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Secretary General, ESPO

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Contents

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Foreword: Fault lines?

A huge crack is spreading across the Larsen C, one of Antarctica's biggest ice shelves. Since March of this year, the crack in question has widened to about 350 metres and lengthened by 22 kilometres; it is now about 130 kilometres long and the the area of ice that threatens to break off is about the size of Scotland. Since the ice itself is already floating, this event, though potentially disastrous for Larsen C, will not contribute appreciably to sea level rise; but the point is that this latest development has happened during the Antarctic winter, when the temperatures are supposed to be at their coldest.

With China and the US, the world's biggest GHG emitters now committing to ratify COP21, the articles by Knut Fleckenstein MEP and Isabelle Ryckbost in this issue are particularly timely. Fleckenstein focuses his attention on maritime transport, arguing for politics to take "a major role in increasing the incentives for "green" solutions", while Ryckbost illustrates some of the findings of a recent ESPO survey. Anticipating next year's inaugural Think Climate conference in Brussels, she also notes that more than 25 European ports nowadays provide incentives to greener vessels on the basis of the Environmental Ship Index (ESI) tool. Meanwhile, Lamia-Kerdjoudj Belkaid takes a look at the regulation of Non-Road Mobile Machinery, a sector of transport that we do not often feature. Commenting that the latest regulations cover the reach stackers and straddle carriers installed in most ports, she notes that FEPORT's objective was to ensure the sustainable greening of all non-road mobile machinery. Reviewing the importance of LNG to Europe's energy security, Vice-President of the European Parliament Adina Ioana Vălean explores recent developments in the global LNG market and argues that it is the market that will drive future success. This, she believes, will come from the disruptive effect of the emergence of Eastern Europe.

Regular contributor Hans ten Berge offers a very positive view of the future role of electrification of transport. Listing numerous advantages offered by EVs; and referring to initiatives such as the Platform for Electromobility and Gear 2030, he calls for an EU strategy for electro-mobility. No technology, he argues, can decarbonise to the same extent and scale as electricity.

Hervé Bernard explains the role of the European Energy Research Alliance (EERA) in the EU's Strategic Energy-Technology Plan (SET-Plan), the framework for achieving its energy objectives. A key factor, he tells us, is co-operation with industry and other stakeholders. And now, more than ever, Europe needs co-operation. June's momentous vote by the British people has to many observers highlighted the political cracks that are appearing across the continent. These might appear principally to concern people's reactions to migration, but it is clear that from Austria to France; and from Germany to Hungary, there is a great deal of discontent. And this discontent is every bit as threatening to Europe's political fabric as that crack is to the Larsen C ice sheet. For climate change does not respect anyone's borders.

Meanwhile, there is much more for you to read inside…

Michael Edmund
Editor

The way forward after COP 21

By Knut Fleckenstein, MEP

The goals are ambitious: The commitment the EU has made in Paris at the COP 21 of lowering the greenhouse gas emissions by 40% by 2030 goes beyond the objectives of the 2011 White Paper on transport. Achieving the White Paper's objectives would mean that emissions from international waterborne transport would only be 9.5% below the 1990 level in 2050.

Whereas maritime transport produces less emissions than other transport modes, growing transport volumes have led to a substantial increase in emissions over the past decades. As the volumes are expected to keep growing, it is clear that the environmental foot print has to be reduced considerably.

We need a comprehensive approach that does not only focus on ports but the whole transport system and that includes all stakeholders along the logistic chain. Shipping is of major strategic importance for the EU's economy. Therefore we need to strike the challenging balance between pushing for a greener framework and safeguarding the sector's competitiveness.

Yes, progress in the IMO is sometimes painfully slow, but I am still convinced that it is the right setting to deal with environmental issues. Unilateral decisions by the EU risk not to be implemented or to shift the competitive edge of our industry elsewhere. Take ETS and aviation for instance, we are just moving from one "stop the clock" to the next.

Discussions for developing a market-based measure for aviation are underway on the international level. Concerning the maritime sector, he EU as well as its individual member states need to be strong players within the IMO and push for progress there. Slow but inclusive progress can be worth more than unilateral attempts, which are bound to fail.

There are some policy areas however, where the EU can and should act in order to improve efficiency and lower emissions. Maritime transport and rail are two modes, which are considerably better for the environment than road transport. Yet, the major volumes are still transported by road.

In order to facilitate and push for a modal shift towards short sea shipping and inland shipping, we need a fully functioning internal market for shipping. In contrast to the other transport modes, there are many

barriers and custom formalities that put shipping at a disadvantage vis à vis other modes.

On the other hand, the ports themselves are undertaking many efforts to become more environmentally friendly. Especially for ports located in populated areas, this is not only essential for the environment itself, but also for the acceptance of the port by the inhabitants. In all aspects of life, being "green" has gained much more importance over the past years. In order to stay competitive and have the support of the local community, a port needs to be able to offer sustainable solutions and show environmental awareness.

In the recently reached deal with the council on the Port Services Regulation we have put emphasis on "green" charges. External costs can be included in the infrastructure charges and the port authority is enabled to give environmental discounts on its charges.

Coming from Hamburg, I am very happy that the Hamburg Port authority is an excellent example for ports that already practice environmental charging. After having been named the European Green Capital in 2011 the "green" consciousness across all sectors has risen even more.

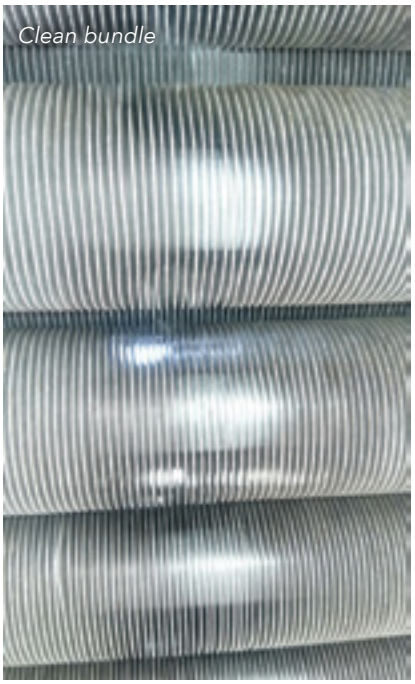
The Hamburg Port Authority is not only creating incentives for environmentally friendly vessels to call at the port, but works with innovative concepts to reduce its impact on the environment considerably. Its "smartPORT energy" concept aims at reducing the dependence on conventional energy sources, lower emissions and reduce expenses.

The greening of the shipping industry is a challenge that needs to be tackled first and foremost on the international level in the context of the IMO. Even though progress will be slow, it will be an inclusive and sustainable progress. Decreasing the environmental foot print is not limited to expensive technological solutions, but can be also achieved with innovative and creative approaches to increase the efficiency of the operations.

Certain aspects need to be solved jointly at the international level, but it does not take the responsibility off each stakeholder along the chain to make their own contribution. Politics need to play a major role in increasing the incentives for "green" solutions and to promote renewable energies. With our Paris commitments we are setting an ambitious goal, which needs to be broken down into concrete action plans in order to lead to a truly sustainable shipping sector.

Coolers and their problems; capacity, noise, energy consumption, plot space, pollution and cross-winds


Polluted bundle


Clean bundle

In air-cooled coolers, the ambient air is used to cool (part of a) process. That is why coolers are always positioned outside. However, this also makes them more sensitive to factors that affect their capacity, such as cross-winds, pollution by dust and pollen, and air pollution (see photograph no. 1). Furthermore, because they are situated outside, the noise of the fans result in coolers often being one of the greatest causes of noise in a process. Besides that, they take up a lot of space and consume a lot of energy. This article proposes a number of solutions for these three problems and even for all three problems at the same time.

CAPACITY PROBLEMS DUE TO POLLUTION

Pollution of the bundles is a well-known problem that occurs everywhere where bundles are located close to trees, roads, agricultural land and cities - in other words, practically everywhere on land. And what if your bundle looks like the one in photograph no. 1?! You've probably long-since resigned yourself to the fact that your cooling capacity is limited or that it has become a bottleneck in your process, yet you need to find a solution fast because you have very little cooling capacity left! There are solutions, but they're often temporary or they only clean the bundles on the outside (because deep cleaning is difficult), which means that your cooling capacity will still not be optimal and is likely to deteriorate again in the course of time anyway.

But suppose there were some as yet unknown solutions that might yield unprecedented benefits?! And suppose you could take them just that little bit further?!

SITUATION

In Gunzenhausen, Germany, there is a rendering factory that is situated in a beautiful location between woods, farms and a B-road intersection - the perfect recipe for polluted bundles, as shown in photograph no. 1. This bundle obviously needs cleaning, and the most obvious way to do that would be to use water. However, if you don't choose the right method (high-pressure water or foam on the inside of the machine), there is a good chance that you'll only manage to clean the first row and not the rows behind. Added to that, the fins often get sprayed flat, and this actually reduces heat transfer. Other solutions are also possible, but many of them require the equipment to be switched off as it cannot be cleaned while the fans are still running. This could cost you a lot.

ALTERNATIVE SOLUTION

The alternative is dry cleaning, which is ideal for induced and forced draft cooling bundles. A special (non-toxic, biologically degradable) powder is sprayed on the bundles using low air pressure (5-6 bar), and in effect this blows the dirt off the fins. With this method, you no longer need to walk over the bundles, the fins remain undamaged, all the rows of fins are actually cleaned, and, if you use induced draft, you don't even have to switch off the fans. In the rendering factory in Gunzenhausen, the bundles

were cleaned using this method in March 2015. The process was managed and supervised by Bronswerk.
The result was a very satisfied and enthusiastic customer thanks to the efficient maintenance solution and ultimate result, as shown in photograph no. 2. The lower costs and increased effectiveness of the process added up to efficiency in terms of minimal downtime, greater reliability and availability and maximum output of the asset.

ONE STEP FURTHER

After dry cleaning, the cooling capacity returns to the desired level – that is, if you don't take into account cross-winds or wind in general. The maximum wind speed at which an A-frame cooler is tested and which it must withstand in order to officially achieve the required capacity is 3m/s, which is almost no wind at all. Wind plays a major role in an A-frame as the pressure drop over the bundle – and therefore the air speeds – are relatively low. The rendering industry often uses flat condensers in which the speeds are higher and the wind indeed has less effect. But of course there is always some kind of effect. Moreover, many coolers (whether A-frames or not) are situated in areas where, during the summer months, capacity problems are caused by the high temperatures of the ambient air. Or they must comply with the stricter European regulations for noise and energy consumption that will come into effect in Germany, for example, in 2017. A number of our customers are encountering these problems or combinations of these problems. For example, a Waste to Energy in Germany had to reduce its production to 60% because of noise violations. And a refinery in Germany even had to close its plant because it was unable to comply with the permitted noise levels with the equipment it was using at that time! These new regulations affected our customer in Gunzenhausen too, but in terms of energy consumption.

High Efficiency cooling with Whizz-Wheel® fan

RETROFIT

In all of these cases, the situation involves an existing plant, with existing coolers and usually limited plot space and sometimes also limited capacity and cable diameters, all of which need to be taken into account to implement the desired or required improvements. Despite the considerable challenges, solutions do exist for these situations of this kind. Using high efficiency cooling with the Whizz-Wheel® fan, the existing plant can be retrofitted. The existing fan and part of the housing are replaced by these very efficient Whizz-Wheel® fans and specially designed inlet and control systems. With a retrofit, we leave the existing plant as it is, but the adjustment still brings about the desired or required changes. In the examples given above, the retrofit had the following results. At the Waste to Energy plant, production had been cut to 60% due to noise violations that restricted the system's cooling capacity. After the retrofit, production returned to 100% – and to top that, the company realised energy savings of 56%! At the before mentioned refinery, where the plant had to close temporarily due to noise restrictions, the company not only returned production to 100% but also realised unprecedented energy savings of 53%. Our customer in Gunzenhausen realised energy savings of 50% thanks to the retrofit with a maximum noise pressure of 72 dB(A). Moreover, our experience thus far has been that bundles under which a Whizz-Wheel® is suspended are less sensitive to pollution and also cost less to maintain.

CONCLUSION

If you have capacity problems with your cooling equipment, the logical first step is to check the condition of the bundles. If there is dirt on the bundles (and this is often the cause, even if the dirt is not visible on the outside of the bundle), you can now safely and efficiently clean the bundles using our dry cleaning method. This will be a vast improvement in itself, but if you aim to keep increasing the cooling capacity and want even less dirt in the future, we would be more than happy to pay you a visit to inform you about the retrofit options we can offer you. Even more importantly, given the forthcoming regulations: if you are facing possible noise constraints and restrictions in your energy consumption, we recommend that you check your cooling equipment and contact us.

Contact details

For more information:
femke@bronswerk.com

Non-Road Mobile Machinery Regulation

Industry and Environmental needs going hand-in-hand

By Lamia-Kerdjoudj Belkaid, Secretary General, FEPORT

On 5th July 2016, the European Parliament adopted the proposed regulation of the European Parliament and the Council on requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery. The regulation covers emission limits from a large variety of combustion engines installed in machines, including those installed in most port vehicles such as reach stackers and straddle carriers. FEPORT's objective was to ensure that the final text led to the sustainable greening of all non-road mobile machinery engines.

When one examines the circumstances surrounding the regulation, it is interesting to note that the regulation received a huge mandate from both the European Parliament (623 votes in favour out of a possible 707) and civil society (almost all users, engine suppliers and environmental organisations supported the adoption of the regulation). This is quite an achievement given that this is a regulation that will regulate the criteria for most engines placed on EU markets for the foreseeable future.

A lot of credit must go to the rapporteur, Ms. Elisabetta Gardini, and the shadow rapporteurs, for their willingness to engage in open dialogue with all stakeholders. Environmental organisations had justifiable concerns about setting engine emission standards that ensure Europe is fulfilling its environmental commitments, whereas industry actors had practical issues regarding the operational and financial viability of some elements. The work of the rapporteur proved that the notion that environmental needs and the competitiveness of EU industries cannot go hand-in-hand is a myth and, for this, the work of the Ms. Gardini and

the shadow rapporteur's should be applauded on this specific file.

As an organisation, FEPORT has supported the adoption of this Regulation. As responsible operators, FEPORT members realise that we needed legislation to ensure that we would have a systematic greening of all port equipment via strict engine standards. That being said, this does not mean FEPORT did not have concerns with the Commission's initial proposal.

Within FEPORT, we believe that there is a differentiation between concerns and opposition. As an organisation, we have looked to address these concerns head-on in a pro-active manner with other institutional actors and relevant organisations.

As industries, it is important that we adopt pro-active approaches to environmental legislation because additional costs of implementation over a number of years may bring profitability over the long term, but also grant early movers a real competitive advantage. On this file, not only FEPORT, but other industries have adopted such a view which allowed for discussions to be carried out in a constructive manner.

Environmental organisations must also be applauded for adopting a pragmatic approach that did not look to relegate industry concerns to secondary status. From FEPORT's perspective, we found all environmental organisations which we discussed with to be open and sympathetic to the real concerns which industries raised.

In our view, the pragmatic and proactive approach adopted by civil society, joint with the diligent work of the rapporteur, lead to the unanimous support which manifested in the European Parliament.

NEXT STEPS

The Non-Road Mobile Machinery Regulation may be finally adopted, but we now need to ensure that the spirit of the regulation is carried through in implementation. For instance, the regulation delegates to Member States a number of transitional provisions. Member States have a responsibility to ensure that these transitional provisions are introduced in as harmonised a manner as possible.

For instance, most transitional measures are allowed for "up to" a certain period of time, which Member States have authority to decide upon. For instance, the regulation allows for replacement engines to continue to be placed on the market for up to 20 years. Member States need to ensure that we do not end up with 28 different transitional periods which would lead to different engines classes being available in different Member States, which would go completely against the idea of a European single market.

LESSONS LEARNT

The best way to ensure that there is a broad consensus for the implementation of legislation is an open consultation process, as had been the case with the Non-Road Mobile Machinery Regulation. By opening up to the views of those directly affected by the legislation, and taking these views on board in the finalisation process, support can be won across a civil society which can also be better prepared for the impact of said legislation.

That being said, civil society can only be expected to have a guiding role if it is willing to be proactive. All too often, civil society can be accused of being too reactive and negative, or too dogmatic in its approach. Too often, the emphasis is on "what can we achieve for our sector" rather than focusing

on building a viable solution that can be supported by all actors. A divided civil society creates confusion amongst policy makers and, ultimately, may be ignored or misinterpreted.

