energy market with contract-for-difference feed-in-tariffs for CCS surely look promising. I should stress that speed of implementation is of essence.

Some international or global processes also deserve a mention due to their interesting potential for CCS. Recently the US and China issued a joint announcement on climate change, at the presidential level. The announcement includes various energy technology actions, including very direct references to developing joint CCS projects. This is significant, as the two countries are the world's two largest energy users and CO_2 emitters. Joining their efforts to boost CCS on the level of concrete projects must be congratulated.

Even more globally, of course the UN-led process to set goals and coordinate actions to combat climate change provides an opportunity for CCS. After all, we are discussing a group of technologies to be deployed exclusively for the sake of climate. So our chance is now to make sure that this global process also includes CCS. This can be done from two directions: both from the inclusion of CCS in Parties' national pledges, and by ensuring that CCS can fully benefit from the various UNFCCC mechanisms alongside other technologies.

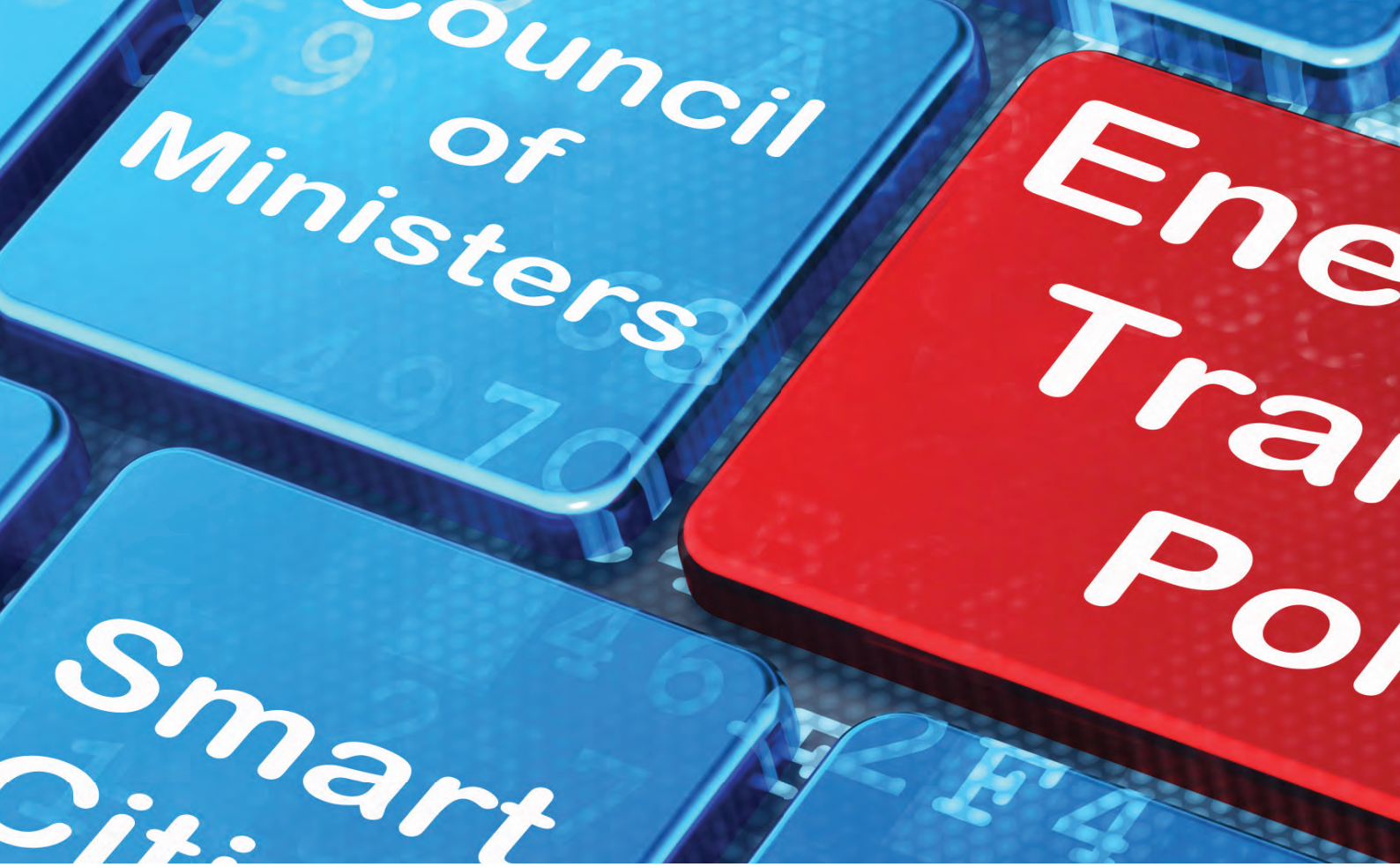
So there are plenty of reasons to be hopeful today.

But let's not forget that policy and politics matter to CCS, more than for any other energy technology at the moment. Unfortunately, in many countries with considerable potential for CCS, and even with much relevant expertise, the backing and championing of CCS by policy-makers has slowed down or disappeared. CCS has become a political orphan. This has unfortunately been the case especially in Europe. But it's not too late to turn this around. It is also imperative that the next wave of investment decisions includes projects in Europe. ROAD, White Rose and Peterhead spring to mind as obvious candidates.

The IEA hopes that Europe continues to work to keep deep decarbonisation possible, by making CCS available. The 2030 timeframe could be crucial, and so it is positive that CCS is explicitly mentioned in the recent political deal on the 2030 framework for climate and energy policies. The next step is to deliver action. Leadership


Didier Houssin

from Member States and industry, jointly investing in their futures, will be key, but success will also depend on certain enabling actions from the Commission. A strategy for CCS could include: encouraging Member States to take advantage of CCS to meet 2030 climate targets; improving the performance of component technologies through research; adapting the New Entrants Reserve to the needs of innovative projects with European added-value; and supporting Europe's industrial sector to maintain competitiveness while sharply cutting emissions. As has already been seen in a number of sectors and regions, CCS is much closer to competitiveness that people realise, but closing the gap requires political commitment.



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The Future of European Energy Low-carbon production through

By Ashley Fox, MEP

The EUs efforts to reduce emissions and the resulting influx of renewable energy onto the grid has dramatically reshaped the way our energy system works and the way it will need to work in the future. The significant uptake in renewables in the EU has of course driven innovation in these new sources of supply, but it has raised numerous other challenges for the industry – innovation and market penetration does not stop at the technologies themselves. The need for investment in electricity grids and storage couldn't be clearer as we look to connect the new capacity, boost diversification and strengthen the internal energy market.

The North Sea is fast becoming world's foremost proving ground for offshore renewables but not enough projects are being supported that allow power to be traded across borders. A modern grid that connects UK offshore wind production to a North Sea wide grid running from France to Norway has its obvious benefits, but we must recognise that each individual project is fraught with political and investment risks.

The Projects of Common Interest (PCIs) that form the backbone of the EU's Connecting Europe Facility are welcome initiatives but the support from this instrument on its own will not be sufficient to

Supply: innovative policy

ensure that projects are built. PCIs could however help unlock much needed investment for innovative projects that combine both transmission and interconnection and will help add incentives for cross-border trading.

Storing energy still remains one of the greatest challenges facing both policy makers and industry, the emergence of intermittent and non-programmable renewable sources has made the problem even more acute. Given the difficulty of varying the output of these sources, rises in demand cannot necessarily be met with increased generation from renewables. Gas will play an increasing role in the mix by providing reliable and flexible back-up power.

Storage technology is therefore essential to bridge the gap between the ramping down time of renewables and the ramping up of the back-up capacity. The EU's research and innovation program, Horizon 2020, will be supporting further development in this area. With a renewed focus on innovation – too often Europe leads on research but falls behind on innovation – we hope the funding will not only see research into new types of storage but also advance the wider development and application of many known technologies.

The main driver of increased electricity storage in the energy market will be economic, as it should be, but if renewables can be produced, stored and then re-introduced during peak demand then storage should eventually be able to both compete with and compliment other forms of back-up power such as gas.

It is still crucially important that research and innovation investment should not focus solely on renewables - it's worth remembering that shale gas wasn't even a viable option ten years ago.

Emissions from gas power plants can reduce CO_2 by up to 80% compared to an old coal fired power plant. The future commercialisation of Carbon Capture and Storage (CCS) will further decarbonise the gas-powered generation – indeed it's almost impossible to imagine a low-carbon transition without gas and CCS.

My political group in the European Parliament, the European Conservatives and Reformists, would argue that one of the biggest failings of the EU's climate and energy strategy for 2020 has been stalling political and financial support to CCS deployment. In Europe we must recognise that renewables alone are not going to solve our energy or emissions goals and a fresh impetus behind CCS in the energy system is urgently needed.

The European Council's recently adopted position on the 2030 Climate and Energy framework will provide the technology neutral approach we have been calling for and expansion of the NER300 facility to 400million ETS allowances (NER400) will, in the medium term, provide a boost for CCS and other innovative low carbon technologies.

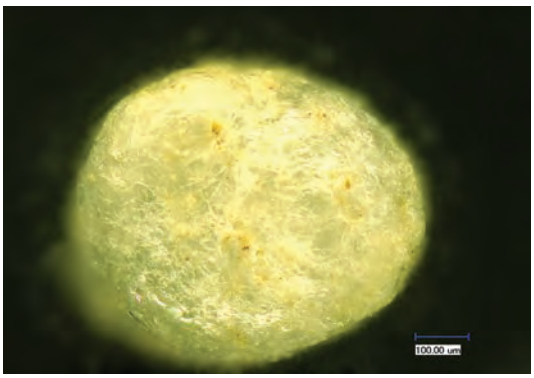
Moving forward we need to be able to move quicker. Much is made of the permitting and regulatory barriers involved with energy projects and this is amplified when operating with different regimes across borders. This problem is clearly even worse for innovative projects where perhaps the economic arguments are not as strong as those of established technologies.

There does now appear to be strong momentum in Brussels behind the Better Regulation agenda and we hope this will see barriers removed in the energy sector – and coupled with events in Russia and Ukraine there is a renewed sense of urgency. These factors and a level playing field for low-carbon technologies in the 2030 Climate and Energy Strategy, courtesy of the single 40% emissions reduction target, should provide both an impetus and opportunity for new energy technology that looks beyond generation to transmission, interconnection and storage.

New generation of thermal insulating renders with CO_2 storage components

PREAMBLE

The possibility of using silicate based insulating materials to replace expanded polystyrene is one step in the right direction for the protection of the environment. However, in the building industry, mortars and renders are a big part of the materials, and their properties could be used as supplementary functions such as the storage of CO_2 in insulating mortars through the utilisation of vegetal components such as industrial hemp.



In collaboration with Lisbonis Chaux Grasses we decided to undertake preliminary tests in this direction.