As an organisation, FEPORT is committed to supporting future environmental initiatives that look to respect both environmental needs and the competitiveness of EU industries. We are hopeful that our partners in civil society will engage in discussions in a proactive and cooperative manner and that policy makers will follow the good examples set out during the legislative cycle of the Non-Road Mobile Machinery Regulation.

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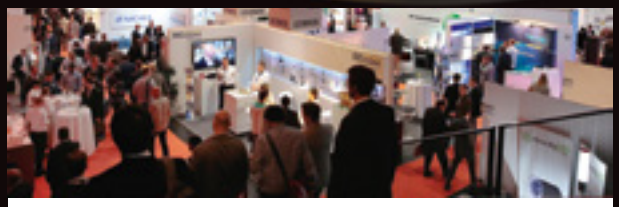

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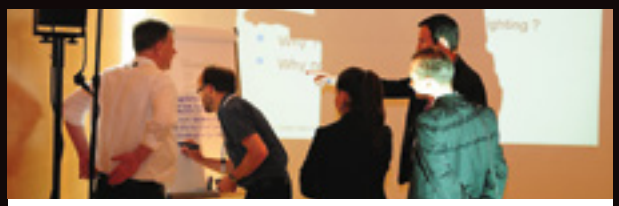

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The LNG era in the Port of Venice

The port of Venice is at the intersection of the main European transport corridors and Motorways of the Sea. Thanks to its strategic position, it can act as a European gateway for trade flows to and from Asia. One harbor with three Ports of call:

Venice cargo port facilities can count on 2.000 hectares of port logistics areas, being one of the major European Ports for project and general cargo and one of the main Ports in the Adriatic Sea for containers traffic. Furthermore, the Port of Venice is the first **cruise Port** in Europe and in Italy (Home In/Out Pax, 2015 – Report Medcruise, Cruise activities in Medcruise Ports 2015) and it counts on the Italian most modern **Motorways of The Sea Terminal** (Ro-Ro/Ro-Pax).

Focusing on environmental issues, the Venice Port Authority (VPA) is committed in many projects aimed at the preservation and improvement of Venice and its Lagoon, such as the restoration of the Venetian waterfront, the remediation of land and water and the use of alternative energies.

The environmental sustainability of Port activities is one of the VPA's main goals. In particular, the actions undertaken under the "Green Port Policy" focus on three main areas:

1. **Air:** in addition to air quality monitoring and assessment, the Port has started up a number of projects aimed at cutting emissions and promoting the use of alternative energy.
2. **Water:** the Port's quaysides have been designed to avoid any contamination seeping from the land into either the lagoon or the water table.
3. **Land:** Venice Port Authority set up a big campaign of soil remediation involving 110 ha, with 105 million € already invested

Since 2013, as part of its environmental policy, the Port of Venice has planned a set of activities to promote the use of LNG as an alternative fuel for both maritime and land transport modes.

It all started in 2013, with the drafting of the North Adriatic Master Plan for the development of port infrastructure for LNG and other alternative energy sources as part of the Poseidon Med project. The demand analysis (see graph below) shows that Venice has all the numbers to become the LNG distribution hub for the whole North Adriatic area for maritime and road transport sectors.

With EU co-funded Action, the whole project is currently being developed

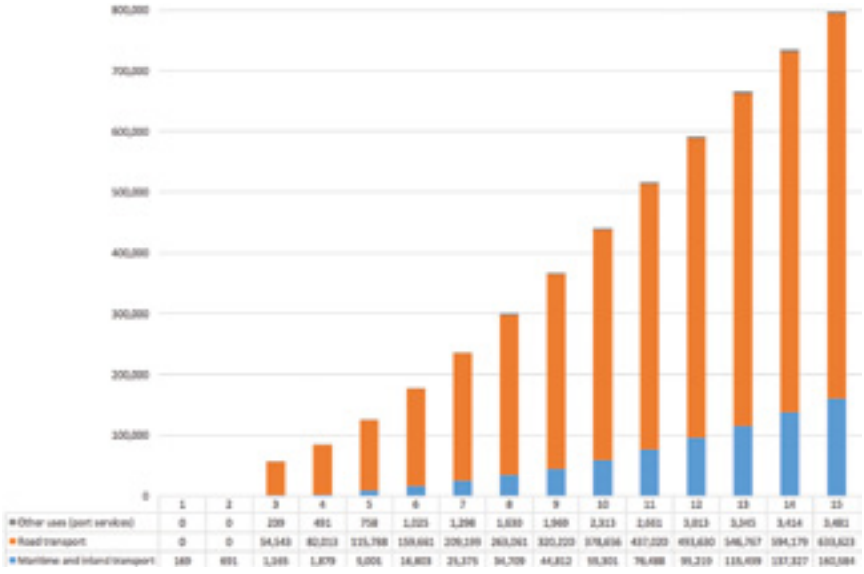
- within the GAINN4CORE project (initiative promoted by the Italian Ministry of Infrastructure and Transport, in order to create the Italian alternative fuels network according to the Directive 2014/94/EU)

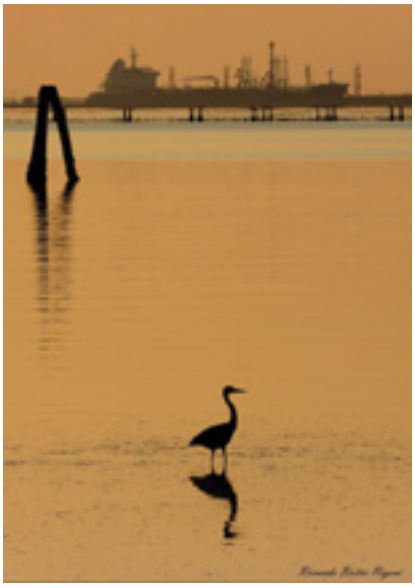
  ENI will design and implement a pilot LNG refueling station with a capacity of about 150 [m3] able to supply a LNG demand of about 3.000 [ton/y], for both maritime and road uses; VPA will take care of studying the accessibility and safety aspects related to LNG storage and distribution, with respect to the above mentioned initiative;

- within Poseidon Med2 project; the European Union has granted the co-funding of over € 9 million to the Rimorchiatori Riuniti Panfido for the construction of the first prototype of an innovative LNG powered ship designed by BMT Titron (England).

A larger LNG hub, is also planned as other port and logistics companies are ready to invest more than 80 mio € on bunkering, maritime and road refueling stations.

LNG demand analysis in the port of Venice 2016-2030. (Ton of LNG)





European ports are thinking climate

By Isabelle Ryckbost (pictured)

The climate is changing. If we want to limit global warming to well below 2°C, everyone will have to contribute, also ports.

The COP21 UN climate talks in Paris in December failed in achieving an agreement on an emission reduction target for international shipping. Unfortunately. Shipping being a global industry, this international Climate Summit would have been the right place and time to engage the shipping industry towards a carbon low future.

But what about ports? Should they wait for what will happen with the shipping sector?

Ports are not only accommodating ships. Ports are energy nodes and clusters of industry. Moreover, port authorities in Europe assume both public and economic responsibilities. They need to secure their "licence", they must ensure towards the people living around the port and society as a whole that their operations and investments are sustainable. They cannot just wait and see. The recent fact finding survey which ESPO has been running in the framework of the EU funded Portopia project shows some interesting figures in that respect.

Overall, 78% of European port authorities consider it as an objective to ensure that port activity is sustainable in the long run. Looking at energy, the survey shows that 25% of ports have more than half of their traffic linked to energy commodities. It also reveals that 38% of port authorities are facilitators

of renewable energy production in the port. 16% of port authorities are even investing or co-investing in renewable energy production. Moreover, ports expect that jobs related to renewable energy will grow considerably in the next five years. Finally, energy consumption has become second in the ESPO top 10 ranking of environmental priorities of European ports that was published this spring.

It is without saying that tackling climate change is of paramount importance for ports. Reducing greenhouse gas emissions and developing a low carbon strategy is on top of their agenda. This strategy is in the first place aimed at limiting the energy consumption linked to the transport and industrial activities in the port. But given the fact that ports play a crucial role in the energy landscape, this strategy can go further. Since energy is an important commodity for many ports, climate change - and the fight against climate change - could become a game stopper. Ports realise that anticipating on this proactively, can allow ports to turn the path towards decarbonisation into a successful business case.

But working on mitigation will often not be sufficient. Even if it is "all hands on deck" to limit the warming of our planet, experts are telling us that we will not be able to avoid all negative consequences of climate change completely. Adapting the port infrastructure to the effects of the warming will be a must for every port. Ports are literally on the first row when sea levels are rising and when extreme weather conditions lead to strong winds, storms and extreme waves.

So standing on the side-lines is simply not an option for European ports.

That is why ESPO decided last December to join the PIANC-led Think Climate Coalition. Think Climate brings together major international associations with interests in waterborne transport infrastructure, in order to help the sector respond to climate change. By further understanding, providing targeted technical support and building capacity, the coalition has a double aim: first of all, to promote the reduction of greenhouse gas emissions, by shifting to low carbon maritime and inland waterway transport infrastructure, secondly, address ways to adapt maritime and waterborne infrastructure and operations to the

potential impacts of climate change such as sea level rise and extreme weather conditions.

ESPO has a long tradition as initiator of bottom up initiatives, which are driving the port sector towards better performance, be it in the field of environment, societal integration or passenger issues. We hope we can play a role in strengthening knowledge and building further capacity on mitigating and adapting to climate change.

Besides, we are not starting from scratch. The ESPO Green Guide of 2012 already has a section dedicated to energy consumption and climate change that calls for concrete action and highlights the best practice examples of European ports.

Moreover, more than 25 European ports nowadays provide incentives to greener vessels on the basis of the Environmental Ship Index (ESI) tool. ESI has been developed by the World Ports Climate Initiative (WPCI) under the umbrella of the International Association of Ports and Harbours (IAPH) and recently celebrated its 5th year anniversary. ESPO fully supports since the beginning all the tools of WPCI and encourages its member ports to get involved.

We hope that through the Navigating a Changing Climate Action plan, developed by PIANC and the Think Climate partners, we can further encourage our ports to set Climate Change on their agenda and for those who are frontrunner to share their knowledge and experience with others.

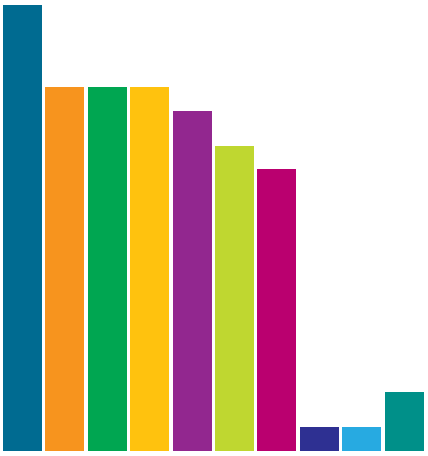
We are certainly looking forward to the first Think Climate conference taking place on 27 and 28 March in Brussels.

Approximate percentage of energy-related traffic in the port by volume (e.g. crude oil, refined petroleum products, coke and coal, LNG, etc.)

- **25%** Less than 10%
- **30%** 10% – 30%
- **20%** 30% – 50%
- **25%** More than 50%

25% OF PORTS HAVE MORE THAN 50% OF THEIR TRAFFIC LINKED TO ENERGY COMMODITIES

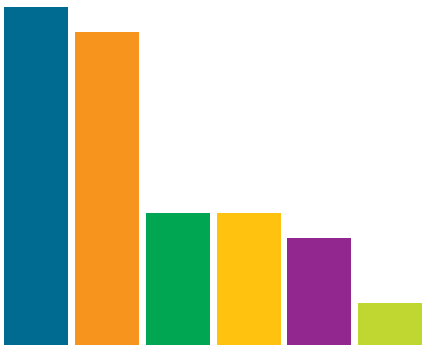
Energy sources for energy production in ports



- **38%** Wind
- **31%** Oil/petroleum
- **31%** Coke and Coal
- **31%** Solar
- **29%** Natural gas/LNG
- **26%** Biomass
- **24%** Waste incinerator
- **2%** Wave
- **2%** Nuclear
- **5%** Other

PRODUCTION OF RENEWABLE ENERGY IN PORTS IS INCREASING

Role of port authority in the production of renewable energy

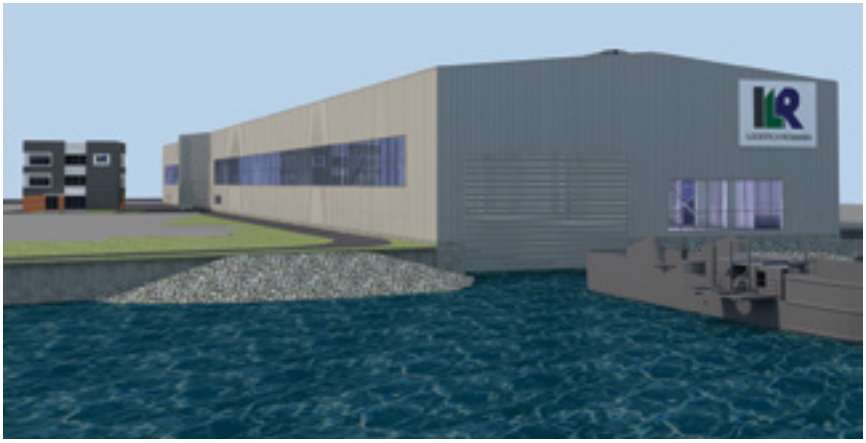


- 41% Provider of land
- 38% Initiator/facilitator
- 16% Logistics support
- 16% Investor/co-investor
- 13% Operator of the facilities
- 5% Other roles

38% OF PORT AUTHORITIES ARE FACILITATORS OF RENEWABLE ENERGY PRODUCTION IN THE PORT

1) Trends in EU ports governance 2016, http://www.espo.be/media/espopublications/Trends_in_EU_ports_gouvernance_2016_FINAL_VERSION.pdf
2) http://www.espo.be/media/news/2016.03.25-ESP-1842_Postkaart%20Environment_V6.pdf

High Performance Green Port Giurgiu



The global main objective of the EU-project „High Performance Green Port Giurgiu" (TEN-T financial assistance by the European Union) is to transform the port of Giurgiu into the first efficient green port on the Danube that plays the role of a leading high-performance tri-modal logistics hub in the area. The first project included the analysis of the current situation in Giurgiu port (technical and operational analysis, market analysis and environmental analysis), the development of concepts for innovative technology at the port and the design of the new green port in Giurgiu. This project ended in August 2015.

The next step is the work. A follow-up project has been funded in the framework of the 1st CEF-call by the European Union with 85 %. Through cooperation between one private company (**ILR Logistica Romania**) and two public companies **(Giurgiu Municipality and S.C. Administratia Zonei Libere Giurgiu)** is this EU-project a flagship project in Danube port development and a best practice for a brownfield rehabilitation.
The construction phase started in September 2015. The main activity will be the construction of a tri-modal logistics center with fully covered ship berth, in which trucks, wagons and ships can be loaded and unloaded independent of the weather. Further activities include the establishment of a railway connection, the rehabilitation of the access roads inside the port, the rehabilitation of the existing quay and various environmental measures. The overall project budget is about 15,5 million euros.

A groundbreaking ceremony with the official unveiling of the project billboard took place in Giurgiu in summer 2016. At the invitation of the 3 project partners many representatives of public institutions, such as Romanian Ministry Of Transport, Romanian Ministry Of Foreign Affairs, European Parliament and Council of Danube Cities arrived on the site of the logistics center in Giurgiu. Planned completion is in 2018.

The effects of this project will positively influence the macro-economic, environmental and social aspects in the Giurgiu-Bucharest-Russe region in the next years.

For more information about the project, please visit the following website:
www.ilr.com.ro/projects/high-performance-green-port-giurgiu.html

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The power behind vessel charging and automated mooring

Global engineering group Cavotec is working actively to develop innovative wireless charging and automated mooring technologies for ships – systems that make dramatic improvements in safety, operational efficiency, and environmental performance. Speaking exclusively to European Energy Innovation, Cavotec Group Chief Marketing & Strategy Officer, Yann Duclot, outlines how Cavotec hopes to support the wider use of vessel charging and automated mooring in what is sometimes described as a conservative industry.

"For us, innovation and partnerships are the two key aspects of encouraging the wider use of systems that drive efficiency, reduce environmental impact, and improve safety," explains Duclot.

"Earlier this year, we entered into a co-operation agreement with Finnish marine and energy group Wärtsilä to develop the world's first integrated marine wireless charging and automated mooring concept."

"The agreement incorporates Wärtsilä's innovative wireless vessel charging system, which is based on inductive power transfer, (IPT), and incorporates our vacuum-based, automated mooring technology MoorMaster™."

"Significant interest already exists in this system, with the first prototype scheduled for installation at an application in Norway during the first half of 2017."

THE IPT SEQUENCE

"What we have done is to combine MoorMaster™ vacuum pads with Wärtsilä's IPT to achieve the fastest ever automated mooring and charging sequence," claims Duclot.

"The speed of the operation supports key industry objectives such as reducing the overall cost of investment in terms of battery cost, vessel weight, and heat load."

As ferries approach the berth, the IPT system readies for the charging and mooring sequence. Crucially – and in one of the key features of this system – charging can begin before the vessel is fully moored, thereby generating significant time savings, which in fast turn-around ferry service settings are especially relevant.

An advanced detection system determines when the IPT unit is within an appropriate range of the vessel, and once 75 per cent of the surface area of the charging plates on the ship and MoorMaster™ are overlapping, charging starts.

Operators manoeuvre the ferry alongside the berth, and once in position, a number of vacuum pads – typically around four for the size of ferry envisaged in this co-operation – extend, and attach to the vessel's hull, achieving safe, secure mooring within 30 seconds.

"This really is a step-change in operational efficiency," says Duclot.

At departure, a signal received from the bridge or ramp indicates to the MoorMaster™ vacuum pads to retract from the vessel within 10 seconds. The charging sequence ends when the induction plates are no longer within acceptable operational limits.

MOORMASTER™ AUTOMATED MOORING

MoorMaster™ is a vacuum-based automated mooring technology that eliminates the need for conventional mooring lines. Remote controlled vacuum pads recessed in, or mounted on the quayside or pontoons, moor and release vessels in seconds.

The system dramatically improves safety and operational efficiency, and in many cases enables ports to make considerable infrastructure savings. To date, some 200 MoorMaster™ units have performed more than 200,000 mooring operations at 30 – soon to be 42 – ferry, bulk handling, Ro/Ro, container and lock applications worldwide.

The vacuum units hold vessels at set distances from the berth, thereby avoiding the need for ships to be repositioned along the quay – resulting in operational improvements and reduced emissions from ships and tugs.

INNOVATION IN PRACTICE

"Separately – but also with a Finnish connection – we received an order involving automated mooring and charging applications earlier this year," Duclot says.

"For this project, we are manufacturing, and will install and commission two combined automated mooring and battery charging systems for an electric hybrid passenger ferry application in southwest Finland."

A Cavotec MoorMaster™ MM200E unit at Lavik, Norway.

"The application integrates our MoorMaster™, Alternative Maritime Power (AMP), and Automatic Plug-in System, (APS). APS automates the connection of cranes, ships and other mobile equipment to electrical power using cable reels,"

"This expands the potential use of mobile electrical equipment, and generates cost savings as well as improving safety," he adds.

Similar to the Cavotec systems that already moor and charge a battery-powered passenger ferry at two berths in Norway, two MoorMaster™ MM200 units will be installed at the Parainen and Nauvo berths, (one unit at each berth), along with two AMP charging towers.

The MoorMaster™ unit signals to the AMP unit when the ship is securely moored, and a laser sensor then guides the AMP connector to a hatch in the side of the vessel where it connects to the ship's battery unit to begin charging.

The electric hybrid ferry, which will be operated by FinFerries, will be approximately 90m in length, 16m wide, and will be able to carry up to 90 cars. It is due to enter service in summer 2017. The vessel will make crossings – at 15-minute intervals during the day, and one round trip per hour at night – throughout the year and in all weather conditions.

"This, and a similar application already in operation in Norway, are attracting interest in the sector, and have the potential to be introduced by similar ferry services all over the world," says Duclot.

Cavotec is a global engineering group that manufactures power transmission, distribution and control technologies that form the link between fixed and mobile equipment in the Ports & Maritime, Airports, Mining & Tunnelling and General Industry sectors. To find out more about Cavotec, visit our website at cavotec.com.

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IN OUR NEXT ISSUE, WINTER 2016

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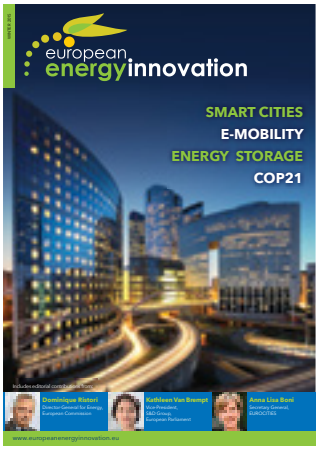

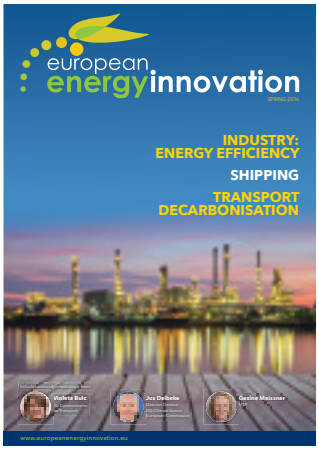

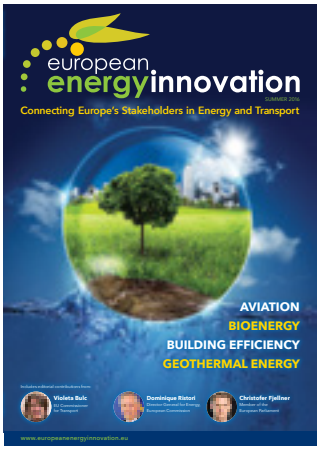

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The NEWLED project

The European project NEWLED (Nanostructured Efficient White LEDs based on short-period superlattices and quantum dots), launched in 2012, aims to develop high-efficiency and high-brightness monolithic and hybrid all-semiconductor white GaN-based light-emitting-diodes (LEDs). This €11.8M FP7-IP project involving 15 leading academic and industrial partners from all over Europe is coordinated by Aston University, Birmingham, UK. The NEWLED consortium has been assembled to bring together highly recognised experts from academia and industry ensuring best material and process development supported by expert simulation and perfectly adapted rigorous analytical capabilities.

The principle objective of the NEWLED project is the development of high brightness white LEDs with high colour rendering index (CRI >95) and efficacies of more than 200 lm/W. Along this, the team also investigates advanced packaging to enable effective heat dissipation and light management to realise lifetimes of more than 50k hours. The devices will have immediate applications in automotive, industrial lighting and displays industries. The widespread implementation would reduce global energy consumption by approximately 10% and reduce CO_2 emissions by 3 Bn tonnes with consequent economic and environmental benefits.

NEWLED collaborators have played a tremendous role in developing and exploiting a range of challenging and cutting-edge research directions to advance both the physical understanding and the key technology underlying novel light-emitting diodes with superior capabilities. During the project, excellent progress has been made: Novel nanostructures and devices have been designed, fabricated and evaluated by the project partners; detailed theoretical models have been developed, e.g. for the optimal ways of colour mixing providing the optimal emission wavelengths, spectral widths and necessary efficacies of the individual monochromatic LEDs that serve as a guide for the development of high-efficacy white LEDs with high CRI. Novel crystal growth approaches are used to develop superior materials that are processed by best-in-class chip processes facilitating optimal current spreading and light extraction.

NEWLED has already delivered significant advances and world record performances in realisation of a new class of LEDs with high capabilities. To date, white LEDs with efficacy of 200 lm/W at CRI of 90 with wall-plug efficiency of ~60% have been demonstrated by the NEWLED consortium. The advantage of the use a dual-colour monolithic blue-cyan LED emitting in the 420-480 nm wavelength range with a mixture of green and red phosphors has also been explored to achieve warm-white light emission with correlated colour temperature (CCT) of ~3300K and superior CRI of 98.6 (Fig. 1), thus allowing a reduction of the number of phosphors used for warm-white light emission with high CRI.

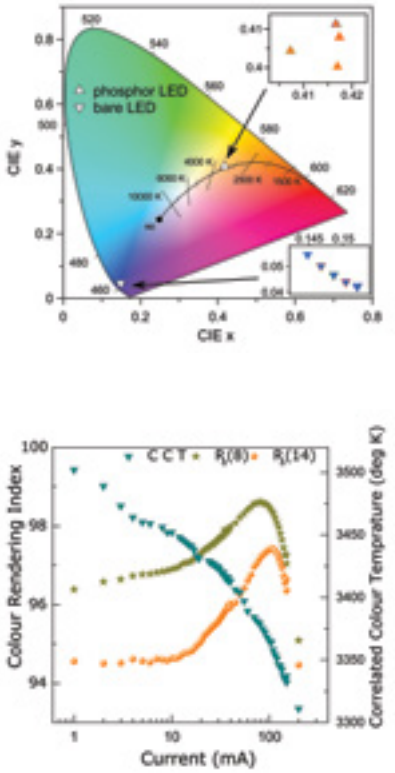

Fig. 1. (Top image) Chromaticity coordinates of a monolithic blue-cyan LED and a phosphor-converted LED with a superior CRI of 98.6; (Bottom image) CRI and CCT vs. current of the developed high-brightness white LED.

The obtained results are enormously encouraging and confirm the great potential of the NEWLED technology to enable future development of highly-efficient and high-brightness white LEDs.

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Secure energy: Market First

By Adina Ioana VĂLEAN, Vice-President of the European Parliament

Earlier this year on April 19th, the first LNG tanker left the US terminal Sabine Pass bound to Portugal, making Europe the third continent supplied with US LNG after Asia and South-America. This is happening exactly at the same time when Gorgon LNG, the world's most expensive terminal starts producing Australian LNG, at a time of steeply dropping demand for gas worldwide.

New Australian and US LNG will dramatically change global gas flows by displacing US and Middle Eastern LNG exports to Asia, and by redirecting these volumes towards Europe. This will work as a strong price balancing mechanism which will lower wholesale prices for Russian Gas in Western Europe by heavily increasing competitiveness and market liquidity.

Meanwhile, in Eastern Europe wholesale markets are still dominated by external suppliers and long term contracts with fixed delivery and price clauses. Underdeveloped markets and low competition among suppliers are keeping wholesale prices for imported gas up, and allow gas to sometimes be used as a political tool. There is currently no disruptor to the current situation where most Eastern Member States are heavily dependent on Russian supplies, and where no real liquid trading hubs are operational.

Actually, there is no disrupter yet...for I strongly believe that Eastern Europe and its energy industry will be that innovative disrupter which will initiate competition and will increase security of supply for the whole European Union.

By connecting our networks with the Sothern Gas Corridor and the LNG terminals in Greece as well as the new gas fields in Eastern Mediterranean, eastern Member States such as Romania can facilitate the access for consumers and industry to the Global Gas market and its competitive prices. Further connections to Hungary and Austria can expand this beneficial influence of more liquidity to all central European markets.

The newly discovered gas reserves in the Black Sea will transform Romania from a very stable self-sustainable gas market, with virtually no imports, in a regional exporter. If we can increase interconnection capacity and link these new indigenous capacities to neighbouring markets, then there will be enough liquidity on the regional gas market to create the first Eastern European Gas HUB.

A new gas HUB will be able to replicate the competitive prices which we find on the National Balancing Point in the UK and on TTF in the Netherlands, thus securing low prices for consumers and a stable and predictable market for investors. That is why aggregating liquidity in a Central Eastern European Hub, wherever you find indigenous production, is a key pillar of the Energy Union because it will allow businesses and consumers to have access to gas on gas competition. With competition, politics will give way to economics and cooperation.

Energy markets today are becoming more dynamic and interconnected than ever. Enabling industrial consumers and households to benefit from this market integration will bring important financial advantages for our citizens and businesses.

As we have seen with the EU electricity market coupling, electricity trading across our internal borders has enabled a strong congestion cost optimization and has triggered a price reduction and approximation. The industry has been the main driver of this development without any regulation being passed at EU level, simply because the market setup allowed higher priced surplus electricity to match lower priced deficit areas. The success of the EU wide electricity-trading platform shows how instrumental digital platforms are for creating new products and lowering prices. It is exactly this kind of innovation that our industry needs in order to regain competitiveness.

Gas markets however, have not yet reached the same level of liquidity and hub trade. Therefore gas market integration remains a challenge for regulators and industry if we want gas to be traded freely across Europe, thus enabling price and network congestion cost reduction. For this, we need to embed innovation in our interconnectors as well as in our transmission networks. Smart grids at distribution level have to be complemented by smart LNG terminals, storage facilities, compressors and pipelines, which would allow gas to immediately balance intermittent renewable power generation, and reduce price peaks generated by congestion, or extreme weather conditions. For all this to happen we need more investment.

I am sure that the Energy Union and the European Fund for Strategic Investments provide the Union with a unique window of opportunity to re-launch long term investment in our infrastructures and thus make our economy's return to economic growth. But in order to succeed, we need to use the EFSI as a vehicle for turning infrastructure investment into a fully liquid asset class with bonds that can be pooled and traded on European and global markets.

In gas as in trade, success will come if we put the market first!

Dialogue for Climate Change: Lowering CO_2 emissions with natural gas

By Gerald Linke (pictured)

The Paris UN summit on climate change once again emphatically emphasised that a fast and efficient reduction of CO_2 emissions is essential if we want to effectively limit global warming. We should consume no more than 565 billion tons of CO_2 by the middle of this century. But, how can we achieve this goal in view of a constantly growing population and the general demand for mobility and comfort? Researchers have made huge progress in recent decades, paving the way for innovative technologies designed to increase energy efficiency and the use of wind, solar and renewable energies; while these developments are most promising they cannot, on their own, reduce CO_2 emissions to the required level.

Natural gas combined with renewables can, by contrast, provide a basis for a sustainable and efficient energy supply. Being the cleanest of all fossil fuels, natural gas yields the highest amount of energy content per unit of carbon burnt. This is the decisive criterion that we must focus on to achieve the 2-degree climate target. Natural gas has to take a dominant role among the traditional energy carriers in the energy mix if it is to contribute efficiently to global climate protection. For example, when burned, natural gas emits only about half as much CO_2 as lignite or black coal, and about one-third less CO_2 than crude oil. In other words: Natural gas emits the least CO_2 of all existing conventional energy carriers when burned, and thus can help reduce large amounts of CO_2 emissions in a very short time.

HIGHLIGHTING THE POTENTIAL OF NATURAL GAS

The most important thing now is to use good arguments to explain that there is no better alternative if we want short-term success in climate protection. After all, natural gas can be used in a wide variety of ways from generating heat and power through to mobility. In Germany, for example, there are millions of out-dated boilers. The replacement by 2020 of 10 million of these boilers by modern natural gas technologies such as, for instance, micro-CHP systems or gas heat pumps would help save 20 million tonnes of CO_2 per annum. This measure would be more efficient from both the property owners' and the national economy points of view than the energetic refurbishment of buildings.

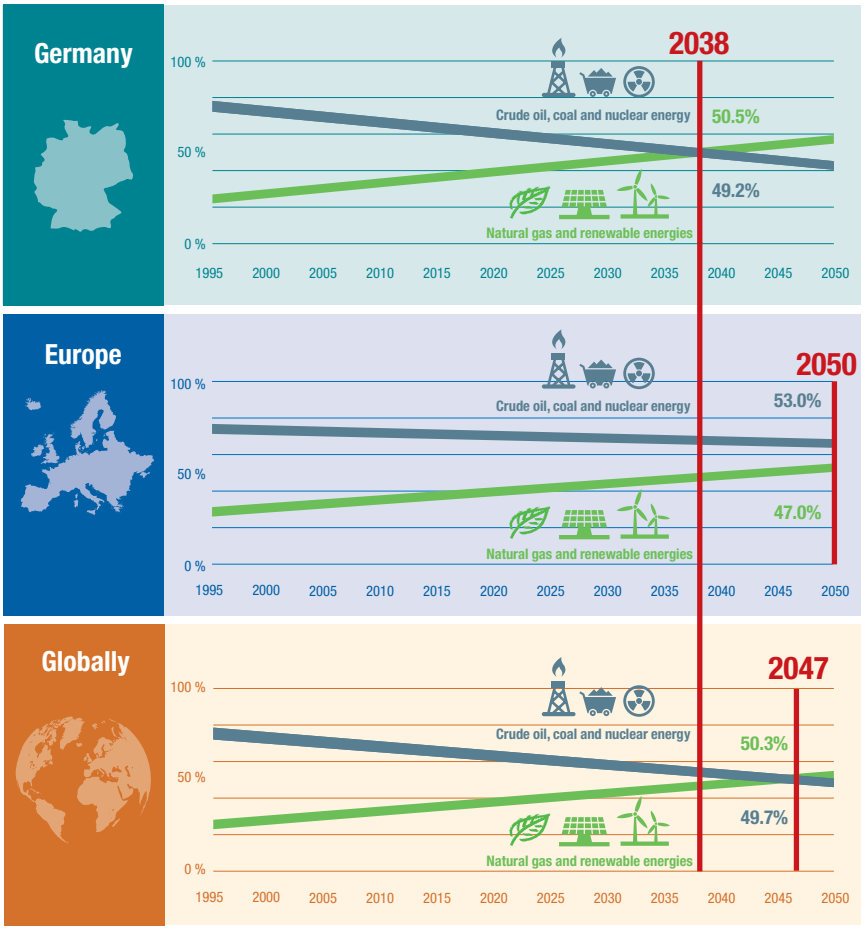
What is more, natural gas is available in abundance, accompanied by an excellent supply infrastructure that permits the storage of surplus energy if sunny and windy days produce more power than the grids can handle. The keyword here is "power-to-gas technology": Electrolysis produces hydrogen and, in a second step, methane from water. Both products can be fed into existing gas lines for

interim storage, to be used for the generation of power in gas power plants or CHP systems when needed. More electrolysis systems however need to be installed systematically in order to ensure safe and secure supply with high amounts of clean power. Calculations assume that from 2025 onwards new systems with an output of 500 megawatts and from 2030 onwards new systems with an output of 1,000 megawatts will have to be installed annually to ensure that the minimum number of electrolysis systems required will be available by 2040.