EXPERIMENTAL STAGE

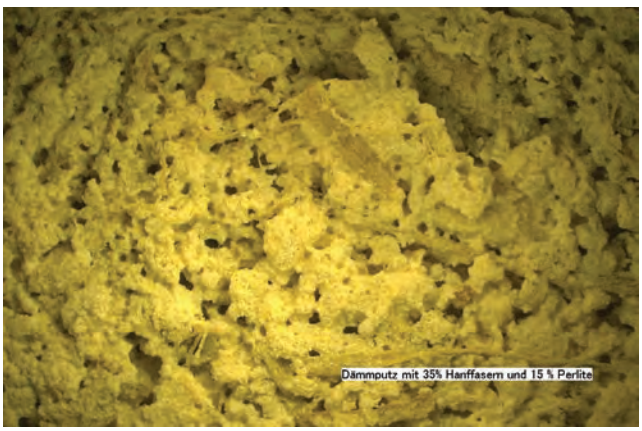
In order to prove the plausibility of this idea we started by mixing hemp aggregates with expanded perlite. These raw materials have the capacity to store CO_2 and to provide additional insulation By mixing the expanded perlite together with the hemp aggregates in a special mortar we were able to demonstrate, during preliminary tests, that it is possible to create a new material with interesting physical and ecological properties. This new material makes it possible to make new highly elastic insulating mortars that can incorporate CO_2 in their structure Furthermore, we can reduce the perlite content by keeping the thermal conductivity in a reduced range.

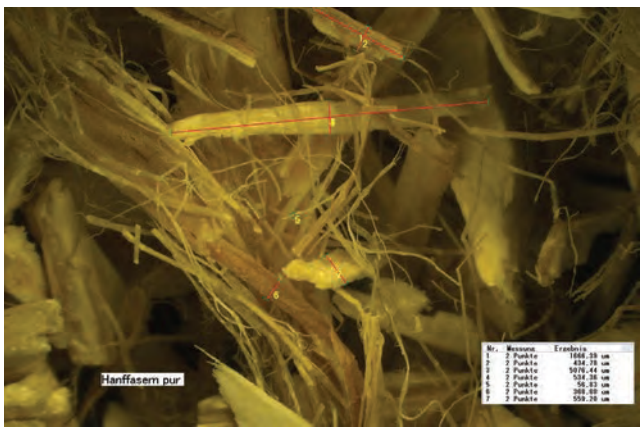
SOME TECHNICAL INFORMATION ON THE CO_2 BALANCE

As the BaFa neu GmbH in Malsch, Germany, informed us, the ecological balance of hemp is very advantageous because of its ability to store CO_2. Mr. Bernd Frank who is the CEO has told us that 1kg of hemp can contain about 1,5 kg of CO_2. The CO_2 requirement for the production of hemp aggregates represents approximately 0,250 kg. As a result we have a mass balance of 1,25 kg of CO_2 contained in a kg of hemp.

CONCLUSION

At this point in time we can confirm that industrial hemp is a plant that has good potential to store CO_2 in building materials. Its thermal insulation qualities also provide additional reduction of CO_2. We are currently seeking partners to join us in an EU project and would welcome any interested enquiries.





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Carbon Capture and Storage: a promising outlook in Europe

By Luke Warren, CEO, Carbon Capture and Storage Association

2015 presents a critical juncture for Carbon Capture and Storage (CCS) in Europe. The prize is a great one - with combined effort from European North Sea states, CCS is capable of permanently locking hundreds of years' worth of Europe's carbon dioxide emissions underground. But decisions taken now by policy makers in developing the right supportive framework, will determine whether Europe will benefit from this technology or if we shut the door on CCS as a climate change mitigation option altogether. Fortunately, there are a number of developments taking place that signal a re-boot of Europe's policy on CCS.

THE CCS PROMISE

Investing in renewables, smarter infrastructure and storage are all going to be necessary to halt the most devastating effects of climate change. But this will not be enough – what is required is a large scale and rapid deployment of CCS.

Including CCS in Europe's future decarbonised energy portfolio is the least cost pathway to decarbonisation. The latest evidence from the International Energy Agency shows that without CCS, the cost of meeting a 50% global CO_2 reduction target by 2050 would increase by 40%. More recently, the IPCC Synthesis Report concluded that without CCS, the cost of hitting our 2C target to limit global warming would increase by 138%.

The recent escalation of political tensions with Russia have bought to the fore the need for energy security in ensuring a prosperous and competitive European economy. With coal and lignite make up more than 80% of known fossil fuel reserves in Europe – CCS is increasingly being seen as a mechanism to reduce Europe's reliance on imported fuels and harness indigenous energy supplies.

The spotlight on industrial emissions has also worked to set CCS at centre stage: CCS remains the only viable technology for reducing emissions from many energy intensive industries (ranging from iron and steel to chemicals, cement and refineries) and ensuring they remain competitive. By 2050, industrial CCS offers to reduce CO_2 emissions by 0.4Gt across Europe.

TECHNOLOGY MILESTONES

As of February 2014, there were 22 large-scale projects in operation or construction – a 50% increase since 2011. These have the capacity to capture up to 40 million tonnes of CO_2 per annum, equivalent to 8 million cars being taken off the road every year.

The beginning of October saw the global premiere of SaskPower's unveiling of the Boundary Dam Project in Canada: the first commercial-scale project in the world combining post-combustion CCS with coal-fired power generation. The project saw the transformation of an aging coal fired power station unit in Saskatchewan into a producer of low-carbon, base-load electricity. Significantly, Boundary Dam promises to capture 1 million tonnes of CO_2 per year – the equivalent of taking more than 250,000 cars off the road annually.

Boundary Dam goes beyond a single pilot – in Europe, it's a call to action. It not only shows us that the technology is there; but that the economics can stack up and working regulatory frameworks can be put in place. Experience gained from large demonstration projects will be essential, both to perfecting technical solutions and driving down costs. Across the world, CCS moves forward – the next two large-scale CCS projects in the power sector are planned to come online in the US: Southern Company's Kemper County Energy Facility in Mississippi, and the Petra Nova Carbon Capture Project in Texas. Outside of the Americas, the Abu Dhabi CCS Project in the UAE will be the world's first large-scale CCS project in the iron and steel sector.

MOVEMENT IN EUROPE

After a series of false starts, things finally look they may are coming together for CCS in Europe. The Sleipner project has captured nearly 1 million tonnes of CO_2 a year since 1996 from gas production by injecting it into deep saline formations under the North Sea. CCS technology also operates on a Liquified Natural Gas plant in Snøhvit, storing up to

Luke Warren, CEO, CCSA

700,000 tonnes of CO_2 per year in a depleted natural gas reservoir deep below the seabed. In the Netherlands, ROAD promises to capture 1.1 million tonnes of CO_2 per year from a new power plant located on the Maasvlakte and store it in a depleted gas reservoir in the North Sea.

In the UK, the White Rose CCS project will capture CO_2 from a coal/biomass facility, while the CCS Peterhead project will capture CO_2 from a fossil gas power plant. In total, these projects will capture and store approximately 3 million tonnes per annum of CO_2 in the North Sea. Both projects are currently progressing through detailed engineering studies with the support of the UK Government.

In a crucial development, CCS benefited from its first mention in the EU 2030 Climate and Energy Framework in six years. The significance of this cannot be understated. The explicit inclusion of CCS within the context of the new NER400 funding scheme is a vital step in making sure that European power sector and energy intensive industries get the support they need to maintain their competitiveness.

Alongside an ambitious cut in carbon dioxide, the Council agreed that Member States should be free to choose the most appropriate technologies to reducing emission with the target of "at least 27%" renewable energy in the mix by 2030 binding only at an EU level. There is much to be welcomed here, as it paves the way for a technology neutral energy framework which recognises the importance of CCS – alongside renewables and energy efficiency – in delivering a secure future energy mix for Europe.

LESSONS LEARNT

What the CCS experience this year shows us, is that all that's really needed is political will. Europe has a unique combination of physical and human assets to develop CCS, undoubtedly providing the opportunity to become a global leader in the CCS sector.

The task for Member States across Europe in 2015 is to scale-up CCS so that it can be deployed at a widespread scale; thereby achieving cost reductions and contributing to significant CO_2 reductions. We urgently need a steady roll-out of projects across Europe; ensuring that CCS becomes cost-competitive with other low-carbon technologies in the 2020s. With decisive action, these projects could deliver real benefits in a matter of years and form the foundations of a thriving European CCS industry.

It is well understood that with every tonne of fossil fuel consumed without CCS, our need to tackle climate change becomes an ever more critical challenge. CCS projects must succeed – so let's all hope that next year, is the year of CCS in Europe.

www.ccsassociation.org
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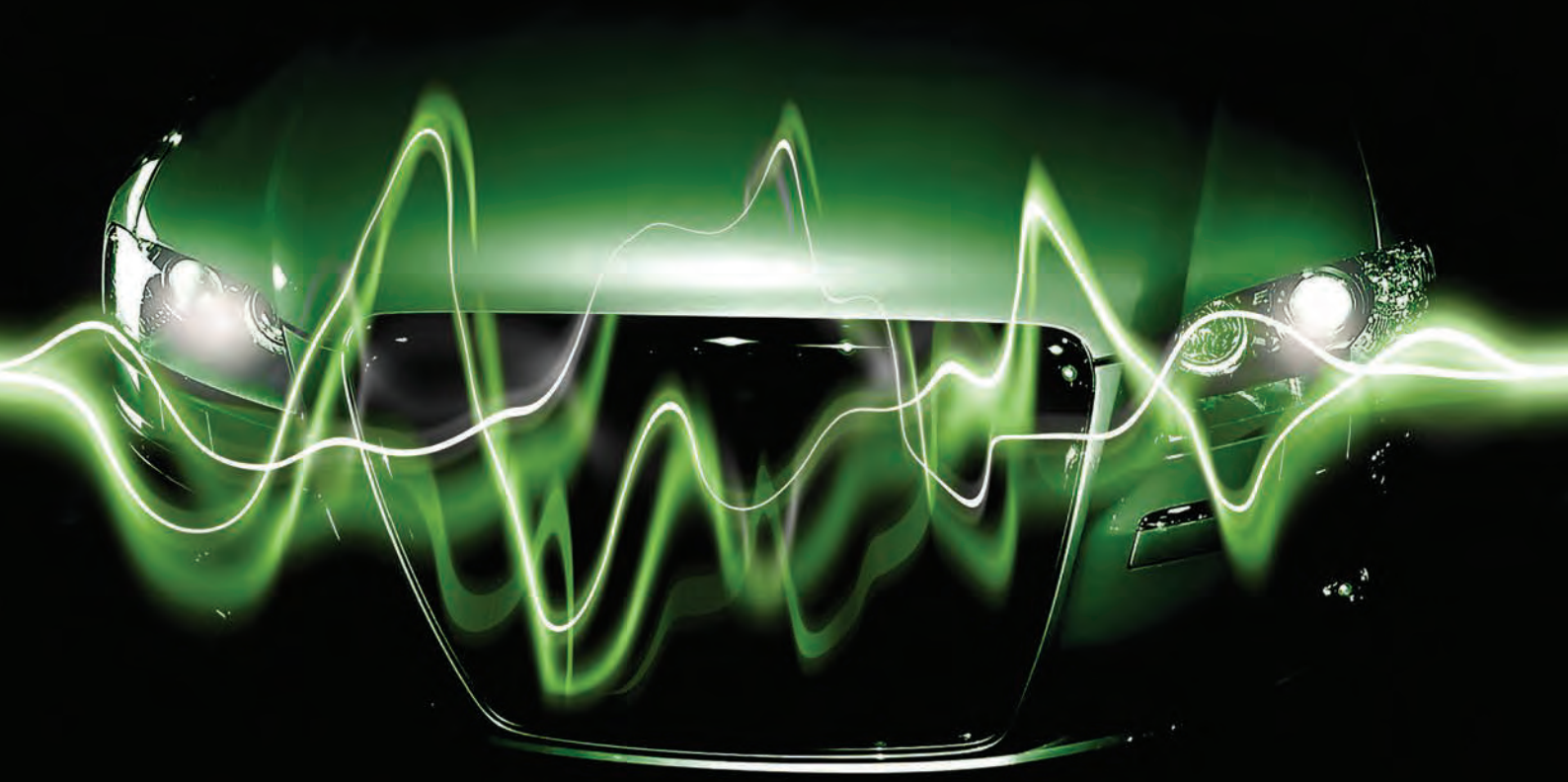

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Once again Brussels is the venue, thus ensuring optimal connection with the representatives of the European Institutions who consider Battery, Hybrid and Fuel Cell Electric Vehicles to play an important role in lowering atmospheric pollution and reducing oil dependency.