In conclusion, natural gas and renewables contribute greatly to reducing CO_2 emissions. Even more, a secure and climate-friendly energy supply, which is affordable for everyone worldwide not just in rich countries – can only be guaranteed with natural gas. And this is why the energy transition in Germany, Europe and everywhere else in the world needs gas.

Natural gas and renewable energies: the „Future Energy Couple“

Natural gas and renewable energies on the fast track: In the future a larger part of the primary energy consumption will be covered by natural gas and renewable energies than by crude oil, coal or nuclear energy. According to forecasts in Germany this will already be the case in 2038 – hence more than ten years earlier than globally seen and at least twelve years earlier than on the European scale.



Source: DVGW energie | wasser-praxis 6-7/16; Data Sources: BP Energy Outlook 2016, Federal Environment Ministry, European Commission

gat 2016 essen

The future of international energy systems will be discussed intensely at this year's "gat 2016", the leading industry conference of the German gas industry that takes place in Essen this year from 8 through 10 November. Leading representatives of national and international energy suppliers as well as decision-makers from the worlds of politics and business will speak about aspects affecting all countries. English-speaking sessions and meetings with simultaneous translation will address such subjects as sector coupling or the use of innovative natural gas technologies. Other keywords include the phase-out of power generation from fossil fuels, decentralised energy supply, low-emission mobility and untapped potentials of the heat market.
www.gat-kongress.de/english

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Small scale LNG, the dutch approach

By Robert Govaers (pictured)

The Dutch National LNG Platform was established in 2012 in conjunction with the 'Rhine and Wadden Green Deal'. Its primary goal is to support the development of a new market for LNG and to use that as a transport fuel for trucks, barges and short sea vessels.

'Green Deals' are aimed at stimulating sustainable economic growth. They can be achieved by eradicating bottlenecks (regulations, laws, permits), activating cooperation or by helping to source funds, in order to realize the necessary plans.

This goal would be achieved through close cooperation with the relevant governmental bodies and by eliminating as many regulatory and other policy-related obstacles as possible. It could also be achieved by bringing together market parties to jointly develop new supply systems and to stimulate as many end-users as possible to choose LNG for their trucks and vessels.

Who are we and what do we do to achieve the implementation of small scale LNG in the Netherlands. An introduction to the Dutch LNG platform and the 6 task forces that started up in 2012.

TASKFORCE 1 - SAFETY AND REGULATION

The taskforce is organized around topics that are safety related. The following issues are addressed:

- The safety measures linked to the transport and distribution of LNG. The constraints linked to LNG distribution by road / rail.
- The implementation of a knowledge safety program in cooperation with all the stakeholders involved.
- The mapping of safety responsibilities between different organizations so that if problems arise all organization are aware of the safety procedures and know where their responsibilities lie.
- A safety design communication plan. On the basis of previous activities a communication plan will be set up in order to ensure that all information is adequately dealt with and integrated into the existing procedures.

TASKFORCE 2 – TRUCKS

- The first activity is focused on the business case. It is important to make sure that the LNG framework continues to be workable.
- Incentives and subsidies. On the one hand we must map the current opportunities for incentives and subsidies and make that publicly available whilst on the other hand the Taskforce will have to endeavor to make LNG fit in with existing incentives and subsidy schemes.
- In 2014, the Green Deal Zero Emission for City Distribution was launched. The system will grant cleaner and quieter vehicles the privilege of having better access and better delivery slots for city distribution.

TASKFORCE 3 – SHIPPING

- The first activity was to gain a systematic overview of the current limitations but also of the opportunities for LNG propelled vessels. This has helped to define the focus for the taskforce.
- Financing is the first market concern for LNG ships. Many banks are hesitating to fund the re-engineering of ships that consider the use LNG. Although the business case is in principle valid, it is not clear to everyone that using LNG for ships is a suitable alternative. So funding is now the key to market development.
- In order to develop the LNG market for ships it is important to have clear objectives with regard to the requirements and the enforcement of such requirements. Both have to be perfectly clear so that ship owners can have an accurate idea of what the future holds. Unless there is clarity they will be uncertain about investing. The advantage of LNG with regard to Sox is that it offers opportunities in the Seca area.
- Probably the most important aspect when developing LNG for ships' engines has to do with methane slip. Ships can often be equipped with dual fuel engines. The advantage is that these kinds of engines can also be used in areas where there

are no bunkering possibilities. The downside is that this technology causes methane to escape from the exhaust. This issue still has to be solved but it is certainly high on the platform agenda.

TASKFORCE 4 – STRATEGIC STAKEHOLDER MANAGEMENT

This taskforce is engaged in dialogue with a group of Dutch non-governmental organizations (NGO's) such as environmental and nature conservation further organizations. The support of these organizations is important for gaining public attention and support for the introduction of LNG to the market. Note that the northern NGO's were the first to embrace the introduction of LNG.

The dialogue has already resulted in a short list of issues relevant to both the NGO's and the platform:

- What exactly is the environmental impact of LNG on emissions within the transport sector, including methane?
- Can we make LNG more sustainable as a fuel through the introduction of bio-LNG?
- The external Safety of LNG and the related distribution of LNG to the market by road or by water?

TASKFORCE 5 – BIO-LNG

This Task force (devoted to Enhancing LNG Sustainability) focusses on the development path for more sustainable LNG in the future. The emission impacts of LNG on air quality parameters (SO2, NOx and particulates) are generally accepted. The climate improvement potential of LNG (lower CO2) in comparison to traditional fuels (HFO, MGO, MDO and diesel) does not, however, stand out clearly enough. In this area LNG performance can be improved when Bio-LNG is introduced to the LNG fuel chain.

In order to realize the robust production of Bio-LNG the following necessary measures have been defined:

- Certification route: establishing a way in which green gas certificates can be converted into Bio-LNG certificates.
- The Renewable Energy Directive (RED): this European directive codifies the way in which the conversion of bio-components into fuel must take place. A transparent interpretation of this directive is essential if the right technological choices are to be supported and a clear attitude towards the future of this directive is to be established.
- Stimulating the physical production of Bio-LNG: Bio-LNG is only available on the Dutch market in very limited quantities. Strengthening the LNG market by increasing domestic Bio-LNG production is therefore important.

TASKFORCE 6 – INTERNATIONAL

The combination of many years of experience with LNG, together with close relations with neigbouring countries, make that the Netherlands proudly fullfils its position in sharing knowledge, supporting and cooperating other countries for a faster implementation of LNG.

The Netherlands has developed a good knowledge basis and position for supporting and cooperating with its neighboring countries.

Mechanisms of the contribution of anaerobic digestion (AD) to GHG-emission abatement: more than only the substitution of fossil energy

*By Meers, E. *[a], Scheidl, S.*, Kirchmeyr, F.*[b], Pflüger, S*. Stambasky, J.*[c]*

Anaerobic digestion (AD) makes a major contribution to reduction of greenhouse gas (GHG) emissions. The generated products – biogas, biomethane and biofertilizer – substitute fossil energy, circulate nutrients and provide adequate waste management as well as more sustainable agriculture.

CURRENTLY AD AND GASIFICATION PRODUCE THE FOLLOWING IN THE EU-28

Energy for heat, power and transport: Currently, around 9.6 billion $_{N}m^3$ biomethane equivalent are produced each year (EBA), constituting a calorific value of 420 PJ of energy in the form of renewable electricity, heat and 'advanced biofuels' (i.e. fuels made from waste). This corresponds to 900 kg of CO_{2eq} per MWh when producing electricity from bituminous coal (US Energy Information Administration), 56.1 kg CO_{2eq} per GJ when using natural gas for heating (IPCC Default), 73.2 kg of CO_{2eq} per GJ when using diesel as car fuel). Approximately 12.5 million tonnes of CO_{2eq} are avoided each year in Europe by replacing fossil energy for these energy applications.

IN ADDITION, THERE IS SIGNIFICANT POTENTIAL FOR FURTHER BIOGAS PRODUCTION FROM VARIOUS FEEDSTOCKS

Taken AD and gasification together, a conservative estimate for the total production of biomethane equivalent in 2030 is 48 billion $_{N}m^3$ per year, in other words a combined renewable energy production of 1700 PJ and 62.5 million tonnes of CO_{2eq} savings for the entire EU-28.

Based on feedstock potential and with the right policies in place, by 2030, the industry could produce renewable energy equivalent to approximately 10% of the EU's current natural gas consumption, for use in electricity generation, heating/cooling and as a transport fuel.

ADDITIONAL PATHWAYS OF GHG EMISSION ABATEMENT

In addition to the current output in renewable energy and the apparent and obvious link to the GHG emission abatement by replacing fossil fuels, there are surplus reductions in GHG emissions which make anaerobic digestion unique as a renewable energy technology. AD therefore brings by far the best reduction in $CO_{2\,eq}$ per unit of energy produced.

Avoided methane emission from manure storage

The EU is largely dependent on animal husbandry for feeding the continent which also produces 1.27 billion tonnes of manure each year. Methane emissions from manure storage contribute significantly to the overall GHG emissions, making agriculture one of the major contributors. Nonetheless, when manure is brought to a digester rather than having it stored for up to nine months, the methane which is naturally produced by anaerobic microorganisms in the manure is captured and put to good use for renewable energy. Since methane is equivalent to 21 CO_{2eq} digesting manure has a huge potential in lowering the carbon footprint of modern agriculture. Dependent on the animal and type of manure, approximately 20-60 $_{N}m^3$ of biogas is produced per tonne, which on average is equivalent to approximately 180 kWh of energy or 150 kg CO_{2eq} from energy substitution AND

250 kg CO_{2eq} of avoided emissions from manure storage under conventional practice (being higher than the CO_{2eq} reduction when only looking at the renewable energy component!). As indicated, annually 1.27 billion tonnes of manure are produced in Europe, offering both a burden as well as a huge potential. Member states such as Denmark have indicated they aim for 50% of manure being digested by 2020 before being spread on land. We estimate that throughout Europe approximately 3.3% of all manure is being digested, equalling ALREADY avoided GHG emissions of 10.5 million tonnes of CO_{2eq}. If we were to move to a level of 33%, the avoided GHG emissions would amount to 105 million tonnes of CO_{2eq}. The GHG emission abatement by avoided emissions when collecting manure and converting it to energy, indicates that this technology can significantly outperform other renewable energy approaches when scoring against tonnes CO_{2eq} per MWh energy.

Biofertilizer production

Biogas installations do not only generate energy but also produce digestate. This is the residual part of organic matter treated by AD, and is rich in plant available nutrients. The microbial processes which convert biomass into bio-energy, also convert mineral nutrients (N, P, K, …) to a more plant available form. When substituting synthetic mineral fertilizer N by mineral nitrogen from biobased renewable sources, GHG emissions can be reduced by up to 6 kg CO_{2eq} per kg mineral N replaced (FP-7 Improved Nutrient and Energy Management through Anaerobic Digestion; www.inemad.eu). In the EU-28, current synthetic mineral N use corresponds with 11 million t synthetic N, leaving a huge potential for GHG reduction when moving to a circular approach for mineral N fertilizer use.

CARBON SEQUESTRATION

In addition to mineral fertilizers which can be refined / extracted from biogas operations, also the residual organic fraction has considerable value as a soil enhancer. The fraction which resists microbial breakdown in an AD reactor is considered to be recalcitrant and adds to the soil organic matter and therefore sequesters carbon from the anthropogenic C-cycle. On average (based on product degradability), approximately 30-50% of organic matter is not broken down in the reactor. Subsequently, in the soil a fraction will break down and mineralise in the first year whereas a significant portion will resist humification and can rightfully be considered as a kind of C-sink. At the moment, each year approximately 237 million t digestate is produced in the EU and used as an organic soil enhancer. Which portion of the organic carbon in digestate could be considered as recalcitrant to mineralisation over prolonged time periods and which could therefore be argued as being removed from the anthropogenic C-cycle, would require further assessment. Nevertheless, the pathway in which digestate and AD contribute to CO_{2eq} emission abatement via sequestration in the soil is evident from a qualitative perspective. COP21 should encourage countries to implement soil organic carbon restoration plans, increasing the current soil organic carbon from <2% to ~ 3% AND to take into account the net difference as sequestered carbon.

Carbonate buffer capacity

Additionally, the microbiological biogas process produces CO_{2eq} and CH_4 in secluded tanks, the CO_{2eq} is continuously converted in significant amounts to carbonate and precipitated to $CaCO_3$, $MgCO_3$ which itself increases the chemical buffer capacity and provides the digestate endproduct with liming characteristics. This carbon is not yet taken into account but provides a consistent sink for carbon sequestration as organic carbon is firstly converted to CO_{2eq} and finally to $CaCO_3$, $MgCO_3$ being thus successfully removed from atmospheric carbon. Under natural withering conditions carbonates can be re-released into the atmosphere as CO_2. However, the rate at which this occurs can be lower than the rate of annual addition of carbonates via consistent fertilization with digestate (derivatives). Further research is therefore required to identify the significance of this potential contribution.

In conclusion, AD has four ways of reducing GHG emissions of which only the replacement of fossil fuels is well known and considered. The abovementioned additional GHG reductions should be fully recognized and accounted for in national action plans to reduce GHG emissions and to make European agriculture more sustainable. This also implies that the AD business model could and should enjoy benefits coming out of the European Trading System (ETS) on CO_{2eq} certificates in reflection of the logic that this technology reduces more GHG emissions than can merely be attributed to the substitution of fossil energy by renewable energy.

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It's all about cooperation: the role of EERA as a key stakeholder to accelerate energy transition

By Hervé Bernard, Chairman of EERA

The establishment of the Energy Union - the EU overall strategy for secure, competitive and sustainable energy - as one of the main priorities of the Juncker Commission, has strengthened the importance of the EU Strategic Energy-Technology Plan (SET-Plan) as a framework to achieve the EU energy objectives, with research as one of the key pillars.

A renewed SET-Plan, launched in September 2015, has given new impetus to the role of the European Energy Research Alliance (EERA) as research backbone and key EU energy stakeholder. It also calls for more cooperation and increased coordination to maximize synergies and pool resources at different levels. Cooperation, both internal and external, is at the heart of EERA's mission and work: internally, by mobilizing and coordinating the research community, bringing together over 175 leading energy research centers and universities from 27 countries in 17 thematic Joint Programmes, and aligning bottom-up activities with the directions set out by the SET-Plan; externally, working in close coordination with stakeholders. This is well reflected in the key objectives of EERA's 2015-2020 strategy, namely: delivering and disseminating results on the SET-Plan actions; acting as SET-Plan ambassador; advising on the priorities of the SET-Plan, on strategic energy targets and on foresight work; coordinating the scientific community in the energy sector to delivering excellent research; supporting the mobility of researchers and implementing student training programmes, in collaboration with university stakeholders (in particular the European University Association); facilitating the transfer of research results, solutions and knowledge to industry.

EERA's strengthened role is the fruit of both a regular dialogue with the European Commission, the Member States and other stakeholders and of our members' huge work to deliver excellent results in energy research.