Policy aspects, new mobility concepts, noise and health factors will also be issues which will be discussed.

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Smart charging – adding value to the power system!

By Aura Caramizaru, EURELECTRIC

The rather hesitant uptake of electric vehicles in Europe to date has recently been boosted by a number of policy initiatives from national governments, including both monetary and non-monetary measures. The proposed German law for preferential parking and access to bus lanes or the French law increasing bonuses for buying electric vehicles are just some examples. Combined with increasing efforts at the EU level – as with the recently adopted Alternative Fuels Infrastructure Directive requiring member states to set clear plans for the roll-out of electric vehicles and related infrastructure – this can only help to further expand the e-mobility market.

Electric vehicles can hold great promise to make the electricity system fit for the future – by acting as flexible demand that draws power from the grid at times of low demand, or in accordance with the available supply of variable wind or solar power, thereby providing electricity storage and flexibility services to the power system. But depending on their market penetration and the time of charging, electric vehicles also have the potential to disturb the power system in a major way, adding additional demand to the already existing residential peaks. The answer

to the negative and the positive scenario is the same: smart charging.

Smart charging refers to a controlled charging process that optimises the use of the grid and the available electrical energy to minimise additional investments in the grid, but also to facilitate the integration of renewables and maximise consumer convenience. In this way, intelligent charging of electric cars helps to avoid grid disturbances by making better use of available capacity and allows electric cars to contribute to an improved power system.

A key concern for network operators is how to make sure that the electric vehicle loads do not have an excessive impact on peak and local demand. The charging of electric vehicles may affect different peaks and locations in the power system – from the global level, where balancing between demand and supply takes place within frequency levels, down to the local level, where voltage stability and overload are at stake. Optimised charging can be used to prevent network failures or power quality issues.

But the benefits of smart charging go beyond utilities and the distribution system. Indeed, one of the main aims of smart charging is to maximise consumer convenience. For instance, customers could benefit from cheaper energy if they allow a certain amount of flexibility in the charging process, say by charging overnight when electricity consumption is generally low. Time-of-use tariffs or dynamic pricing will allow them to charge their cars at lower cost.

Another key benefit of smart charging for the customers: they can plug in their car without having to ask the network operator to increase the maximum power available at their home delivery point. Instead, the electric car could be accommodated within the existing power connection.

Electric vehicles not only have zero-tailpipe emissions, but also offer great opportunities to promote fuel diversification and reduce CO_2 emissions. Smart charging increases benefits as it can provide flexibility and move the charging process into periods of higher renewable output, when strong winds or sunshine lead to peaks in renewable electricity production. By using this energy to charge electric cars, smart charging would make the most of the available renewable resources while reducing the stress on the system that variable renewable energy could otherwise entail. In the future in a more advanced vehicle-to-grid scenario, electric cars could even be used to store excess power from renewables and supply it back to the grid during periods of high demand. The ability of electric vehicles to assist in balancing networks could reduce the use of less efficient "peaking" plants, thus increasing efficiency and minimising costs for the whole power system.

Finally, electric cars, as 'batteries on four wheels' will become an integral part of the power system of tomorrow. This differentiates them from conventional cars: they are not just cleaner and more energy efficient, but also able to connect key links across different industries like electricity, automotive, ICT and more. Smart grids will enable the use of information and communication technologies in e-mobility, which will help to implement load management strategies and reduce charging impacts. There are huge potential benefits, and it is therefore key to conceive change simultaneously and proactively, in both the power and transport sectors.

What is needed to move smart charging closer to market deployment? EURELECTRIC is working with its members on smart charging implementation and on defining enabling technical and regulatory frameworks. Customer behaviour will also have to change to fully make the most of all the benefits that electric vehicles entail. Results of this work will be presented in a 'Talking smart grids' event in Brussels, in March 2015.

Moreover, e-mobility and electricity stakeholders must work together to ensure a standardised exchange of data and information so that electric vehicles are able to effectively communicate with the grid and avoid unnecessary and stranded investments. Interoperability is also a prerequisite to allow an effective charging management process to take place. Only by working together can all stakeholders benefit from the opportunities of electric vehicles and their effective and intelligent integration into the power system.

ESTRELIA project successfully finished

Increased performance of building elements at reduced costs for energy storage in FEVs now available

Ewald Wachmann, project coordinator

High costs together with concerns for driving range, reliability and safety have been the main hindrance for market adaption of full electrical vehicles (FEVs). ESTRELIA was an EU funded project where 9 strong partners worked on the major goal to provide increased performance of building elements at reduced costs for energy storage in FEVs. The project outcome provides cost efficient solutions to set industry standards and mass production

The ESTRELIA platform which has been developed during the last 42 months enables a significant advancement of the technology capabilities for battery management systems design: ESTRELIA provides building blocks with enhanced reliability and safety at lowered costs for smart energy storage for FEVs. This is accomplished by proposing a modular approach with ultra capacitor power packs with higher density with 50% energy advantage.

Cycling test of the power pack consisting of the new ultra capacitors supplied by Corning and the Li-Ion energy pack provided by E4V have shown that high current power demand can be overtaken by the ultra capacitors and thus relieving the Li-Ion battery which can be monitored by lower thermal stress.

A new BMS ICs AS8506 based on a new concept in the HV-technology enhances also the modularity of Li-Ion batteries as energy packs. For the first time provide a flexible active cell balancing chip set also suited for the high accuracy demanding monitoring of Li-Ion batteries. The AS8506 Cell Monitor and Cell Balancer IC enables autonomous cell balancing, simultaneous cell voltage comparison and simplified readout of cells all in a robust, simple and small solution. The AS8506 features simultaneous cell voltage comparison with upper and lower threshold, active- or optionally passive cell balancing by simultaneous comparison of actual cell voltages with a target cell voltage. Cells which are below target will either cyclically receive charge packages from an isolated DCDC converter or, optionally, cells above target will cyclically be discharged by an external resistor through integrated switches in an autonomous way.

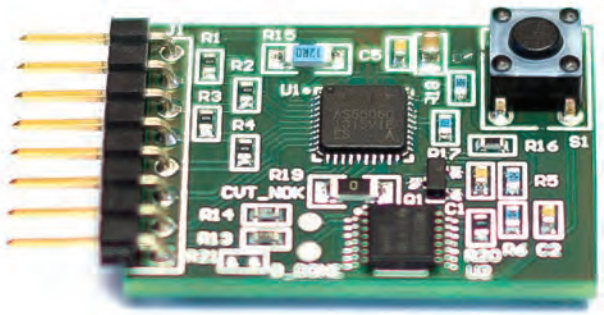
KEY FEATURES

- Simultaneous cell voltage capture for balancing and SOA monitoring
- Autonomous balancing and SOA monitoring strongly reduces data communication and data processing and thereby improves EMC robustness
- Active charge balancing with very few external components for good efficiency and little heat dissipation.
- Absolute cell voltage readout for OCV capture and cell impedance calculation. Readout of 2 temperature sensors

KEY BENEFITS

- recover capacity loss of batteries, increase operating time, as well as improve overall system run time.
- tremendously reduced communication saving costs in the system and making the system more reliable
- active balancing is possible as an as an energy efficient option

ESTRELIA
Safe Batteries with power



AS8506 BMS IC demo board for autonomous cell supervising and active or passive cell balancing function

The demo device features AppliedSensors' iAQ-engine as gas sensor module which can be operated with an external power supply or 9V battery. Changes of VOC and hydrogen concentrations are indicated by LEDs and can be logged via UBS or memory card. A BMS can be interfaced via I/O pins and I2C bus.

The excellent functionality of this BMS monitoring and balancing concept has been demonstrated in this project in combination with Li-Ion batteries as well as with ultra capacitor power packs.

Tests with newly developed HV-test equipment have proven test isolation protections in the environment of several 100's V as present in FEVs. So the demonstration of a newly developed precision HV-attenuator enable also integrated solutions for accurate voltage measurements.

ESTRELIA also developed a new safety sensors which are based on silicon based MEMS approaches delivering enhanced safety functions at lowered cost compared to existing solutions.

Test with abuse of Li-Ion cells have shown showed that it is possible to detect gas emissions a sufficient time span before a thermal runaway occurs. The gas sensor can detect a rise in VOC concentration even before a bloated cell fully opens. The measurements showed that this time span is, dependent on cell temperature and cell current, in the range of tens of seconds to several minutes. This time span is more than sufficient to take measures to avoid a thermal runaway of the battery.

While the gas sensor allows detection of very low levels of volatile organic compounds as emitted in thermal overruns of battery packs, the new spark detector concept enables general safety functions by flame detection from all hazardous events in a FEV.

Finally the development of new actuators as low cost power antifuse together with the new energy management HW (BMS IC) and SW from FhG IISB enables dynamic reconfigurable topologies for the energy storage unit, thus still enabling the functionality of the FEV despite single failing cells.

Key Partners

VALEO EQUIPEMENTS ELECTRIQUES MOTEUR SAS	FRANCE
COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES	FRANCE
ACTIVE TECHNOLOGIES SRL	ITALIA
E4V SAS	FRANCE
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EV adoption calls for political leadership

Strong deflation of electric vehicles cost justifies the need for state support and makes it even a necessity in the early technology adaptation phase.

By Bert Witkamp, Secretary General, AVERE, bert.witkamp@avere.org

SUMMARY
Electric vehicles (EV's) have the potential to become a major alternative drivetrain option for passenger cars. The advantages for consumers and society are considerable promising a more enjoyable driving experience, cleaner and healthier urban environments and drastically lower CO_2 emissions. Reduction of fossil fuel import dependence and the capital outflow which is threatening our political independence and the potential for building a new high-tech innovative industry, are other important benefits. However EV's are still in the very early phase of production and market development. Governmental support is needed to reduce the risks accompanied with early commitments of consumers and industry. These are essential to achieve the necessary technology improvements and reduce costs. Support is needed and can be provided in different ways. Government leadership and deployment support will determine whether the Valley of Death can be crossed safely.


Bert Witkamp

DEFLATION IS SLOWING CONSUMER SPENDING AND POSTPONING PURCHASE DECISIONS

Economic wisdom says that deflation is one of the greatest dangers for our economy. People will postpone purchasing while waiting for lower prices, creating a downward circle of lower consumer spending. I doubt the generality of this statement, for example will we eat less because food is getting cheaper or drive less because gasoline gets cheaper?

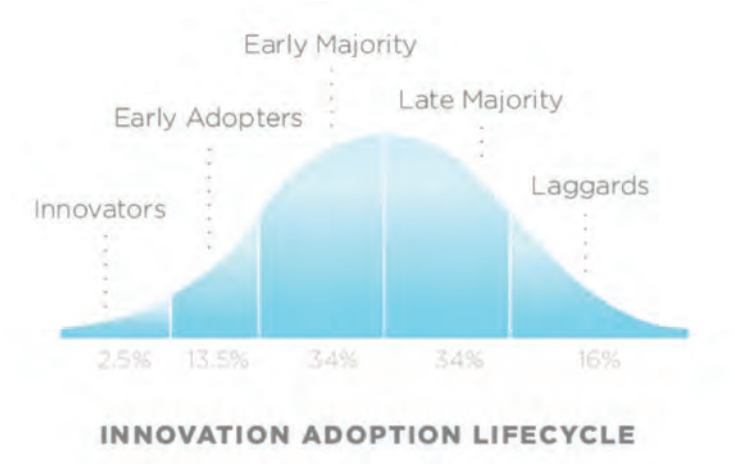
For consumer goods which are evolving very fast, deflation has, for decades, been the name of the game, but this does not seem to reduce the appetite of consumers to invest in the latest technology, knowing very well that what they buy will be outdated in one or two years. In the case of mobile phones, which now have become smart phones, price are much lower when looking at like for like functionality. However, replacement happens very quickly because people would rather pay more in order to get the new functionalities.

What about the effect of deflation for electric vehicles sales?

One thing is certain, for a mass scale introduction of electric vehicles we need to get the cost down significantly. However the first question is whether consumers like EV's and will buy them when costs are comparable with the current internal combustion engine (ICE) cars.

PUBLIC AUTHORITIES AND CONSUMERS LIKE EV'S

Authorities worldwide love them! In the USA, China, Japan, Western-Europa to name a few, authorities are promoting the development of EV technologies and promoting market introduction by giving incentives. This is easy to understand, in all these countries EV's have a large potential, when deployed on a large scale, to reduce the dependence of fossil fuel imports, to improve the air quality and sound levels in urban areas, and to reduce CO_2 emissions in order to combat climate change. They also see this innovative technology as potential for their industries and look at the possibility of linking EV's and smart grids to develop an "internet of (clean!) energy". Consumers who are familiar with EV's love them and EV's score very high in consumer satisfaction surveys. In Norway and California, where EV's are financially competitive with ICE vehicles, the sales increase in double or triple digits every year. In Norway EV sales represent 15% of new car sales and this despite the fact that only a few models are available on the market.



INNOVATION ADOPTION LIFECYCLE

OEM'S WRESTLE WITH MANY UNCERTAINTIES AROUND EV'S

It is more difficult for OEM's as they have to balance the short term interests and priorities with longer term developments of which electrification is one of several with autonomous drive and connected cars as more likely priorities. As such it is understandable that most OEM's are not putting their full weight behind EV's. Many OEM's are bullish about the future prospects of EV's however and are carrying out significant research. But when it comes to deployment it is a different story. Again, because of the current high prices, overall limited range and long charging times, EV's do need support for deployment. In markets where the level of support is sufficient, and for longer time frames, we do see that consumers are switching to EV's. Where a few years ago price competitiveness, performance and appeal were unattractive for most customers, now we begin to see a change. Well known brands such as BMW, Volkswagen, Renault, Nissan, Mercedes are all selling full electric or plug-in electric vehicles and the number of models is increasing on a monthly basis. Tesla has shown, in just a few years, that electric vehicles can be attractive, with high performance and sufficient range. The approach is also different from OEMs: start to develop EV's in the luxury segment and use this learning curve to develop lower cost technologies for mass market.

WILL EV'S BE THE BETTER CAR IN THE FUTURE?

This question is key to the whole discussion of whether we will see a massive deployment of EV's or not. Today a question like this requires a much more holistic view. The cost of purchase and ownership must be taken into account alongside the impacts to health, environment and climate. Impacts on the economy and import of fossil fuels have become very important arguments as well. From this angle, the question can be answered confidently with a: "this is a real possibility".

Battery costs are going down by 8% per year and there is a wide consensus that by the mid/ late 2020's the cost of ownership of EV's will match those of ICE vehicles, and the latter will get more expensive due to tighter emission regulations worldwide. Avicenne Energy, one of the leading global consultants on rechargeable batteries, expects a battery price around 200€ per kWh in 2020 at pack level. The announced Tesla Giga factory price at pack level is expected to be below 150€ per kWh. Robert Bosch expects a doubling of the energy density between 2010 and 2020. They also point out that, through optimised energy management at battery and vehicle level, the reduction of energy requirement for an average car is from 20 kWh for 200 real world kilometres to 12 kWh. For a realistic range of 200 km this means going from a 44 kWh battery weighing 500 kg to a 24 kWh battery of 100 kg. These developments will continue after 2020. As predicted by many OEMs, a larger range will also become affordable by that time.

THE RAPID DEFLATION OF EV COST MAY CAUSE LOWER DEPLOYMENT RATES

All stakeholders in the process are faced with the fact that EV's will become more attractive and lower costs will arrive very rapidly. For authorities, from a societal point of view, this means that given the potentially large benefits and high competitivity, offering a temporary support for EV technology is justified. ICE technology, on the contrary, is getting more expensive due to stricter regulation especially for CO_2 or fuel economy requirements. This cost increase is not linear; a 90 g/km CO_2 target may cost an extra 1500€ per car whereas 70 g/km could cost as much as 4000€. It means that the EU has a powerful mechanism to improve the attractiveness of EV's by setting a challenging CO_2 target. However this leaves consumers with the dilemma: do I buy now or should I wait a few years to buy a better EV at a lower cost. Also second hand value may decrease rapidly. For OEM's one of the questions will be whether to aspire leadership for EV's or to wait and benefit from the cost reductions which will take place. However, these cost reductions will only take place in full when sufficient volumes of EV's and batteries are being produced.

ELECTRIC VEHICLES ARE NOT SMART PHONES AND INNOVATORS OR EARLY ADOPTERS DO NEED SUPPORT

EV's represent a technology which is potentially superior. However replacing a technology which has been optimized for 100 years and which has offered enormous benefits is not something which happens overnight. As EV's are still too costly and surrounded by uncertainties, OEM's will make the transition to EV's only when they are forced to do so. This can be through regular market mechanisms where new competitors come in or through regulation. Tesla is the best example where market mechanisms have had some effects. In several countries the Tesla Models S has become a successful competitor in the luxury car sector. However in other sectors this is not happening because the battery cost is too large.

In discussing whether it is justified to provide support to new technologies from a societal point of view, several points have to be taken into consideration.

It is argued that all major technology transitions have been successful because government intervention and support have been given. Many examples can be found from the technologies which have been developed by, for instance, NASA or ARPA in the US. They have greatly benefitted commercial organisations and society. Also examples in the energy sector show that transitions only take place when governments commit significant resources and take leadership. Nuclear energy would never have, and still today will not happen, if no government support is given. Without such support solar and wind energy would never have become the competitive industry which it is today in many places. Germany would not have taken the lead in developing such a large market and manufacturing base. However at certain times support is no longer justified. Nuclear energy has failed to become the low cost and carefree solution for our energy problems and therefore it is no longer justified to maintain this industry at taxpayers' expense. For EV's we are still far from being able to draw the final conclusion.

The technology adaption curve of Roger Everett shows that the market introduction of EV's is still carried by innovators. Current sales are still below 1% of the total market for passenger cars and, looking further, we see that in most markets only a handful of recently introduced models represent 80 or 90% of the total EV sales. Growth rates however are in double digit and higher than almost any new technology. It is often argued that EV technology has reached maturity and as a result does not justify support. This is in sharp contrast with the phase we are in which is still the very early market introduction phase.

The reality is that 1) the EV as a product is still in its very early product development life cycle and 2) the EV market is also still in that early phase when mostly innovators are buying EV's. In other words, although very promising and developing at a very rapid pace, the EV market development is still very fragile and truly needs support in order to become successful.

A successful development of the EV market needs government leadership and support as well as a coherent approach which aims at the people who are most likely to buy in the new developments. At present those are still the "innovators" and "early adopters".

"Innovators" are willing to take risks, have financial liquidity, are social and have close contact to scientific sources as well as interaction with other innovators. Their risk tolerance allows them to adopt technologies that may ultimately fail.

"Early adopters" have the highest degree of opinion leadership among the adopter categories. Early adopters have a higher social status, financial liquidity, advanced education and are more socially forward than late adopters. They are more discreet in adoption choices than innovators.

"Early majority" adopt an innovation after a varying degree of time that is significantly longer than the innovators and early adopters.

Authorities have many tools available for the stimulation of EV technology adaptation, be it with direct stimulation of EV's or by defining stricter requirements for ICE vehicles. Virtually all technological innovations in the automotive industry start in the top segment and trickle down later. Interestingly electric vehicles have been developed and positioned as small and expensive cars.

Policies stimulating the development of EV's in the expensive car segments, where battery cost is relatively small as well and incentives could be lower, could prove an effective means to promote EV's. Tesla has proven that luxury EV's have a very high performance and adequate range at a competitive price and create a market buzz which makes the car highly desirable. In Europe, the development of a strong EV market could become an important industry growth.

Live Urban Demonstrations of ZeEUS – Zero Emission Urban Bus System

Launched in November 2013, ZeEUS (Zero Emission Urban Bus System) is a flagship EU project coordinated by UITP, which aims to test a wide range of different innovative electric bus technologies and charging infrastructure solutions. This initiative is co-funded by the DG Mobility and Transport of the European Commission with a budget of €22.5m (€13.5m EU-funded). ZeEUS brings together 40 leading partners who represent the entire stakeholder spectrum. The project, which will run until April 2017, will test full electric, plug-in hybrid and battery trolley buses in live operational demonstrations evaluating their economic, societal and environmental benefit. Core demonstrations will take place in 8 European cities: Barcelona (Spain); Stockholm (Sweden); Glasgow, London (UK); Bonn, Münster (Germany); Plzen (Czech Republic) and Cagliari (Italy). In total, 35 plug-in hybrid, full electric and battery trolley buses built by the European bus manufacturers more active in electrification will be tested by local operators.