In the framework of our role, a particular focus has been placed on cooperation with industry. This is developed in a number of ways, including through joint projects, both within the Joint Programmes and bilaterally, and via recommendations to EU decision makers based on common research and innovation priorities. In addition, we recently developed a software tool to make research results easily available to industry and facilitate knowledge transfer. We also signed a Memorandum of Understanding with EMIRI, the *Energy Materials Industrial Research Initiative,* with concrete cooperation measures in the field of materials for energy. Another way to increase our link with industries will be explored at the EERA conference in Birmingham on November 24th-25th, where companies will sponsor the event and will join the programme, thus getting direct access to the whole research community for fruitful exchanges.

Cooperation with industry is key to our work and to help companies taking up research results and turning them into innovative solutions for the citizens and the market. The solution-oriented

vision is very much in our chords: as societal challenges are cross-border, we support research activities oriented to solve them and which have an impact. Results can be assessed in a number of ways and based on different time perspectives, included, but not limited to, solutions that can be taken up by the market in the medium and short timeframe. Dialogue with industry is essential to achieving this. However, this is not the only impact of research, and EERA's work is dedicated also to supporting research collaboration that can come up with innovative approaches and new ways of thinking. This often produces results in the longer rather than the shorter run and provides society and industry with new options for the not-so-near future. This is crucial particularly in a field like energy, characterized by a long innovation cycle and which requires big investments in terms of time and resources before research results can turn into commercial solutions. Keep on supporting a long-term research agenda is therefore essential to EERA's vision and to our work to contributing to Europe's energy goals and its competitiveness on a global scale.

We are committed to these goals and we will keep on working to increase our efficiency and to improve internal and external cooperation to support synergies and alignment of objectives and resources. In this context, we led a wide internal consultation process to develop our Strategy and Implementation Plan for 2015-2020, outlining EERA's role to support European energy research in coordination with key stakeholders. We also recently launched a Task Force to develop a proposal for a mobility scheme in the energy field, involving the European University Association in the exercise. With regards to research alignment, a number of EERA JPs will be involved in the European Common Research and Innovation Agendas (ECRIA) projects within Horizon2020, a new instrument proposed by the Commission to co-fund activities with Member States and acting organizations. This is a step further to aligning national and EU priorities in energy research and to support activities in this direction.

Achieving Europe's energy research and innovation goals is not a one-man job. I believe EERA should continue on the path of cooperation with industry and the other stakeholders, while strengthening its identity of key research player to contributing to the EU energy strategy and objectives, in the short and long-term alike.

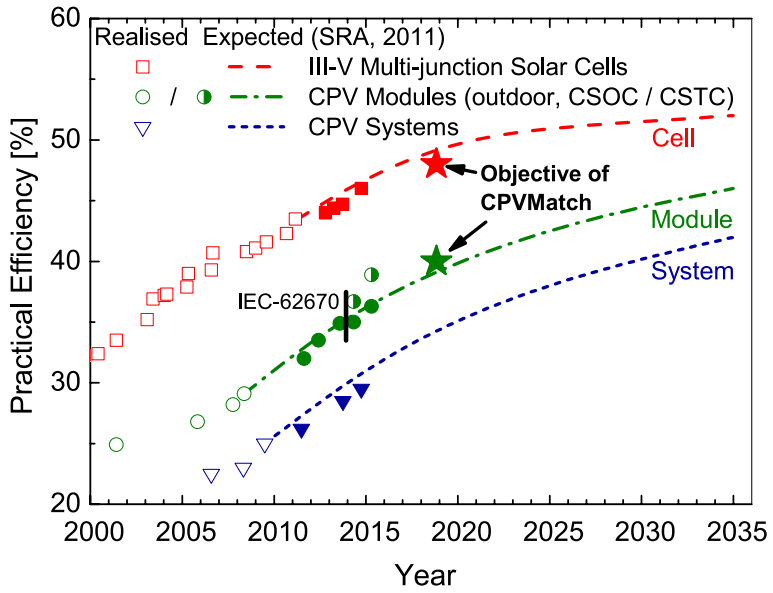
Contact details:
For more information about EERA please visit www.eera-set.eu

CPVMatch: A European Project for Highest Efficiencies in Concentrating Photovoltaics

The EU-funded project *Concentrating Photovoltaic modules using advanced technologies and cells for highest efficiencies* (CPVMatch) will bring practical performance of high concentrating photovoltaics (HCPV) closer to theoretical limits. Leading European experts in their respective fields of science, technology and industrialization are engaged in the project to realize novel multi-junction solar cell architectures and innovative HCPV module concepts.

CONCEPT

It has been proven that the only realistic path to close the gap between theoretical and practical ultra-high efficiency solar cells is the monolithic multi-junction (MJ) approach, i.e. to stack different materials on top of each other. Each material/sub solar cell converts a specific part of the sun´s spectrum and thus manages the photons properly. However, large area multi-junction cells are too expensive if applied in standard PV modules. A viable solution to solve the cost issue is to use tiny solar cells in combination with optical concentrating technology, in particular, HCPV, in which the light is concentrated over the solar cells more than 500 times. The combination of ultra-high efficient cells and optical concentration lead to low cost on system level and eventually to low levelised electricity costs, today well below 8 €cent/kWh and at the end of this project below 5 €cent/kWh. Therefore, to achieve an optimised PV system (high efficiency, low cost and low environmental impact), world-wide well-known partners in the field of CPV technology work together in this project to run and progress together the development of highly-efficient multi-junction solar cells and the improvement of the CPV module technique.



*Development of record efficiencies of III-V multi-junction solar cells and CPV modules (cells: x*AM1.5d; modules: outdoor measurements, since 2014: Concentrator Standard Operating Conditions (CSOC) or Concentrator Standard Test Conditions (CSTC)). The trend lines show expected efficiencies from the Strategic Research Agenda (SRA) developed by the European Photovoltaics Technology Platform in 2011.*

IMPLEMENTATION AND OBJECTIVES

The collaborative project started in May 2015 with a duration of three and a half years and an EC contribution of 4.95 M€. The consortium consists of four research institutions (Fraunhofer ISE, RSE, CEA, Tecnalia), one University (UPM), two industry partners (AZUR Space Solar Power, AIXTRON) and two SMEs (ASSE, Cycleco) and is coordinated by Fraunhofer ISE. The consortium addresses in their research all topics required to manufacture highly efficient CPV modules. This includes material issues, manufacturing and equipment aspects and production challenges. University and research institutes are working in close co-operation with industry partners in order to ensure fast industrial exploitation of all results within the whole value chain.

The central objective of CPVMatch is to realise HCPV solar cells and modules working at a concentration level ≥ 800x with an efficiency of 48 % and 40 %, respectively, with a low environmental impact.

In order to develop the targeted high performing CPV solar cells and modules, two strategies are adhered to (both for the multi-junction solar cell and module technology). The work on cells and module technologies is accompanied by a profound life-cycle and environmental assessment and the development of adapted characterization methods of new multi-junction cells and HCPV modules. The

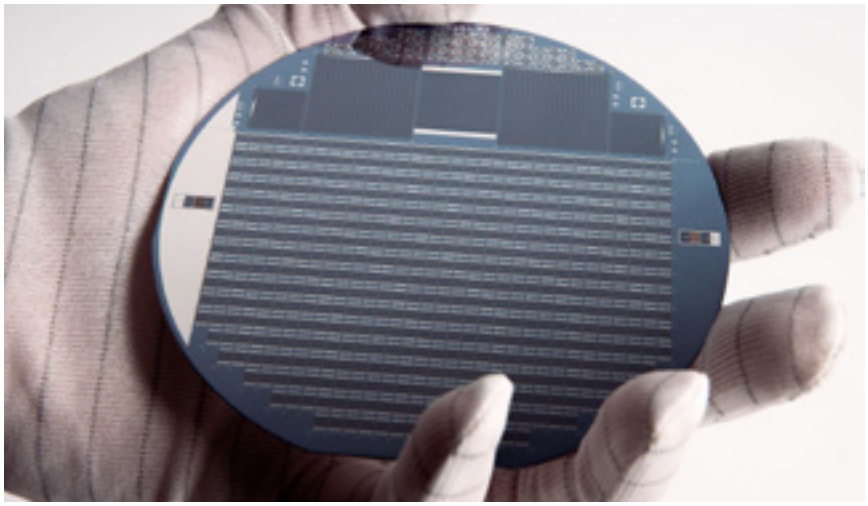
following specific objectives have been defined for the project:

- *Development of a novel wafer bonded* ***four-junction solar cell*** *for better spectral matching with an* ***efficiency of 48%*** *using advanced materials and processes*
- *Development of a* ***lattice-matched multi-junction solar cell*** *with high efficiency potential and low process cost, comprising* ***nanostructured coatings*** *and* ***innovative lattice-matched materials****, obtained* ***by combing III-V and IV elements***
- *Development of* ***innovative, Fresnel lens-based HCPV modules***
- *Development of* ***smart,*** *mirror-based* ***HCPV modules***
- ***Life-cycle*** *and environmental* ***assessment*** *of new multi-junction cells and HCPV modules*
- *Assess the developments realized on solar cells and modules by means of* ***adapted characterization methods***

IMPACT

The central expected impact of this project is to significantly increase the technical performance of III-V multi-junction solar cells and HCPV modules and thus to lower the cost for PV energy. HCPV systems reach efficiency levels which flat-plate PV will never be able to reach cost-efficiently. In addition, CPVMatch will help to increase the reliability, maintainability, and lifetime of CPV while increasing simplicity and decreasing operation and maintenance costs.

One of the central aims of the project is also to reduce the life-cycle environmental impact of electricity generation. HCPV systems already have low energy payback times of 6 to 9 months in Southern Europe, which will be further reduced through CPVMatch. Therefore, this project will contribute to solving the global climate and energy challenge by improving one of the most promising solar energy technologies.



Wafer with multi-junction concentrator solar cells © Fraunhofer ISE

Prototype of a new mirror-based concentrator. © ASSE

CPV power plants in Southern Europe could deliver predictable, low-cost and reliable electricity and hence improve EU energy security by lowering the need for energy imports of fossil fuels and nuclear material. This holds in particular as most of the CPV manufacturing value chain lies within Europe and includes several of the key enabling technologies, which were identified as essential for maintaining European competitiveness. Many start-up and smaller companies exist in Europe that can produce CPV systems, including cells, modules and other system components. Hence the success of this project will help to nurture the development of the European industrial capacity to produce CPV components and systems and to open new opportunities for companies and the strong research community in Europe.

CPVMatch

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Europe at crossroads: defining the face of future mobility

By Hans ten Berge, Secretary General, EURELECTRIC

Transport is responsible for about a quarter of EU emissions and is almost exclusively dependent on oil. As the Energy Union aims to break oil dependency and to decarbonise transport, especially for road and rail, electro-mobility is the key technology for replacing fossil energy sources. As the old energy order ends and a new one begins, electro-mobility opens the doorway to new markets and new technologies.

However, in order to make the shift to electro-mobility, a cornerstone of Europe's 2016 decarbonisation of transport strategy, there is a need for an overarching EU wide strategy to ensure that benefits are maximised and risks mitigated.

POSITIVE SPILLOVERS OF ELECTRO-MOBILITY

Electric transport offers numerous advantages. Electric vehicles (EVs) are cleaner, quieter and three times more energy efficient than their conventional counterparts. Using electricity in transport can reduce significantly local air pollution in cities, especially when it comes to pollutants such as particulates, NOx, SOx, VOCs and ozone. According to the international non-profit association Transport & Environment, particulates and other harmful substances stemming from transport exhaust gases are causing half a million premature deaths a year in the EU[1]. Thus, surface transport electrification would effectively address the public health crisis caused by urban air pollution.

The electrification of light vehicles such as bicycles and powered two-wheelers, cars, vans, trucks and buses, and also the further electrification of railways, will help Member States to meet greenhouse gas emission reduction targets for 2030[2]. A shift to electro-mobility could halve emissions in urban centres by 2050 and zero-emission urban logistics could be attained by 2030. Furthermore, it would effectively cap the emissions of the sector by de facto bringing them under the EU Emissions Trading System (EU ETS), which again would strengthen the EU ETS. In addition, electrification would contribute to the achievement of the Transport White Paper's objective of banning combustion engine cars from urban areas by 2050.

The EU's transport sector is currently 94% dependent on oil , with a bill of up to €1 billion per day on oil imports. Using electricity in transport – above all when electricity is increasingly generated domestically e.g. via renewable energy sources in Europe – would help reduce those imports and thereby lower the annual cost of the EU's oil import bill.

But EVs also offer benefits to the power system as such: they could support the power system in its energy transition by maximising the local grid integration of variable renewables. Electric vehicles can play a dynamic part in the electricity system by acting as local storage connected to a smart home charged from customers' own solar panels. This will also facilitate the integration of prosumers in the electricity system while reducing the peak production exported to the grid and flattening the demand curve.

By means of smart charging, electric vehicles can act as flexible loads which again benefits the power system as a whole by minimising or eventually avoiding grid reinforcements. A widely electrified European car fleet in combination with smart charging would offer significant capacities in terms of load shifting and also could provide ancillary services to the electricity grid. Analysis shows that even if all cars on the road today were electric, the current electricity system could cope with the resulting increase in electricity demand, provided that the charging of those cars is carefully managed.

ADOPTING A SYSTEMIC APPROACH

Even though technologies to electrify transport are already available on the market, they are currently a niche market. Projections on how fast this niche market will grow, vary widely and largely depend on the evolution of policies supporting the decarbonisation of transport.

A number of initiatives like the Platform for Electromobility (initiated by various stakeholders including EURELECTRIC) and Gear 2030 (initiated by the EU Commission) currently encourage electro-mobility, but the efforts could be better coordinated.

An EU strategy for electro-mobility should first acknowledge electrification as the final piece in the sustainable mobility jigsaw. As the energy transition is leading to a much cleaner, interactive and customer-friendly power system, one obvious way of decarbonising transport is to switch fuel to electricity. There is no energy carrier that can decarbonise to the same extent and scale as electricity.

The EU electro-mobility strategy should also aim to increase the share of electric journey and freight kilometers travelled using vehicles and trains, many of which are manufactured in the EU. Member States should develop comprehensive and ambitious national plans for the development of electro-mobility, including targets for recharging infrastructure and EVs, public procurement measures and other implementing mechanisms. In this context, national policy frameworks for the transposition of the Directive on the deployment of alternative fuels infrastructure will be notified to the European Commission in November this year.

Furthermore, the revised EU Effort Sharing Decision, which establishes binding annual greenhouse gas emission targets for non-EU ETS sectors, should reflect a clear approach for the decarbonisation of transport post-2020. Moreover, the upcoming review of the Regulations setting CO_2 targets for cars and Light Duty Vehicles should aim for ambitious standards for the post-2020 period. Car manufacturers largely opposed the previous regulation, which demanded a mandatory target for new cars of 130 grammes CO_2 emissions per kilometre by 2015. Despite this opposition, European carmakers reached their 130g/km target early. Meanwhile, a European Commission study investigating the competitiveness effects on the automotive industry concluded that post-2020 EU LDV CO_2 legislation would not directly affect competiveness of EU car manufacturing, component manufacturing and fuel or energy supply industry. Therefore, this shows that the new Regulation should aim for goals that are more ambitious.

Electro-mobility offers an unequalled solution to make Europe's transport more efficient, less dependent on imported energy, low carbon, clean and quiet. The policy and investment choices we make today have to more ambitious, so that electro-mobility can become a cornerstone of Europe's decarbonisation of transport strategy.

1) See Transport & Environment: Don't breathe here. Tackling pollution from vehicles, September 2015, https://www.transportenvironment.org/sites/te/files/publications/Dont_Breathe_Here_report_FINAL.pdf, page 3.
2) Transport White Paper 2011
http://ec.europa.eu/transport/themes/urban/cpt/index_en.htm

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electric mobility south-west

The joy of reason – smart and sustainable mobility

Germany is currently adapting to a new future in road transport – one that is automated, connected and electric. Home to OEMs and leading automotive industry supply companies but also endowed with a deep-rooted SME culture and a highly diverse research landscape, the Federal State of Baden-Württemberg is now trailblazing the design and development of these new technologies and applications. One of the major players is the Cluster Electric Mobility South-West. Funded by Germany's federal and state-level governments, this leading-edge cluster comprises more than 100 companies as well as 13 research institutions and universities working together under a cross-sectoral and interdisciplinary remit – a unique advantage when it comes to driving forward the right kind of innovations in e-mobility systems.

'Being sensible has never been so much fun. And being sensible means harnessing renewable energies for our roads in order to reduce pollutants and achieve net-zero GHG emissions. However, e-mobility is also fun because it offers simple, smart and direct solutions and – in terms of general appearance – many other advantages over conventional vehicles. The Cluster Electric Mobility South-West has become increasingly successful at promoting the industrialisation of electromobility.' Says Franz Loogen, Managing Director of e-mobil BW GmbH, the agency that coordinates the cluster's activities. 'Our focus constantly revolves around the interplay of three key factors: fascinating technology, economic potential and ecological sustainability.'