The project also foresees a set of activities to develop standards, support local regulations and identify financial tools in order to foster the introduction of electric buses in the European cities fleets. Demo groups, which consist of stakeholders conducting demonstrations, will test e-buses in real operations and will be able to provide practical answers to cities, public transport operators and authorities who are interested in introducing electric buses but would like to gain more insight before taking the decision to deploy and invest.

The first core demonstration was launched in Barcelona on 14 October 2014. Within this demonstration, lead by the local operator TMB (Transports Metropolitans de Barcelona), two full-electric 12m buses i2e from IRIZAR have been already put in service, while two 18m articulated plug-in hybrids by SOLARIS will come in 2015.

After Barcelona, it was Stockholm's turn to showcase their Volvo 12m plug-in hybrid buses during Stockholm Fair on 28 October 2014. The presentation precedes the Launch Event scheduled on January, during which the buses will be presented to the citizens, city officials and local stakeholders. As part of the ZeEUS project, an Observatory will be set up to closely follow the developments of selected tests of high capacity urban electric buses. This activity will help provide the entire stakeholder spectrum with the global picture of the electric bus market. The ZeEUS Observatory will involve Observed Demonstrations, which will contribute to the discussion about some key topics of electric bus systems and the key phases to achieve market introduction.

All information about the project will be presented every year in an eBus publication in order to provide key insights into how the market of electric bus systems is progressing. The ZeEUS Observatory will also organise an annual ZeEUS Electric Bus Forum in Brussels to showcase Demos' electric bus developments along with workshops dedicated to the key topics of urban electric buses. A Call for Observed Demonstrations has been launched. Should you wish to apply, please contact stephanie.leonard@uitp.org

Visit our website: **www.zeeus.eu**
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Batteries and e-mobility: inseparable twins


Alfons Westgeest, EUROBAT

Energy is a key requirement for modern societies; it keeps lights on, brings transportation and enables the production of goods. However the balance of supply and demand is increasingly challenging. Several battery technologies are available and can contribute to low carbon solutions and a sustainable future in Europe.

Europe relies heavily on external sources for imports of gas and oil; the transition to greener, independent and sustainable energy system is an absolute need.

In October the European Council decided the principles on the 2030 Climate and Energy Package 2030. The ambition is a shift to renewables, with more and more European electricity being generated by wind turbines, hydroelectric power, solar energy, and other forms of renewable energy. At the same time, green electricity could gradually reduce fossil fuels in the transport sector. This long term transition could benefit the environment, reduce Europe´s dependency on import of fossil fuels but also create jobs and growth: according to "Fuelling Europe´s future", a 2014 report issued by the European Climate Foundation based on economic impact studies and the input of various stakeholders and research institutes. The report forecasts that up to 1.1 million net additional jobs could be generated by 2030 if this transition will take place[1].

As reported in its 2011 White Paper Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system[2], the European Union is committed to reduce CO_2 emissions from the transport sector by 60% by 2050 compared to 1990 level. Batteries have a fundamental role to play in this transition, and can respond to the different needs and demands of a transport sector with an increased degree of hybridization and electrification. The various types of batteries used in vehicles include lead, lithium-ion, nickel-metal hydride and sodium-nickel chloride; each of them has different chemistries and characteristics. Batteries can bring significant benefits to the performance and energy efficiency of traditional combustion engine vehicles, while they are at the core of vehicles with a high degree of electrification.

Advanced lead-based batteries are fundamental for vehicles with initial levels of electrification, whereby conventional combustion engine vehicles are supplemented with start-stop and micro-hybrid technologies, which thanks to innovation and development can improve overall efficiency and performance. Not only is this battery technology used for SLI functions to power a vehicle's starter motor, lighting, and ignition system but also providing power to the vehicle's increasingly demanding on-board electronics. Advanced lead-based batteries now provide

EUROBAT

start-stop functionality, and other micro-hybrid features in a growing proportion of new European vehicles, lowering their fuel consumption by 5-10% as stated in a joint industry report[3]. Thanks to their increased charge recoverability and higher deep-cycle resistance, advanced lead-based batteries can also offer regenerative braking in micro-hybrid and mild-hybrid vehicles, boosting vehicle´s acceleration with stored energy.

For vehicles with a higher degree of electrification, batteries play a more active role: in full-hybrid vehicles (HEVs) it is additionally used for a certain range of electric driving while in plug-in hybrid (PHEVs) and full electric vehicles (EVs), high voltage battery systems provide significant levels of vehicle propulsion, either for daily trips (20-50 km) in plug-in hybrid vehicles, or as the only energy source in full electric vehicles (100 km+). In plug-in hybrid vehicles, the battery must also provide hybrid functions when its capability for electric drive is completed. For these classes of vehicles, nickel-metal hydride (HEVs), lithium-ion (HEVs, PHEVs, EVs) and sodium-nickel chloride batteries (heavy duty PHEVs and EVs) are the preferred battery technologies thanks to their fast recharge capability, good discharge performance and lifetime endurance. At the same time, hybrid and electric vehicles also use a 12Volt electrical system for controls, comfort features, redundancy and safety features which are supplied by a 12Volt lead-based battery.

Looking ahead therefore all the above mentioned battery technologies must be able to play their important role in the decarbonisation of the European transport sector; their differences and their ability to cope with different technical demands are their main strengths. The global and European markets for start-stop and micro-hybrid vehicles are expected to increase significantly over the next decade, driving also an increased demand for advanced lead-based batteries. Also the demand for hybrid, plug-in hybrid and full electric light commercial, buses and heavy duty vehicles is set to increase: the continued development of advanced traction batteries (mainly lithium-ion and sodium-nickel chloride) for hybridised and electrified powertrains is likely to be at the same time cause and consequence of this increase.

The continuation of excellent research & development in Europe will be made possible by retaining a strong European battery manufacturing industry. European policy making must be coherent and support the industry and its supply chain to increase the learning curve for all battery technologies. The near future benefits of such policies will lead to systems that can deliver higher energy and power density, lifetime and charge acceptance for full hybrid and electric vehicles. At the same time, fuel efficiency requirements will drive improvements in advanced lead-based technologies. Overall, the performances and competitiveness of batteries will improve considerably in the near future, playing a fundamental role for the decarbonisation of the European transport sector and the transition to a greener, independent and sustainable transport system.

1 Cambridge Econometrics (CE), in collaboration with Ricardo-AEA, Element Energy etc.: "Fuelling Europe´s future", p. 4.

2 White Paper Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM(2011) 0144

3 EUROBAT – ACEA/JAMA/KAMA – ILA: A review of batteries for automotive applications, 2014, p. 6.

EUROBAT, the Association of European Automotive and Industrial Battery Manufacturers, acts as a unified voice in promoting the interests of the European automotive, industrial and special battery industries of all battery chemistries. With over 47 members comprising over 90% of the automotive and industrial battery industry in Europe, EUROBAT also works with stakeholders to help develop a vision of future battery solutions to issues of public interest in areas like e-Mobility and renewable energy storage.

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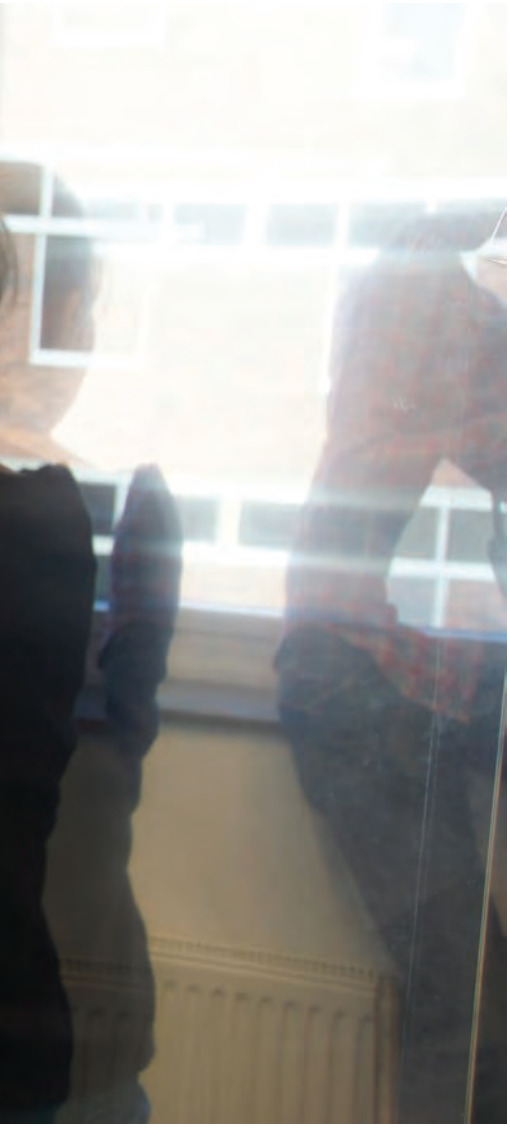
The Swedish Hybrid Vehicle Centre – A catalyst for new vehicle technologies

The Swedish Hybrid Vehicle Centre (SHC) is a national centre of excellence which unifies Sweden's competence in the area of hybrid and electric vehicle technology. We serve as a platform for interaction between academia, industry and society and aim to maintain Sweden's position among leading nations in automotive research and development.

Doctoral student Verena Klass at KTH Royal Institute of Technology investigates how Li-ion batteries behave under electric vehicle operation. The research is financed by SHC. Photo: Henrik Lundgren

The driving force of SHC is to explore hybrid and electric propulsion systems, find the best technical solutions and analyse the subsystems. We finance industry relevant research carried out within the centre, and conduct studies of different hybrid and electric vehicle technologies to assess their potential. Our activities make us one of the stakeholders in national and international discussions within the electric and hybrid vehicle area.



A CENTRE FOR RESEARCH AND COLLABORATION

Our research concentrates on four important areas: *System studies and tools, Electrical machines and drives, Energy storage and Vehicle analysis*. The projects that we finance cover the different aspects of electric and hybrid vehicle technology, ranging from the vehicle in relation to its environment, over such topics as diagnosis and energy management, integrated charging, safety and charging infrastructure, down to details in the cells of lithium ion batteries. We manage a national doctoral student network and finance a number of doctoral students to provide industry and academia with competence.

Keeping pace with global progress, SHC hosts a daily newsletter for Swedish authorities, industry and academia, which covers the international development of hybrid and electric vehicles. In addition, we synchronise Swedish research on fuel cells, initiate studies and analyses on this increasingly important technology and convey the results.