DRIVING PROJECTS FORWARD

New materials, new parameters for component durability, new vehicle architectures and new concepts for workshop service and usage all require intensive development inputs. By way of example, in the current cluster project 'e-volution – integration of innovative concepts for a more efficient e-vehicle offering higher performance', Porsche AG is engaging and interacting with six partners in a bid to fulfil a research-driven objective in which pre-series cutting-edge technologies from all sectors are pooled and expressed in one vehicle.

E-vehicles need advanced charging technologies. The project 'BiLawE' is developing a smart, bidirectional, inductive charging system: the driver simply parks the vehicle and its smart algorithms enable it to decide whether it needs to 'fill up' or whether it can feed power into the grid. With electrification, we are seeing the automobile morph from an end consumer to a component of the energy supply system. On the one hand, the state-of-charge window for plug-in vehicles can be attuned in order to balance fluctuations in renewable energy supply. On the other hand, e-vehicle batteries can serve as integrated energy stores and feed power back into the grid. The cluster project 'IMEI' focuses on e-mobility and energy supply integration in e-vehicle fleets and aims at integrating processes that are presently separate from each other, such as the scheduled delivery slots in urban zones and the daily load curves in the power grid. At its core, IMEI is asking how networked electromobility can help shaping the smart city and thus make it a quieter, cleaner and generally more attractive place to be.

AN INCREASINGLY INTERNATIONAL PLAYER

An orientation towards the global e-vehicle market is encoded in the genetic make-up of the Cluster Electric Mobility South-West. The vast majority of companies and research facilities concerned are international players. An example of the cluster's international approach is its long-standing cooperation with the French region of Auvergne-Rhône-Alpes. To open the door to Europe for those SMEs that are not yet operating internationally, the cluster – with the support of Germany's Federal Ministry for Education and Research (BMBF) – is now set to strengthen the cooperation in Europe as of 2017.

Don't miss out on the latest news, go to www.emobil-sw.de/en/

Intelligent Transport Systems – a Tool or a Toy?

Message from the organisers

THE EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY (COST)

Over the past 30 years, the European Cooperation in Science and Technology (COST) has been helping researchers coordinate national initiatives leading up to today's Intelligent Transport Systems (ITS) concept. COST networks – also known as Actions – have been proposing solutions for transport issues affecting European citizens' lives, especially in urban areas: air quality, congestion, safety, accessibility, equity, inter-modality and journey time.

For instance, transport operators and experts are now able to analyse harmonised EU data thanks to the COST Action "SHANTI" methodology, meant to measure urban mobility. Travellers are also receiving more reliable information and experiencing safer journeys thanks to the work of TU1004 and TU1305, the latter using big data to improve transit predictive models. Similarly, app users may soon take advantage of European tracking and tracing technology, as Action SaPPART is advancing work on a standard use of Global Navigation Satellite Systems for personal mobility applications (EGNOS and Galileo).

Understanding, analysing and developing ITS is a complex matter, requiring a wide range of expertise. We noticed that COST Actions in ITS tend to grow more interdisciplinary, as they engage experts from different backgrounds: urban planners, architects, transportation engineers, sociologists and economists. This way, COST networks sum up the interdisciplinary nature of ITS.

By co-organising the conference, COST and the invited Actions aim to share their experience and expertise with the wider ITS community, and certainly stimulate future collaborations.

Dr Mickael Pero
Science Officer
COST Association
www.cost.eu/events/itstooltoy

UNIVERSITY OF ŽILINA

The University of Žilina has a long tradition in transport and information and communication technologies research – two main technological pillars of Intelligent Transport Systems.

In 2014, the University was awarded an ERA Chair grant for ITS, meant to unlock the university's research potential and strengthen Žilina region's position in the field, while boosting ITS solutions Europe-wide.

We are very proud that the event is held under the auspices of the Slovak Presidency of the Council of the European Union. This transdisciplinary conference – organised alongside the European Cooperation in Science in Technology (COST) and ERTICO – is the perfect opportunity to set up a unique platform for leading European research institutions, companies, and government agencies to exchange ideas. This will help build stronger connections between European researchers and all other stakeholders.

We are confident that the debate will identify all the necessary tools to improve decision makers' understanding of ITS uses, in order to meet transport policy goals at all levels.

Dr Karl Ernst Ambrosch
ERA Chair holder
University of Žilina

Hydrogen mobility conquers the roads

By Claudia Fried, Clean Energy Partnership spokesperson, Berlin

A vision becomes reality: Europe's largest demonstration project in the field of hydrogen mobility, the Clean Energy Partnership (CEP), has further successes to report: in 2016, thanks to new models and a new car-sharing project, more hydrogen fuel cell vehicles than ever are on the road. The expansion of the H_2 infrastructure by the partners also continues to progress under the project's new chairman Thomas Bystry.

After Berlin, Hamburg, Stuttgart and Munich, more metropolitan areas will be opened up and connecting axes built. In a first stage, Germany's first 50 hydrogen filling stations are being built as part of the CEP. H_2 filling stations recently opened in the south of the country in Ulm and Metzingen. In North Rhine-Westphalia, the network was expanded with a station in Wuppertal where largely standardised space-saving storage, compression and fuelling components were installed, which can be flexibly inserted in a basic filling station layout. This is a huge step forward that allows for investing in hydrogen pumps at smaller sites as well.

In spring 2017, Honda is expected to launch a new fuel-cell series model in Germany. The new 5-seater Clarity Fuel Cell is the Japanese car manufacturer's second hydrogen- and fuel-cell-powered sedan. Its competitor Daimler has also announced a new H_2 series model in 2017: the new SUV GLC F-CELL, which has a battery that can be recharged by means of a plug. This gives it an additional range of 50 km beyond that of the fuel-cell stack. In Munich, the CEP partners Linde and Hyundai are launching the world's first car-sharing project with fuel-cell cars. "BeeZero" uses 50 Hyundai ix 35 Fuel Cell cars.

Since the beginning of the year, the Clean Energy Partnership has had a new chairman: Thomas Bystry from the Shell Hydrogen team succeeded Patrick Schnell of Total in this voluntary position. Bystry has participated in several CEP working groups, is a renowned expert in the field of hydrogen technology and is regarded as a staunch advocate and ambassador: "Hydrogen is the fuel of the future: very application- and customer-friendly in the mobility sector, and a very low-emission fuel," said Bystry.

Thanks to extensive research and development work and the high level of expertise within the partnership, the CEP has evolved from a demonstration project into a respected authority on the subject of fuel cells. Its expertise is also highly acclaimed in the international arena. In order to further their shared goal, the Clean Energy Partnership is in constant exchange with European Union-funded projects such as H2ME, HyFive and New IG and in May, for instance, reported on hydrogen mobility's potential for reducing CO_2 emissions to the UN Climate Change Conference in Bonn. Hydrogen can contribute significantly to the decarbonisation of the transport sector.

20 industry partners, technology, oil and energy companies and most of the world's largest car manufacturers, as well as leading public transport operators are currently working under the umbrella of the Clean Energy Partnership (CEP) to establish hydrogen as a fuel. The CEP was established under the auspices of the German Ministry of Transport and Digital Infrastructure (BMVI). It is coordinated by the National Organisation for Hydrogen and Fuel Cell Technology (NOW) and funded by the National Hydrogen and Fuel Cell Technology Innovation Programme (NIP). The partnership focuses on the continuous operation of efficient hydrogen vehicles, quick and safe refuelling, and the sustainable production of hydrogen.

www.cleanenergypartnership.de

The Platform for Electro-mobility

By Thomas Willson (pictured)

The European Union (EU) stands at the cross-roads of transport policy and emissions. At present, transport remains the only sector bucking the trend on emission reductions, accounting for 34% of all emissions from non-emission trading system (ETS) sectors. Electro-mobility offers an unparalleled solution to address such difficulties, presenting the opportunity to reduce oil imports, improve efficiency and reduce carbon emissions, by replacing fossil mobility within cities and across long distances. In addition, benefits in improving local air quality, noise pollution and facilitating the integration of renewable energy sources in the EU's energy system, present a compelling case to strengthen our support for the technology.

The "Platform for Electro-mobility" was created as a means to support such a reality, bringing together likeminded stakeholders across industries and transport modes, representing producers, infrastructure managers, operators and users of transport, cities and civil society. At present, the Platform for Electro-mobility counts twenty-three members, sharing a vision for a sustainable, multimodal transport system in which people and goods are primarily moved across land in Europe using sustainable electricity.

In April 2016, the Platform for electro-mobility was officially launched, holding an event to mark the publication of its first recommendations paper, which outlines needed actions for the EU to become a leader in e-mobility'. The launch event featured Henrik Hololei, Director-General at DG MOVE, and Panellists from DG CLIMA, Council Presidency of the Netherlands, Alstom, Renault-Nissan and the City of Manchester, who all underlined the need for electrification of the transport sector to play a key role in achieving the goals of the EU's Energy Union Strategy.

It is in this context that the Platform for Electro-mobility approaches the EU's Energy Union strategy, which aims to ensure 'secure, affordable and climate-friendly energy' through five reinforcing 'pillars': supply security, a fully integrated internal energy market, energy efficiency, climate action and research and innovation. A key priority of the Junker Commission, the Energy Union made clear that electrification of transport is crucial to address oil dependency and decarbonisation of the sector, urging a quickening of pace in the uptake of electro-mobility.

The Platform for Electro-mobility welcomes the strategy and calls for more work to be done to embed electro-mobility within the Energy Union. It is the view of the Platform that electro-mobility is able to support

each of the five pillars, providing an opportunity to cement Europe's position as leader in innovation and climate-friendly technology. Below, we present our views on how electro-mobility and the Energy Union can mutually reinforce each other in the years ahead.

ELECTRO-MOBILITY IN THE ENERGY UNION

Security of Supply

In 2014, the EU relied on imports for 88% of its crude oil supply and studies have shown that our energy dependency has only increased. In 2015, a year of historically low oil prices, total spending on crude oil imports in the EU was €187 billion (equivalent to 1.3% of EU GDP, or €368 per capita). Adding estimates for diesel imports yields a total of around €215 bn, equivalent to €425 per capita. Today, Russia accounts for 30% of our oil imports, while geopolitically instable regions such as Nigeria and sub-Saharan Africa represent 16% of our imports. A further 15% came from the Middle East. Reducing such dependency requires the swift electrification of transport, which would help the EU provide energy security by minimising our reliance on imported fossil fuels.

A fully integrated internal energy market

Electro-mobility is the bridge between the power and transport sectors, providing new sources of flexibility to the energy system. Harnessing this flexibility will be an important factor in achieving a smart and cost-efficient energy system in the EU, which allows participants to make the best use of cheap energy when available. At present, EU regulatory support for smart charging and energy storage is lacking and we must carefully consider electric vehicle (EV) owners can participate and reap benefits from our rapidly evolving energy system.

Energy Efficiency

Electro-mobility ensures a more efficient use of energy as compared with fuel-based solutions (from electric rail and public transport to electric vehicles which are three times more efficient than combustion cars), and therefore makes transport as a whole more energy efficient. In addition, EVs are expected to make an important contribution to the use and the optimisation of renewable energy sources, with their ability to provide flexible energy storage. Seizing these benefits will be a key driver in supporting Member States to achieve energy and climate goals.

Climate Action

While half of the European power mix is decarbonised today, this share is expected to grow to three-quarters by 2030. Any shift from oil to electricity in the transport sector would therefore substantially reduce our overall CO_2 emissions and help the transport sector to meet European climate targets. As organisations such as the IEA have indicated, at least three out of every four cars sold will need to be full EVs or plug-in hybrids by 2050, for the transport sector to be able to support meeting the 1.5°C target agreed at COP21.

Research and Innovation

Electrification of transport will bring innovative technology rapidly into the market, by opening up a wealth of new possibilities for technology and services. In particular, research to further improve battery performances and reduce cost should be supported at EU level, but also improving railways' energy efficiency. To quicken the arrival of this innovation, we will need to ensure strategic focusing of research and investment tools at the EU's disposal, shining a light on the exciting possibilities for electro-mobility, including in particular energy storage, light electric vehicles and electric buses.

In summing the benefits brought by electro-mobility to each of the Energy Union Strategy pillars, it is clear that a powerful case can be made to realise such a vision through European policy-making. The Platform for Electro-mobility urges EU decision-makers to continue and strengthen their support for a sustainable transport system in Europe.

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Project Mission and Scope

ALISE is a pan European collaboration focused on the development and commercial scale-up of new materials and on the understanding of the electrochemical processes involved in the Lithium Sulfur technology. It aims to create impact by developing innovative battery technology capable of fulfilling the expected and characteristics from European Automotive Industry needs, European Materials Roadmap, Social factors from vehicle consumers and future competitiveness trends and European Companies positioning.

The project is focused to achieve 500 Wh/Kg stable LiS cell. The project involves dedicated durability, testing and LCA activities that will make sure the safety and adequate cyclability of battery being developed and available at competitive cost.

Initial materials research will be scaled up during the project so that pilot scale quantities of the new materials will be introduced into the novel cell designs thus giving the following advancements over the current state of the art. The project approach will bring real breakthrough regarding new components, cell integration and architecture associated. New materials will be developed and optimized regarding anode, cathode, electrolyte and separator.

DELIVERING INNOVATION TO THE MARKET

ALISE Consortium is dedicated to market transfer of different devices/ systems/components being developed in ALISE project along the value chain due to the commercial interest of SME/ Industrial Partners.

Complete panels of specific tools and modelling associated will be developed from the unit cell to the batteries pack. Activities are focused on the elaboration of new materials and processes at TRL4. Demonstration

of the Lithium Sulphur technology will be until batteries pack levels with validation onboard. Validation of prototype (17 kWh) with its driving range corresponding (100 km) will be done on circuit. ALISE is more than a linear bottom-up approach from materials to cell. ALISE shows strong resources to achieve a stable unit cell, with a supplementary top-down approach from the final application to the optimization of the unit cell.

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Electric vehicles (EVs): how far down the track have we come? How far have we yet to go?

We take a slightly closer look at three developments.

*"It is not only what we do, but also what we do not do, for which we are accountable." – **Molière***

By Michael Edmund, Editor

One rainy April day in 1906, a man was absent-mindedly crossing the Rue Dauphine in Paris. He collided with a horse and cart, and the life of Pierre Curie - *the* Pierre Curie - was cut tragically short. In partnership with his brother Jacques, Monsieur Curie had been instrumental in our early understanding of piezoelectricity, although he is probably better known for his collaboration on radioactivity with his wife Marie. The couple worked with Henri Becquerel, whose father Edmond is credited with the discovery of the photovoltaic effect: quite a formidable French scientific dynasty, and today these technologies represent two of the more exciting prospects for our efforts to combat climate change in general; and for electric mobility in particular.

It was almost four years ago that EEI brought you Scott Brusaw's fascinating vision for the incorporation of photovoltaic (PV) technology into roads. His idea comprises an intelligent, interlocking modular system of tempered glass panels. They may be walked over and driven upon; with their PV capability, they can flash warnings to cars when pedestrians attempt to cross or when the surface is freezing; and they can heat themselves to reduce the risk that might pose. Four years ago, Solar Roadways was little more than a working prototype, but two funding contracts have since been completed with the U.S. Government, with a third being awarded in November 2015. The concept has been proved; and today stands ready for its first installations in driveways and car parks. The system certainly has had its critics, but it deserves our close attention because the claims made for it are startling, to say the least: a 75% reduction in GHG emissions and the facility to recharge EVS continuously while travelling along it. And the small matter of enough clean electricity to power the entire planet. This, by the way, from replacing just the tarmac surface of the United States; and quite apart from any economic and public health consequences of eliminating accidents on frozen roadways.

Many of us are familiar with using a piezoelectric device on gas cookers and barbecues: a crystal responds to being struck by generating a spark that may be used to light a gas flame. Recent work from Spain confirms that integration of piezo devices into the asphalt of a roadway is not only feasible, but likely to prove a cost-effective means of generating useful electricity. The authors of the study calculate that 10% of the energy generated in Madrid could be derived from 0.6% of its roads. The technology obviously does not rely upon sunlight, with the further appeal that the greater the amount of traffic using such roadways, the greater the energy recovered from them. However, piezo technology is not yet as advanced as the solar roadway solution, while the laws of physics of course remain in force, making it impossible to extract more energy from the technology than is put into it by traffic. Piezo-enabled roadways nevertheless offer the prospect of significant reductions in GHG emissions.