SHARING AND SPREADING KNOWLEDGE

Sharing knowledge is just as important as building the knowledge itself. To create room for the exchange of ideas, SHC regularly arranges workshops within our fields of competence and disseminate findings from research projects and investigations through seminars and lectures. We also give courses in electric and hybrid vehicle technologies, intended for doctoral students and for the industry.

PROMOTING INTERACTION AND EXCHANGE

SHC involves five technical universities and three Swedish automotive manufacturers. By facilitating a network, including specialists from industry and academia as well as doctoral students, we build a common competence base for our partners. Linking related research projects together, we promote cooperation and exchange of knowledge across disciplines and workplaces and highlight the shared interests of our partners.

SHC's partners are leading Swedish vehicle manufacturers and technical universities.

SHC is financed by its partners and by the Swedish Energy Agency.

www.hybridfordonscentrum.se

The World leader of emobility

By Rune Haaland, President, Electric Vehicle Union.

Norway has got 40 000 registered EVs driven by renewable energy only. Hydro and wind produce 99% of the total electricity production. The energy is stored in huge water reservoirs giving Norway the capability of supplying both effect, energy and quality. Under these conditions, you may understand why the Norwegians love electric devices of all kind, and electric vehicles in particular. 15% of the new car sale market is electric and is predicted to rise to more than 20% next year.

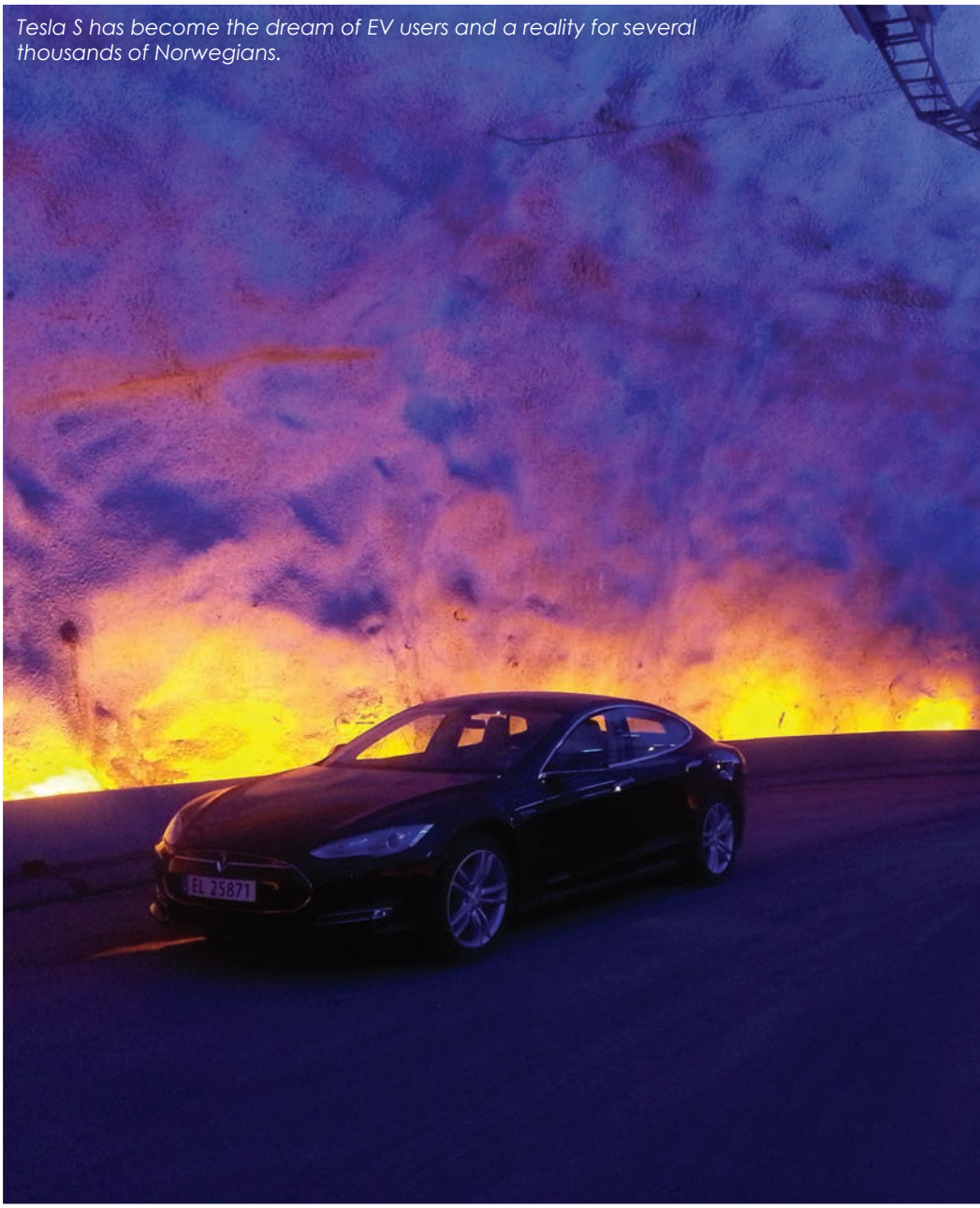
The half Nissan Leaf with the Mayor of Oslo, Fabian Stang (right), EVU President Rune Haaland (middle) and Snorre Sletvold, Secretary General of the EV Association.

THE EV CAPITAL

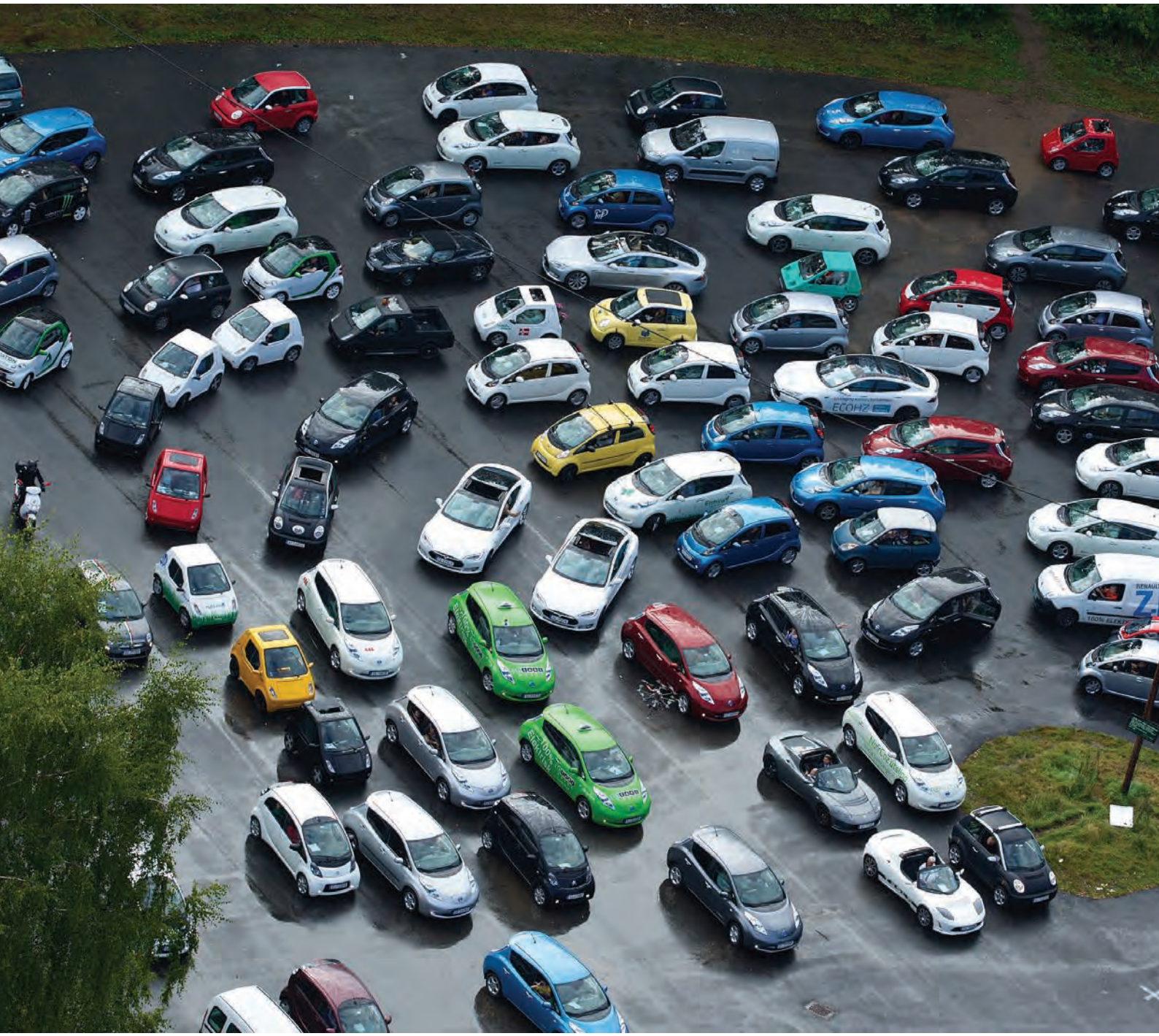
Norway is the country and Oslo is the EV Capital of the world. The longest row of electric vehicles established a world record of 255,5 EVs driven by renewable power from the oldest existing hydro power plant owned by the Municipality. Oslo is now replacing its entire car fleet of 1000 cars with zero emission EVs from Mitsubishi, Nissan and Peugeot. The city owned bus operator, Ruter, has started to investigate electric buses, and the taxi companies have started to explore the use of Nissan Leaf and Tesla S.

POLLUTER PAY

Strong EV policy based on the Polluter Pay Principle, established by the former Prime Minister of Norway, and former Leader of the World Health Organisation, Gro Harlem Brundtland, is the medical doctor and lady behind the World environment and Health policy. Mrs. Brundtland was the leader of a United Nation world report on sustainable development



Tesla S has become the dream of EV users and a reality for several thousands of Norwegians.



delivered in 1986. One of the key policy tools recommended was to implement the Polluter Pay Principle in all nations. This policy has been supported by a huge majority in the Parliament.

FREE PARKING

You can see EVs moving, charging and parking in all streets of the capital. The Municipality of Oslo have established a free of charge public infrastructure with a basic power of 3,6 kw for each charging point, both in commercial districts and residential areas. The Municipality gives a 50% contribution for semi public charging point on private property. Free parking was decided by the Norwegian Parliament for public roads in 1996 after a five year campaign driven by the Bellona Foundation, heavily backed by the pop group AHA.

TOLL ROAD ACCESS AND REMOVAL OF CAR TAX

Oslo established a toll road around the city in 1990 and Bellona started a campaign for electric vehicles to improve the air quality in the cities. No pollution – no tax was the simple logic from Bellona. This logic was adopted by the labour government and decided by the Parliament in 1996. Sissel Rønbeck was the Minister of Transport at that

Mayor of Oslo, Fabian Stang (Conservative Party) on eBike in front of 255,5 EVs. The 0,5 is a half Nissan Leaf.

time and Mrs. Brundtland was the Prime Minister. The Labour Government removed the car tax on EVs in 1990 beginning with the imported conversion of a Fiat Panda for the Bellona Foundation and the pop group AHA. The Minister of Finance, Gunnar Berge, removed the car tax for this particular car, and the Ministry of Finance implemented this decission into the State Budget for 1990 – 25 years anniversary for the polluter pay principle on cars.