And so we come to the EVs themselves – or, more particularly, to the batteries that power them. Tesla and Formula e might have revolutionised the image of the EV, but public acceptance has nevertheless remained relatively low, principally because of the weak points in the EV proposition: the twin issues of vehicle range and the time required to recharge the batteries.

However, with so much at stake there has been colossal investment in novel battery chemistry and design. Lithium-air batteries appear to approach the energy density of gasoline, while magnesium and solid state lithium ion variations offer contrasting improvements on the existing technology. A new porous stainless steel/thin-film electrolyte hints at extending the interval between recharging, while gold nanowires may significantly extend overall battery life. Meanwhile, the wonder material graphene offers perhaps the most exciting prospect: a Spanish company has developed a graphene polymer battery that could allow EVs a maximum range of 800 kilometers (497 miles) and a recharging time of a few minutes.

This brings the argument full circle. Solar roadways can put useful electricity into the road system, and piezo roadways can reduce the energy lost from it. Each requires substantial investment in the road network; each

could recharge EVs as they pass, substantially overcoming the need for further advances in battery technology, which is nonetheless happening anyway. These are technologies for the future, but Tesla's Model 3 already stands poised to offer the blend of affordability, range and performance that represent a realistic alternative to conventional cars. Given the inexorable rise in both atmospheric CO_2 levels and global temperatures, the planet may not be able to wait long enough for us to debate solar or piezo roadways fully: economics might have to be subordinated to public policy, which should in turn be subordinated to planetary expediency.

A final thought: what else might M. Curie have discovered if a solar roadway had flashed a warning as he tried to cross the Rue Dauphine 110 years ago? How many other accidents might have been prevented since then; and how many lives saved?

URLography

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The way forward for reducing CO_2 emissions from cars[1]

By Arno Behrens, Head of Energy, CEPS

The transport sector accounts for around one-quarter of EU greenhouse gas (GHG) emissions. Cars and vans alone contribute about 15% of total EU CO_2 emissions. Given its increasing importance in EU GHG emissions, the transport sector will play a significant role in the EU's efforts to decarbonise its economy in line with its international commitments.

Currently, transport is not covered by the EU Emissions Trading Scheme (EU ETS), although some elements of transport activities are partially covered by the ETS; namely EU aviation, and rail via the power sector or refining of fuels. In the course of 2016, the European Commission will publish a Communication on the decarbonisation of transport, which will be followed by specific legislation. This Communication will indicate how the transport sector will contribute to achieving the 30% CO_2 emissions reduction objective set for non-ETS sectors until 2030 (compared to 2005). The European Commission has indicated that the Communication will focus on three elements: (i) improvements in the efficiency of vehicles, including through emissions standards for cars and vans and the review of the test cycles; (ii) better management of road transport activity, including modal shift, charging systems and intelligent transport systems; and (iii) decarbonisation of fuels, including electrification and alternative fuels.

A TECHNOLOGY NEUTRAL POLICY FRAMEWORK

There are various technological options to reduce GHG emissions from cars. In the short term, progress can still be made through improving the efficiency of the internal combustion engine, hybridisation, advanced biofuels, weight reduction, reduced resistance (surface and air), and intelligent transport systems, including eco-routing and ecodriving.

In the medium to long-term, hybrid, plug-in hybrid and electric cars could allow for steeper emissions reductions. Current barriers to the deployment of electric vehicles are cost, low range, and lack of infrastructure and consumer acceptance. A key element will be the development costs of batteries, but there is evidence that these costs have been falling rapidly.

Another medium-term option is biofuels with a positive effect on GHG emissions, such as advanced bio-fuels. Biofuels may be an option for aviation and road haulage, as not all heavy duty vehicles are expected to fully run on electricity, at least in the short term. A major issue is scale and most studies put the potential contribution of biofuels far below 10% of EU fuels demand.

Another option could be natural gas vehicles, which constitute an option for heavy duty vehicles. Passenger cars fuelled by natural gas have been around for a long time but have not managed to penetrate the European market without tax breaks. In light of the long-term reduction targets, natural gas can only be a transition fuel, unless it is produced carbon free, e.g. by substitute natural gas produced from a power-to-gas (P2G) process.

In the longer run, i.e. beyond 2030, hydrogen fuel cells vehicles could become an option.

Reductions will also occur through a better transport system and alternative mobile solutions. Existing ones are rapid transit systems, cycling and walking, urban planning, ICT, efficient comodality, green logistics or by getting the transport prices right. There might be new potential in the digitalisation of transport and energy, e.g. by the sharing economy of connected cars.

It is very unlikely that there will be one single winning technology, not even in the long term. The decarbonisation of different modes such as passenger or freight, but also of urban and long-distance transport, will likely rely on a variety of technologies and fuels. This will mean that the policy framework will need to be technology-neutral, yet reward low-carbon solutions. It will also require flexibility to support all low-carbon solutions while accounting for technological change. Policy should also account for societal co-benefits of technologies, such as reduction of

noise and air pollution, other health impacts and balance of payment impacts.

EMISSIONS STANDARDS WORK

Transport policies should aim to achieve the necessary GHG emissions reductions, but should equally be aimed at keeping the EU car industry and its products globally competitive. The key policy for achieving both is the steady tightening of technology neutral emissions standards in line with the technological frontier and equipped with adequate flexibility provisions. Passenger cars have been subject to mandatory CO_2 emissions standards since 2009. Actual emissions levels seem to suggest that these standards work effectively. The steady tightening of standards will continue to incentivise combustion efficiency and in parallel speed up the deployment of new low-carbon technologies and fuels such as vehicles running on low-carbon electricity, sustainable biofuels, gas or hydrogen. But a precondition for emissions standards to work is a robust and credible monitoring system to assess the gap between emissions measured under the test cycle and real emissions. Otherwise emissions reductions will remain statistical, largely unrelated to existing real-life conditions.

The impact of emissions standards can further be enhanced if incentives are reinforced by member state, regional and local strategies. This optimisation will also require that incentives are aligned with carbon efficiency, requiring an end to environmentally harmful subsidies. In addition, member states should reinforce technology neutrality by doing away with tax breaks, for example, for diesel or natural gas. Similarly, support for those biofuels that increase GHG emissions should be discontinued while respecting existing legal commitments.

On the EU level, a more proactive infrastructure policy for alternative fuels should focus on creating an internal market free of barriers for alternative fuels. This could include the creation of cross-border corridors for charging and fuelling stations which could later be linked to speed up the development of a pan-European low-carbon network.

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1) This contribution is based on the CEPS Special Report "Towards an Effective EU Framework for Road Transport and GHG Emissions" (July 2016), available free of charge at https://www.ceps.eu/publications/towards-effective-eu-framework-road-transport-and-ghg-emissions.

V2G – From concept to pilot

By Peter Bach Andersen, DTU Elektro

GRID INTEGRATED VEHICLES AND V2G IN A NUTSHELL

The introduction of the electric vehicle represents both a challenge and an opportunity for the electric grid. The electrification of transportation, a necessity to reach European and International environmental target, means that there will be a new demand for electric power and energy. In Denmark the roughly eight thousand electric vehicles (by early 2016) represent the addition of around 3500 new three-person households in terms of electric power demand. The impact, however, is greatest in terms of power, where electric vehicles can significantly add to the peak loads seen in the electric grid.

On the other hand the vehicle, through new technology, can be made to actively support the power system. The vehicle can represent a fast responding, high-power flexible demand with a high degree of flexibility (charging can

be delayed during the night without consequence to the driving needs of the user).

The vehicle may even be able to deliver power from the main propulsion battery back into the electric grid upon demand. This ability is called "vehicle to grid" or simply V2G.

These capabilities combined means that electric vehicle has a strong potential in supporting an economic and stable power system based on renewable energy.

BRIEF HISTORY OF V2G

The leading expert on V2G, and the first to thoroughly explore its application, is Professor Willett Kempton of the University Of Delaware.

Back in 1996 Professor Kempton saw the potential in using the electric vehicle battery, an expensive asset which remains unused for 23 hours a day (while a vehicle is parked), to support the power system.

The concept was first described in the 1997 publication "Electric vehicles as a new power source for electric utilities".

Over the coming years Professor Kempton not only demonstrated that vehicles, with relatively slight soft- and hardware additions could be made to support bidirectional powerflow (V2G) – but also that there is an economic incentive in participating in power market products where the EV owner is compensated for letting her vehicle support the power system.

THE NIKOLA PROJECT – A DANISH APPLICATION OF V2G

Seventeen years after the idea was first formulated, a Danish project was initiated to perform a thorough investigation of how electric vehicles can support the power system in a Danish context.

A group of researches from the Technical University Of Denmark had already worked for some years on EV research and had started cooperating with Professor Kempton and his team.

By 2013 it was time to investigate how the knowledge and technology of professor Kempton could be applied to, and benefit a European power system.

The Nikola project was born. The project partners created a so-called service catalog. E.g. a list of all the kind of services that the electric vehicle could provide to the power system both on a local (distribution gird) and system-wide (transmission net and market) level. The approach was then to go through all of these services to understand the technical and economic potential of each.

These services included adaptive charging, where charging is simply delayed to reflect the price of energy or the renewable content in the grid at a certain point in time.

It also included services that hinder the adverse effects that a fast-charging vehicle may have on a local distribution network – creating bottlenecks and overloading. All of these services were tested either in the university labs or as part of a field test in a small Danish town.

One of the largest accomplishments of the project however, was when a large vehicle company, Nissan Motors, decided to join the project.

This allowed the Nikola partners to carry out the services using state-of-the-art series produced vehicles which even supported the V2G capability.

The advanced visionary V2G concepts conceived in 1996 could now be tested on present-day electric vehicles already driving in the thousands on Danish roads.

Together with Project partners, NUVVE, Nissan and ENEL, it became possible to demonstrate that two Nissan Leafs reliably could deliver frequency containment services adhering to Danish ancillary service terms.

In the experiment the Leafs where

connected to two V2G supporting DC chargers developed by the Italian power company ENEL and was controlled (rate and direction of power between EV and grid) using technology from NUVVE.

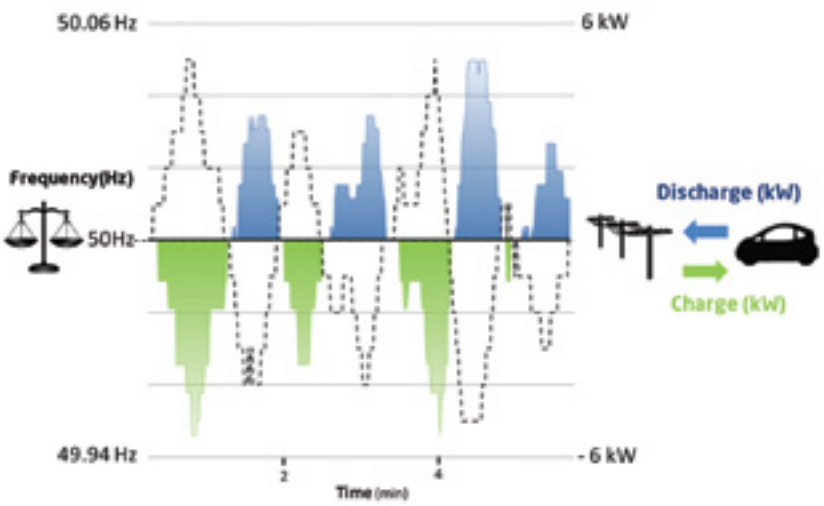
In frequency containment, a fleet of electric vehicles is paid to constantly monitor the system frequency and react to any deviations from the target 50 Hz.

If the frequency rises above 50 Hz there is too much energy in the system and the vehicles are asked to charge, if the frequency is less than 50 Hz there is too little power in the system and the vehicles are asked to discharge.

The electric vehicles qualities as mentioned earlier (fast response, high power etc) makes them well suited to deliver this kind of service.

Of course the backend system developed by NUVVE needed to control the charge/discharge operation to minimize battery degradation and ensure sufficient energy for the trips done by the EV owner.

Photo: Nissan Motors



The Nikola project analyzed the potential revenue of participating in this service and found that the earnings could be more than 100 Euro pr month pr vehicle.

Compare this with the cost of energy for driving the vehicle which for an average Danish EV owner would be around 40 Euro pr month.

This means that providing such services would not only benefit the power system - it could also substantially decrease the costs of owning an electric vehicle.

Another important point is that these services can also be delivered by non-V2G vehicles as well. However, the V2G capability considerably strengthens the grid benefit and revenue in performing the services.

In Nikola it was found that a V2G enabled electric vehicle could earn 6-13 times more in the market than a car without this capability. The main difference is that a car, that cannot discharge its battery, will eventually fill up and will no longer be able to provide the service.

MOVING FORWARD

The vision of Willett Kempton, and the learning from the Danish Nikola validations, has during the summer of 2016 been carried into a commercial pilot in the City of Copenhagen – the Frederiksberg pilot.

Here, an operational fleet of Nissan eNV200 vans used by a local utility will be made to participate in grid system services. Initially ten vehicles are used – more will be added during the pilot.

This activity is the world's first commercial V2G application on an operational fleet of vehicles and is a cooperation between the companies NUVVE, Nissan, ENEL and the Danish utility company Frederiksberg Forsyning.

This will be a big breakthrough for V2G technology and the idea of the electric vehicle as a resource for the Danish and European power system.

The pilot will also interface with, and support, the Danish parker project starting this year.

The Parker project seeks to support and validate that series-produced electrical vehicles can support the future power grid by participating in advanced smart grid services.

The parker project also seeks to increase the visibility and attention around the electric vehicles ability to support the grid by working with a number of electric vehicle manufacturers.

From sustainable Mobility to E-mobility

By Joseph Beretta, Avere-France President, AVERE Vice president

THE ROLE OF E-MOBILITY IN SUSTAINABLE MOBILITY

E-mobility has the potential to play a key role in ensuring sustainable mobility for the future. The current conditions is today met, this is partly due to the current economic situation, with increasing sales of electrical vehicles, a large extent also due to quick progress in charging infrastructure deployment, and clear and unified vision from politicians.

E-mobility can be a large part of a long-term solution to mobility challenges; for that full cooperation between utility providers, infrastructure companies, energy sector, standardisation bodies, automotive industry and the full support of national governments and the European institutions is required. Avere-France and AVERE Europe assume this networking role at both levels.

THE REASONS TO CHOOSE E-MOBILITY:

1. Environment point of view:

Electrification is credible option for decarbonisation of surface transport. Electricity is now already a significantly cleaner power source than oil, and will become more free carbon content in coming decades. Sustainable e-mobility can help clean up electricity by providing a storage option, stabilising the grid. Electric vehicles have not exhaust pipe emissions and emitted very low particulates from brake, thank to regeneration braking.

2. Energy concerns:

Electric traction is inherently 2 to 3 more energy efficient than other options,. Electricity is superior to oil; gas or biofuels to regards diversity and independence of energy. It can draw from a wide variety of energy sources, especially from renewable like wind and solar.

3. Alternatives have not the same credibility:

Natural gas is not a low-carbon expect Bio gas but its stay today a niche solution. Biofuels have huge and, as yet unresolved, sustainability challenges, especially to regard agricultural land. Only hydrogen may be part of future e-mobility but efficiency issues have yet to be addressed.

4. The economics aspect of electric vehicles:

E-mobility can reinforce trends towards sustainable transport (high fixed costs, low variable costs) help vehicle sharing. A key element on electrification must be to go beyond ownership. Electric traction is also well suited for small and light vehicles such as e-bikes, e-scooters, and small quadricycles that are quickly becoming more popular.

5. Innovation and competitiveness:

There are large chose of technologies: petrol hybrid, plug-in, full electric and fuel cell vehicles for future vehicle powertrains. It's time from Europe to regards global competitiveness to switch from diesel to E-mobility. A shift to electrification of transport is a benefit from air pollution, imported oil, cleaning electricity and, in the process, stimulating jobs, growth and sustainable mobility choices

DEVELOPMENT OF E-MOBILITY IN FRANCE

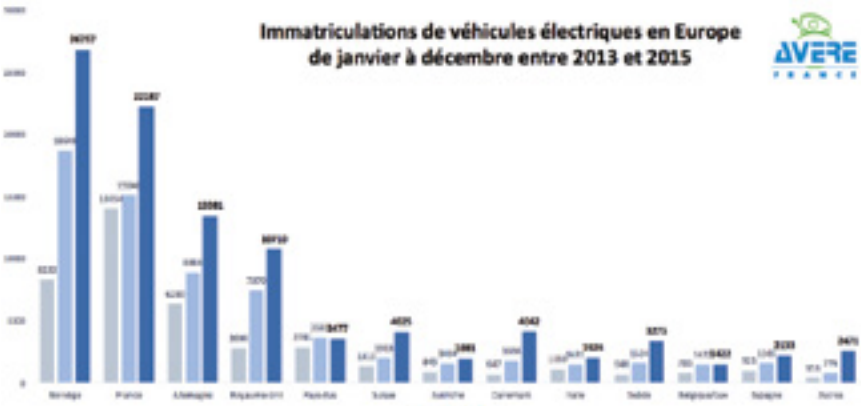
E-mobility will play a key role in solving many of the challenges to energy use and urbanisation. France is one of the most dynamic markets in the world, the EVs market shares are only 1% of the whole automobile market when PHEV are only 0,4%, which makes France the 4th European market in terms of penetration after Norway, Denmark and Switzerland.