BIDIRECTIONAL CHARGING

Level 2 Smart charging means that the EV can back up the electricity grid by sending power the other way. The electricity can move both ways if we want it to do so. Such technology was developed in Japan because of the earthquake and tsunami. Both Mitsubishi Imiev and Nissan Leaf can cook rice using the CHAdeMO connector. The Euro Leaf is prepared for bidirectiona power. Bidirectional DC charger prototypes for home charging will be tested next year in a pilot project with a fully integrated vehicle to home solution. The first generation commercial bidirectional AC and DC chargers will be ready for testing springtime next year. Private cars are normally parked more than 95% of the day, meaning that they could be able to do more than driving. Home charging and public charging with next generation chargers do open a new world of smart and convenient use of renewable energy.

SMART LIVING

Efficient energy use in buildings and transport is the modern hightec green way of living. This concept is a powerful tool for business development and job creation and will improve the economy of the EV users. Roofs of a buildings with a southern direction will be equipped with PV panels, and connected to a stationary battery and smarthouse technology. The purpose is to save solar energy during daytime, connect vehicles and move the electricity freely in all directions. Connectec EVs will be able to collect more energy and supply the house or the grid if needed. Norway will capture the spinning reserve for housing and grid backup. Smart Living is the modern way of ecofriendly lifestyle.

ELECTRIC VEHICLES

By Frédéric Vergels, Organiser EEVC 2014

DEVELOPMENT OVER THE LAST 15 YEARS

When I joined AVERE, the European Association of Battery, Hybrid and Fuel Cell, Electric Vehicles Secretary General, in 1997, there was a real enthusiasm for electric vehicles. The California Clean Air Act had just been issued and required the car manufacturers to have at least 10% of their annual production alternative fuel-propelled by 2000. At that time GM had launched the EV1 and PSA was inaugurating a new assembly line dedicated to the 106 electric. Everybody was very optimistic for the future.

Unfortunately, under the pressure from the petroleum lobby, the Bush administration that came on the power in 2000 reshaped the Act, so that its objectives became vague and incoherent. All the OEMs reduced their efforts towards the development of electric cars. The story of "who killed the electric car?" was debated in the US and in Europe, and there was much less real will to put EVs on the market.

For the next 5 to 7 years, all the efforts were dedicated to the development of fuel cell vehicles. However, concerns have rapidly arisen regarding the costs of the technology and on the real impact on the environment. Life Cycle Analysis has showed that for fuel cell technology, being pure electric is much less polluting on a global level. In parallel, under the pressure of the "Prius" phenomenon, there was a lot of research into hybrid vehicles too.

Since 2009, mainly because of public opinion becoming more and more concerned by the climate change issue, and the rise in the oil price, together with the problem of energy dependency, authorities started again to promote the development of alternative fuelled vehicles. Research and Developments efforts were thus again focused on production and this leads to the series of new Electric Vehicles that are now entering the market.

MAJOR TRENDS IN ELECTRIC MOBILITY

I feel we should make the distinction between different types of mobility. The issues involved are the overall benefits, peoples' choices and the length of the journeys involved: short, medium and long distances.

In the short-term, I feel that urban mobility will become more and more electric. Both for persons, for which we see more and more small dedicated vehicles entering the market, and goods, for which authorities are now realizing the freight platform logistics completed with electric delivery vans and electric vehicles are a solution that combines mobility, silence, protection of the environment and cultural heritage.

For medium distance journeys, hybrid and plug-in hybrid vehicles will become more and more popular, while for long distances, especially for goods transport, I see no alternative that the traditional gasoil [known as diesel in some member states - Editor] On this last point, I feel I should mention the Tesla EV and the development of their Supercharger network. Last Spring I drove one ModelS from Stavanger in Norway to Paris, a trip of nearly 1800 Kms in two days with no problems!

THE DIFFERENCES IN THE EV MARKET IN CHINA, JAPAN, EUROPE AND NORTH AMERICA

The major differences are both cultural and geographical.

The Chinese market is growing

very fast. It seems that almost every day, new actors are entering the sector. The products are focused on urban vehicles, due to the fact that most of the trips are inner-city. For the moment, the demand is such that the Chinese manufacturers only respond to their domestic market. However, they are gaining expertise and will attack other markets sooner or later. Let's hope that, at that time, we will be ready to compete!

The European and Japanese markets and approach are more similar. Pure electric vehicles will cohabit with hybrids since the needs for are both for short or mid distances.

Last, the North America market is different because of the fact that the daily trips are much longer. There, again with the exception of Tesla, I see hybrids taking the lead while, obviously light electric vehicles will continue to expand in places like resorts.

THE EEVC 2014

When attending congresses on electric vehicles I am always surprised that they are generally dedicated to only one aspect of the whole transport issue.

My point of view is that the issue is global, and it is very important to develop an arena where everyone's needs and constraints are well understood by everyone else. This is the only way to make sure that the most appropriate products and technologies for Battery, Hybrid and Fuel Cell Electric Vehicles are selected for market introduction. EEVC aims therefore at providing such an arena by gathering the different actors, from industry, research institutes, NGOs and public authorities.

The Congress is a unique opportunity to meet top decision makers as well as representatives of all the major related European Associations, who will also share their vision there and seek ways to develop synergies to foster the development of eMobility.

Too often, Congresses and Conferences deliver no real output. Here, at the closing session, we intend to present a summary of the discussions, with recommendations for a faster introduction of electric vehicles. It will be aimed at the European Authorities, but also to the Regions. I think these latter are too often forgotten in the discussions and that this is a mistake because they are large enough to be addressed. Close enough to the cities, for which developing incentives and policies for market introduction are really important, and large enough to have a valid voice at national or even supra-national level. Furthermore, Regions also represent entities which are homogenous both in cultural and geographic terms.

As you will have seen from the programme, lessons learned, best practices, infrastructure, barriers and market requirements will be hot topics. All of them are issues to be analyzed for a fast market introduction of the technology.

EEVC ATTRACTS INCREASING INTEREST

I have organized conferences in this field for a long time and I think I always manage to give them a "special touch", appreciated by delegates. In order to set-up a coherent and informative programme, as well as to attract good speakers, you need to know the field you are dealing with. In my opinion, too may conferences are organized by event companies who have no intrinsic knowledge of the issues their conferences are dealing with.

Anyway, to me, as I said earlier, one of the major differences is that we have the entire value chain represented at EEVC. The other thing is that we hold it in Brussels. It is extremely important that European Authorities and industry collaborate over medium and long term in bringing transportation into this new electric drive era.

The European dimension is really represented at EEVC. For example we are organizing the now already famous EU Project Day on eMobility providing a complete overview of the different programs and related projects supported by the European Authorities and fostering the development of eMobility.

This year, EEVC takes places at a time when the European Commission will launch new related call for projects. This will therefore be a unique opportunity to identify possible actions, overlaps, synergies and/or gaps.

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Supporting Energy Saving in Residential Buildings: A multi-benefit program

By K. Mathioudakis, Secretary General for Energy and Mineral Resources, Ministry of environment, energy and Climate Change

Promoting energy saving in residential buildings is a multi-benefit activity. Energy consumed in the residential sector is a significant part of total energy consumption (e.g.29.4% in Greece, 26.2% in EU, from Eurostat data 2012). Programs aiming to saving energy in residences are thus highly desirable within an overall energy performance improvement framework. One such program is the Greek "Energy Saving at Home" program. It provides financial incentives in the form of grants and interest-free loans, for energy-saving interventions in residences.

The program was launched in 2011 by the Ministry of Environment, Energy and Climate Change. It covers low energy performance buildings, classified at class D or lower (classes according to the national code for energy performance of buildings). The form of benefit depends on the owners' income. Grants are escalated in 70%, 35%, 15% of cost, for lower, middle and higher income respectively. All participants are eligible for an interest free loan, for the remaining part of the costs.

The program has some particular

features that maximize its effectiveness: Interventions have to be chosen from a list that an Energy Inspector draws, while their completion has to also be certified by an Energy Inspector. The provision for ex-ante and ex-post Energy Inspections ensures that interventions are materialized in a sound and optimal way, since they are not left to the owner's discretion but are under the guidance of appropriate specialists. It also allows for the establishment of a database by collecting data as to the effect of the program, valuable for assessing overall energy targets and future design of energy efficiency interventions. The involvement of the Inspector is also useful, in assisting beneficiaries to prepare the necessary documentation. For simplification of the process, payment for the interventions is directly made to the technicians performing them. For a wide coverage of beneficiaries, maximum Eligible Budget per application is 15.000 €.

The program set-up, from the State's side, has also the interesting feature that private banks have a direct involvement and participation. They contribute two thirds of the funds for loans, the remaining one third being contributed by State structural funds, managed by ETEAN (Hellenic Fund for Enterpeneurship and Development). The part of the State constitutes a "revolving fund", as the amount lent to beneficiaries is returned to the fund after repayment. The banks manage the citizen's applications, notably the citizen gets in contact with the bank of his/her choice and then all the process for financing the project is managed by the bank.

In order to maximize effectiveness, the program has been designed so that it addresses primarily energy-devouring buildings. A prerequisite for eligibility is improvement by one energy class or energy savings by 30% of the reference building. On the other hand, specific interventions are considered eligible, such as replacement of existing frames (windows, doors),shading systems, installation of heat insulation, burner/boiler upgrade, solar water heating, automatic heating controls.

The program "Energy Saving at Home" is an important tool for energy upgrade of existing buildings, with direct benefit to citizens, but also to employment and the economy. A feature of energy interventions in buildings is that they involve a significant local added value. Building materials and equipment are almost exclusively produced locally, while building interventions are relatively work intensive, needing engineering and construction work. Therefore, buildings energy interventions constitute a pillar of the construction sector, which may be very significant in times of an economic crisis, when primary construction is badly hit. The data collected from implementation so far, allow concrete estimations of such effects. For example, it is estimated that at the current rate of implementation, 2.500 new jobs are created annually.

Finally, processing the data already collected, some conclusions can be drawn as to the program's effectiveness and application characteristics. The size of the average household participating is 106 square meters, average cost of intervention cost 10,000, average grant 53% of cost and average annual primary energy consumption reduction 42%. The majority of the applications concern buildings, certified in the H class; therefore it has covered primarily high-energy consuming buildings.

Before closing, some comments should be made as to the process of designing and setting up the program, in terms of the experience gained from its implementation. First, it should be mentioned that after its first launch, citizen's response was not as expected, thus a revision of the terms had to be effected twice. It reduced bureaucracy, extended the criteria of eligibility and increased the amount of direct granting. Even though these changes resulted to a tremendous increase of interest by the citizens (to the point that the eligible applications today require funding beyond the originally assigned), the experience of program's implementation shows that further improvements are possible and feasible, to make the it more accessible and increase its scope of application. Currently, the extension of the program to the forthcoming Fund Management Period is under elaboration.

Potential growth of renewables and corresponding progress in Greece

By Eva KAILI, Member of the European Parliament

According to the Hellenic Wind Energy Association, Greece has an estimated wind potential between 8.5 GW to 10 GW (with the existing grid planning), while the under implementation National Renewable Energy Action Plan foresees the wind power capacity to increase from 1.6 GW in 2011 to 7.5 GW in 2020 (International Energy Agency (IEA) 2011).

Greece currently imports the majority of its oil and gas requirements and security of supply is one of the key objectives of the national energy policy and one of the major geopolitical threats that the region and the EU are facing.

In addition to the above positive for RES facts, the strengths of the Greek RES market include:

- ideal climate conditions for wind and solar energy,
- a proven and profitable track record of existing RES investments in the last 20 years,
- the successfully operating Feed-In Tariff system (long term Power Purchase Agreements),
- substantial investment subsidies
- the actual need and the corresponding decision and commitment of the Greek Governments to replace some of the existing old electricity production facilities that utilize lignite and oil, with clean technology and RES.

Since 2010 Greece, has significantly improved the RES related institutional framework and through the necessary

laws, presidential decrees and ministerial decisions the country has effectively committed to the EU set targets and the Kyoto Protocol Agreements.

The new legislation included as an objective, to facilitate small projects and to accelerate the licensing procedure of the larger RES projects, since bureaucracy and red tape was the main problem investors used to complain about. To this end, the previous multiple environmental licensing stages were merged and renewable energy project zoning (land use) was effectively revised.

The main elements of the 2010 RES legislation improvements include:

- Clear and ambitious targets for each renewable energy source, providing long-term clarity to investors and industry on the market volumes.
- A significant reduction of the number of administrative steps involved in the permitting process ("a one-stop shop"), providing clarity on the administrative process.
- Clear administrative deadlines, ensuring that developers will receive decisions after a reasonable pre-determined and fixed time.
- A clear tariff structure, ensuring a stable return on investment, complemented by financing support.
- A reward system targeted towards local communities, ensuring benefits to the local communities and individuals.
- Further detailing of a spatial planning policy, ensuring clarity and non-recourse for the proposed project locations.

The Greek Energy Framework Policy follows the requirements of the "EC 20-20-20". In principle it means that Greece must achieve by year 2020: 20% reduction of carbon dioxide emissions, 20% penetration of renewables in the energy balance, 20% growth of energy-efficiency savings.

These objectives will be met, through a number of stated government policies and reforms that include, investment in RES, network and grid improvement, privatizations, energy efficiency of buildings, public transportation initiatives and upgrades, extensive institutional reform, etc.

The new institutional RES framework and the demonstrated commitment, has already proven its effectiveness even through the period of the Greek crisis and fiscal instability.

Effectively, during the last years electricity production from RES has almost doubled in share. According to the Greek authorities, a stunning 25.000 MW of renewable energy projects have acquired a production license, 1.900 MW an installation license and 2.200 MW an operation license.

Wind projects account for about 90% of the capacity of the licenses, so wind power remains the dominant form of renewable energy, with 1.5GW installed capacity, followed by solar (460MW), small hydro (206MW) and biomass (44MW). The contribution of RES in the electricity mix in 2012 reached 14% with an increase of 23% from 2011. Note that in 2008 the RES contribution was 5% plus a 4% from the old hydro plants.

As a result of the improved legislation and operational framework for RES investments in the recent years, the RES industry is one of the few remaining profitable sectors of the Greek economy.

What is missing and what is needed are large scale RES projects that will have a big effect on the proposed "EC 20-20-20" targets.

Unfortunately, these large projects cannot be financed by the Greek distressed banking system or the existing Greek Energy companies or the indebted Greek state and definitely require foreign investments and specific EU financing and support tools.

A number of RES projects have been discussed and investigated in the last five years; the majority of them are wind energy production related, with a potential capacity of over 2.500 MW. Other projects include PV and solar thermal with a total project capacity of more than 500 MW.

It is important that the Greek side and the EU relevant authorities work together so that these projects and the holistic Greek policy approach will be taken in account by the EU Commission, the experts and the other relevant bodies involved in the process of designing the new EU energy strategy that is under consideration.

Eva KAILI

Member of the European Parliament (2014-2019)

Full member of the Committee Industry, Research and Energy (ITRE)

Vice-Chair of the European Parliament's Science and Technology Options Assessment body (STOA)

ITRE representative on the STOA Panel

ΚΑΠΕ CRES | CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING

Challenges and objectives of the Greek energy policy

Greece is currently undergoing a systematic effort of recovering after a six-year period of continuous and deep recession with severe effects on the society and the economy. The energy sector in Greece is called upon to play a fundamental role in this recovery process, by contributing to the social welfare and development of all sectors of the Greek economy.

Ensuring energy supply is crucial in order both to maintain balanced social and economic conditions and to secure the competitiveness of the country. This revolves around three main pillars:

- maximizing the exploitation of indigenous energy potential,
- identifying and differentiating imported sources of supply and
- ensuring adequate energy reserves for use during potential supply crises

Moreover, the current economic environment stresses out the urgent need for cost effectiveness both in the supply and the demand side of the energy sector. Priority should be given to ensure reliable, affordable and adequate supply of energy to all consumers and enterprises, to strengthen their role in the market. To make this possible, a wide range of energy options for consumers should be ensured and all imbalances in regards to their access to energy should be normalized. The aim is to increase competition and to mitigate as much as possible market distortions and market power.

The Greek energy strategy, considering the above, is consistently formulated under the following challenges:

1. Security of energy supply and diversification of energy mix
2. Protection of final consumers through energy products and services at a tolerable and rational cost
3. Energy poverty mitigation
4. Effective functioning of internal energy market
5. Protection of the environment and climate change mitigation
6. Improvement of energy efficiency in all sectors of final consumption
7. Protection and improvement of competitiveness of the Greek industry
8. Sustainable development of all sectors of the economy

These challenges will be confronted through coordinated actions which will span across four major areas, namely the improvement and update of the legislative framework, the implementation of infrastructure projects, the development and promotion of market mechanisms and the optimum exploitation of domestic energy sources (both conventional and renewables) considering the technological developments of energy technologies.

To this end, Greece has committed to foster the high penetration of RES in the Greek energy system and improve energy efficiency in end use, as presented in detail in the respective national action plans.

In the field of electricity generation from RES, focus has been placed on both technologies that have significant physical potential and high commercial maturity (i.e. wind farms and photovoltaics). However, the rapid reduction observed in the development cost of photovoltaics (PV), combined with disproportionally high support foreseen in the previous years, has led to an abrupt increase of the investing interest due to the high profit margin and subsequently to a significant growth of the PV installed capacity, well over their estimated development, projected in NREAP.

However, this should not act as an indication for the evolution of renewables in the short term, since the growth rate of new RES installations is not expected

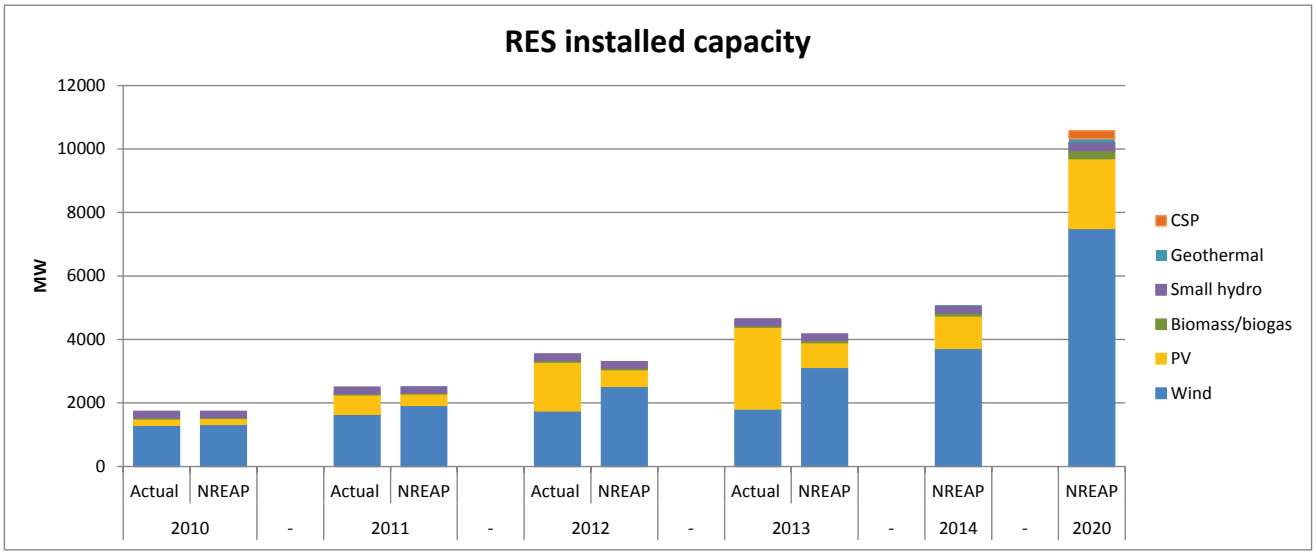

Figure 1. RES-E installed capacity per technology from 2010 to 2020

to be as high in the following years. In view of streamlining the support scheme for the ongoing promotion of RES and taking into account the state aid guidelines, a process for the reformation of the support scheme for electricity from RES is currently in progress. Alongside, actions are taken to ensure the enhancement of the transmission and distribution system and to remove all barriers related to the licensing procedure so that greater penetration of RES is enabled.

Moreover, the targets set for the penetration of renewable energy in the national energy system in 2020 may have to be revised in the near future, in the framework of the upcoming national energy roadmap to 2030 and the assessment of the national energy mix.

As regards energy efficiency, it is expected to exhibit significant improvement in the following years, which will stem from the implementation of a planned set of targeted measures.

These mainly focus on the energy upgrade of buildings that will be further supported through new market mechanisms and financial support tools. The national energy policy seeks to develop a smart system for the management of energy production and demand, which will be expected to contribute to the implementation of the country's energy challenges.

The new planning, in view of the urgent need for a more cost-effective energy mix, will consider, among others, the degree of effectiveness of implemented policies, the actual penetration of specific RES technologies in the last years, the development of investment costs for all RES technologies, as well as the consequences of the economic recession both in shaping the energy demand of end use sectors and in the investing environment.

The top priority and objective of the Greek energy policy remains finding, securing and managing the most appropriate sources of energy supply, in order to ensure a safe, smooth, seamless and reliable coverage of the country's energy needs in the future and taking into account the protection of the Greek citizens and economy.

The Centre for Renewable Energy Sources and Saving (CRES) is the Greek national entity for the promotion of renewable energy sources, rational use of energy and energy conservation.

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