Strong barriers remain for electromobility to grow massively:

- the high retail prices of vehicles;
- the low level of consumer acknowledge and acceptance;
- the lack of recharging infrastructure

Indeed, there are still strong myths on electric vehicles and, in spite of the existing subsidies and the development of charging infrastructures network, price and range are still considered as obstacles by most of the people.

Public support can be considered as vital for the growth of electromobility in France. But it is not enough. Avere-France deployed a strong effort on pedagogy and information is still



needed in order to fight popular beliefs.

FRENCH ECOLOGIC BONUS/MALUS:

Since 2008, finance Law orientates car buyers towards cleaner vehicles: the Ecologic bonus/malus system. Still in place in 2016, this system offers subsidies for the purchase of a clean vehicle while financing it by taxing polluting ones. Electric and hybrid vehicles receive the higher bonus (6300€ for EV), which is a way to address the question of its expensive price. This measure has had a strong impact on the growth of the market and is considered vital by professionals of the sector. In addition, the entering into force of the superbonus" on the 1st of April 2015 has increased the demand on electric and hybrid vehicles while accelerating the renewal of the French automotive park. Indeed, it adds from 2500€ to 3700€ to the bonus if destroy a diesel car registered before 2006.

French people and electric vehicles:

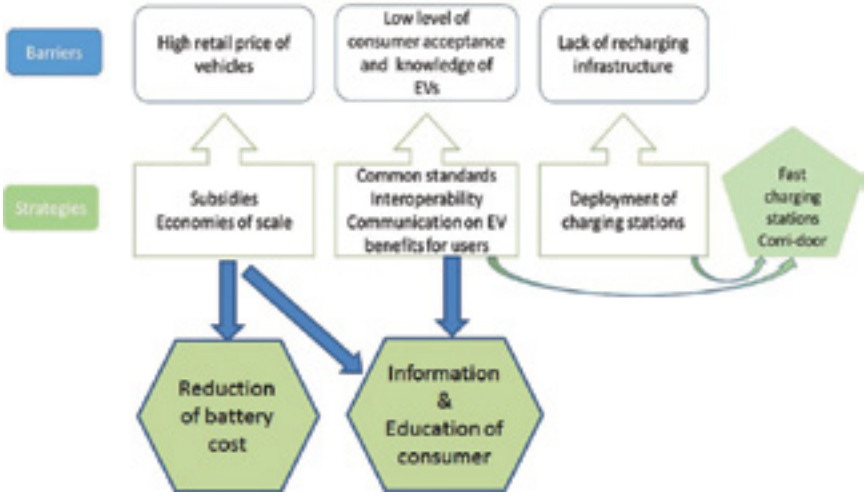
A predictable success, Avere-France, Mobivia group and IPSOS conducted a survey on the perception of electric vehicles by French people. The conclusions are relevant: 28% of French people are ready to buy an electric vehicle! And it is even more when people have already tested an EV.

FRENCH ELECTRIC CHARGING INFRASTRUCTURE

In order for electric vehicles to achieve a breakthrough, expansion of charging station infrastructure is important.

Investment on public networks:

In order to enable a real development of electromobility in the country, France has decided to invest in an accessible charging point network providing security and secondary charging solutions to EV drivers.



The responsibility of building these networks have been given to local authorities. A total budget of 50 million euros in subsidies is allocated to these operations. Moreover, a law voted on the 4th of august 2014 allowed private operators to install charging point network in the public space of a city council without having to pay a tax for occupying public space when this belongs to a national project. The French government has chosen three projects, the first led by BOLLORE COMPANY, the second by Compagnie Nationale du Rhône, and the third by SODETREL.

Financing private charging stations:

In addition to the development of public charging points, France recently decided to give subsidies for private ones through the certificate of energy saving mechanism. Avere-France has been put in charge of this 15 million euros program and will deliver subsidies in collective housing buildings (individual or shared charging point) and in companies charging infrastructure (fleet, salaries or visitors charging points). More than 12 000 private charging points should be installed

CONCLUSION

Electrification of transport offers a unique opportunity for simultaneously decarbonise transport; end dependence on imported oil; create jobs and growth; and stimulate industrial innovation. To do this we should, adopt a cross-modal and cross-vehicle electrification of transport and energy network, facilitate the transport multimodality and a shift to more sharing sustainable, lighter and smaller vehicles.

E-mobility is clearly a part of our future.

L'Avere-France, association nationale regroupant plus de 130 acteurs représentatifs de la filière de la mobilité électrique œuvre depuis plus de trente ans dans ce domaine. A ce titre, l'association dispose d'une véritable expertise sur le secteur et ses enjeux. Notre rôle est de répondre aux attentes de nos membres, de défendre la filière et favoriser l'émergence de cette nouvelle forme de mobilité.

Bordeaux, France, or how to become a "smart city" with ETSI

By Christophe COLINET, chairman of the ETSI working group "Sustainable Digital Multiservice Cities" in ATTM technical committee.

By 2030, the United Nations estimates that two out of every three people will live in cities hit by economic and environmental crises that have been ongoing since the end of the last century. A digital environment should leverage the 'Smart City' concept and pave the way for new features, new ways to manage, govern and live the city of tomorrow.

In Bordeaux, the smart city concept is part of the "Bordeaux digital city" programme implemented by the city's mayor, whose ambitions are aligned with sustainable cities and the "COP 21 agenda". The city's main goal is to decrease consumption of resources, put the user at the heart of implementation and allow a systemic approach to the city.

To develop and have visibility across Europe, the cities of the 21th century must be attractive.

The Bordeaux metropolitan area (750,000 inhabitants) has undergone great urban and economic transformation thanks to major structuring projects. The virtuous circle was initiated by the first urban project in 1995, which laid the foundations for upgrading the city to a European metropolis. In 20 years, Bordeaux has become the most attractive French city to live and work in, according to several recent studies*. True to its history, to date Bordeaux is the largest urban complex to have been recognized by UNESCO, and the quality of life of the

world's capital of wine doesn't prevent it from being one of the most dynamic and active urban laboratories in France.

Thanks to its reputation for research and development, the quality of its education (more than 80,000 students) and a strong presence in innovative sectors, Bordeaux became a reference for industry, in aeronautics, lasers, atomic research, wine, and emerging clusters such as video games or e-health.

These results are the outcome of an approach combining a sustainable urban development project, social inclusiveness, and a solid digital agenda. They have been recognized by the national and international community through numerous awards and labels.

To accompany and accelerate this development the Bordeaux metropolis decided to systematically involve

digital services based on a user centric "smart city" model.

ETSI SUPPORTS THIS USER CENTRIC GOVERNANCE MODEL WITH NEW STANDARDIZATION GROUP

To address the issue of users' involvement in the standardization process, the city of Bordeaux decided to be involved in ETSI and initiate the creation of a working group dealing with "smart cities". The "Sustainable Digital Multiservice Cities" (SDMC) group was created in 2016 within ETSI Access, Terminal, Transmission and Multiplexing (ATTM) technical committee. On the other hand and in order to identify cities' needs at European level, Bordeaux created a standards working group in January 2016 within Eurocities - an association of over 140 European Cities.

FIRST SMART CITY STANDARDIZATION GROUP CHAIRED BY A CITY AT ETSI!

The first Sustainable Digital Multiservice Cities meeting was held on 9 June 2016 and Christophe Colinet, Smart City Project Manager in Bordeaux Metropolis (Directorate General for Digital and Information System), and EG4U** secretary, was elected as a Chairman. The objective of this newly created working group is to identify and share the needs of the cities with the various national, European and international standardization organizations. The specifications will serve as a starting point for discussions with OEMs and support European legislation.

This working group is a logical follow up of the ETSI Group Specification "Global KPI Modelling for Green Smart Cities" (ETSI GS OEU 009) developed in ETSI ISG OEU (Operational energy Efficiency for Users) in 2014 with the same city as initiator. ETSI GS OEU 009 should be published during Q1 2017. SDMC is involved in General Engineering and Global KPI Smart City standardization. The group works closely with other ETSI standardization bodies involved in energy efficiency or machine-to-machine technology as well as H2020 projects such as CITYKEYS where Eurocities is a consortium partner or the ESPRESSO project where ETSI is a consortium partner. SDMC is also closely cooperating in EC Mandate M/462 phase 2.

EUROPEAN STANDARDS TO ENABLE EFFICIENT ENERGY USE

The European Commission mandated CEN, CENELEC and ETSI to enable efficient energy use in fixed and mobile information and communication networks through Mandate M/462 Phase 2. ETSI gathered a group of experts to issue 13 European Standards (ENs) in support of the mandate. The 13 ENs will support the implementation of an efficient infrastructure of Information and Communication Technology in the following areas: Sites (access site, radio access, central office, core site, e.g. transmission site or data centre); Long haul/backbone using optical fibre technologies; Transit/metropolitan edge/back haul using optical fibre technologies; Transport and local distribution access focused on optical fibre technologies and radio based stations and Residential, including end-user connections.

These 13 European Standards should be published in Q1 2018 and will address: equipment and system standards to minimize energy consumption and optimize end-of-life environmental impacts; KPIs with methodologies to determine equipment energy efficiency; standardized global indicators to monitor the improvement of overall efficiency of operational networks and methodologies to evaluate information technology and networks equipment end-of-life environmental impacts.

The 'bottom-up' approach to involve users in ETSI's standardization process enables them to contribute to the smart city standards. It allows cities to define their objectives, express their needs in terms of interoperability and efficiency and contribute to the technical standardization that will support innovation and the regulation of the «Sustainable Smart-Cities» of tomorrow.

** Source : poll OpinionWay for Foncière des Régions, Novembre 2014*

***EG4U: The European non-governmental organisation (NGO) of Information and Communication Technology (ICT) Users. This NGO, dedicated to energy management & waste monitoring, has been created early December, 2015, by ICT (Information & communications technologies) users, members of ETSI Industry Specification Group (ISG) called Operational energy Efficiency for Users (OEU), based in Sophia Antipolis (France)*

Decarbonising heat – the challenge for the UK

By Chris Le Fevre (pictured), Senior Visiting Research Fellow, Oxford Institute for Energy Studies

The challenge of mitigating the environmental impact of fossil fuels in power generation has received a great deal of attention in recent years. Much less attention has been paid to the issue of heat despite its scale and importance in many European countries. In the UK, for example, heat demand accounts for 48% of total energy consumption and between a fifth and a quarter of total carbon emissions. In the UK 80% of space heating and hot water in domestic and commercial premises is provided by natural gas with only 4.8 % coming from renewable sources in 2014 – the lowest in the EU.

If carbon reduction goals are to be met heating will need to be substantially decarbonised. Though the scale of the task can appear daunting. The annual amount of natural gas energy delivered for heating in Great Britain is nearly double that of total electricity consumption and peak levels are 5 times greater. Heating demand varies dramatically between seasons and on a cold day in winter can be up to 12 times that of the summer load. Gas is well suited to meet these requirements in the UK:

- The fuel is available in nearly 23 million households
- A wide range of flexible supply options including underground storage and pipeline and LNG imports means that peaks in demand can normally be comfortably met.

Replacing natural gas is, therefore, far from a trivial endeavour. The problem is exacerbated by the fact that in energy efficiency terms the UK has some of the worst housing in Europe and 90% of existing housing stock is still expected to be in use by 2050. Furthermore, most householders are happy with gas which is seen as cost effective, responsive and reliable. The case for change is far from understood or accepted.

There are three elements that need to be addressed if a zero carbon heat system is to be developed:

- Heat Supply
- Networks
- Consumer premises

There is also the need to reduce demand through improved energy efficiency. The biggest gains are with the consumer by, for example, installing condensing boilers and cladding

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Table 1: Summary cost and impact assessments for Urban/suburban properties

Cost/impact	Hydrogen	Electrification/heat pump	District Heating
Heat supply			
Networks			
Consumer premises			

Source: Red = highest cost/impact Green = lowest cost/impact

solid walls though home heating will still be required. A recent study from Imperial College has looked at the cost and effectiveness of three potential solutions to decarbonising heat:

- Convert gas distribution networks to hydrogen – this is technically feasible due to high proportion of polyethylene pipe in the distribution network. Existing gas storage facilities could be utilised though the much lower calorific value of hydrogen presents some major challenges. Consumers may need to change appliances but disruption would be relatively minor. The biggest challenge is developing a low cost, large scale source of hydrogen. The two options looked were electrolysis of water or the reformation of natural gas. The latter would produce CO_2 so would also need to employ carbon capture and storage (CCS). Both options are technically unproven and very expensive.

- Direct electrification of heating using low carbon sources of power generation coupled, where necessary, with heat pumps located on consumer premises. This may be an effective option in well insulated, multi-occupancy buildings but significant investments in electricity network capacity are likely to be required. Installation of heat pumps would be costly and disruptive for consumers and may only be feasible for less densely populated areas.

- District heating (DH) which would require the development of a new network to distribute centrally generated heat to consumer premises. This is a popular approach in a number of European cities but is not a low carbon solution unless the DH plant is itself low carbon. Installing a new heat network in a built up environment would be hugely disruptive and expensive. Perhaps even more problematically it could prove very difficult to get individual consumers to sign up to the new system without some form of compulsion which in itself may be politically unacceptable. DH using low carbon sources such as heat pumps could have a role in new build developments particularly with a large "anchor tenant' to underwrite a long term commitment.

Other sources such as biomass, solar and geo-thermal could also play a limited role but do not, under present technologies, present a scalable solution. Transitional approaches such as hybrid heat pumps could also be adopted but they do not provide an enduring low carbon solution.

The Imperial study has looked at the applicability of these different options and these are summarised in table 1. It is clear that that there is no single solution and due to the diversity in housing densities and types approaches should be tailored to suit local circumstances.

Equally important will be establishing an appropriate strategic and regulatory framework to facilitate an effective "system of governance for heat". This should include a detailed assessment of the risks and issues associated with transitioning away from natural gas. The existing networks and associated infrastructure such as storage and interconnectors are likely to continue to have a role even if it is not in transporting natural gas. Declining gas throughput during a transition could, however, result in disinvestment in key infrastructure happening in a haphazard and uncoordinated manner. Cooperation between network operators, energy suppliers and the regulator will be essential. This may require radical rethinking of both the network's regulatory regime as well as the competitive energy supply market.

In the words of the Chinese proverb - a journey of a thousand miles starts with a single step. This journey is likely to require a number of single steps before a clear route, or more likely routes, is identified. These steps need to be made soon if the 2050 low carbon objectives are to be met.

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P R O M I T H E A S The Energy and Climate Change Policy Network

9th International Scientific Conference on Energy and Climate Change

12 -14 October 2016
Athens, Hellas

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The Conference aims to contribute in increasing the world momentum for developing and implementing converging deep decarbonization pathways in the content of the COP 21 in Paris, December 2015.

Based on the existing state of climate change policies of the BSEC countries, the Conference aims to bring together scientists, policy and decision makers and market stakeholders and facilitate the knowledge transfer on these critical issues related with the regional economic cooperation.

The Conference is divided into 3 main parts. The **first** is devoted to the **policy dialogue** and apart from distinguished scientists, high level officials from the Permanent International Secretariat (PERMIS), the Business Council (BSEC-BC) and the Parliamentary Assembly of BSEC (PABSEC) will be invited to contribute. A special session on "**Green Energy Investments**" is planned for the first day. Market stakeholders, bank officials, policy makers and academics will discuss on current trends and emerging investment opportunities. The **second** day is devoted to **peer – viewed** presentations and discussions. Finally, the **third** is shaped as a "**Brokerage session**" that will bring together mainly scientists, policy makers and market stakeholders with the aim to facilitate them to present their activities (projects and programs), discuss about funding opportunities, especially in the context of Horizon 2020 calls and finally to increase the cross-interaction on innovative ideas and cooperation on common importance topics.

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