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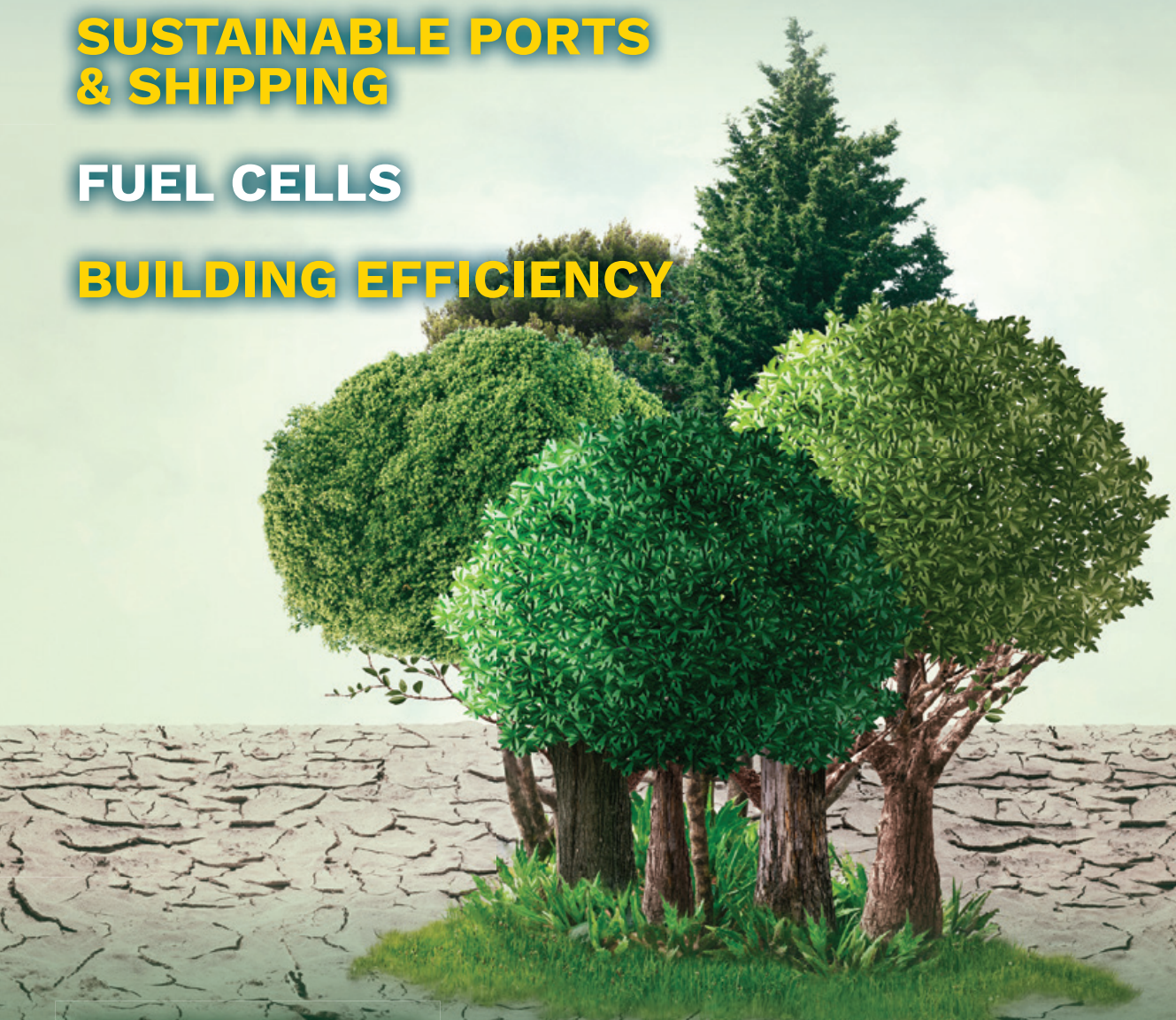

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- **The environmental priorities for European ports** - Isabelle Ryckbost, Secretary General, ESPO
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Foreword

Notre maison brûle

In August 2002, then French President Chirac addressed the Johannesburg Earth Summit with the words "Notre maison brûle et nous regardons ailleurs". Atmospheric CO_2 levels that year were in the range of 375ppm. This August, with atmospheric CO_2 standing at 411 ppm, French President Macron addressed the G7 summit and paraphrased Chirac with the words: "Notre maison brûle. Littéralement." Unfortunately, his observations on the fires burning in the Amazon basin met a less than diplomatic reaction that seems unlikely to douse the flames; and Brazil has angrily rejected a proposed financial package designed with just that in mind. The ensuing debate has in part distracted attention from the near-apocalyptic scenes in the rainforest. It is an apt – if uncomfortable – metaphor.

Against such a discouraging geopolitical backdrop, we explore in this issue how digitalisation and decarbonisation are more than alliterative partners in the decarbonisation of Europe's energy systems. Géraldine de Decker reviews how these two "megatrends" will evolve together, commenting that AI has as much power to transform our world as the arrival of the steam engine or electricity did in their time. She explores how AI can facilitate decarbonisation through smart grids by improving efficiency and reducing waste; and through the electrification of transport through improved battery management algorithms. She comments upon importance of AI in data centres before showcasing Eurelectric's forthcoming AI discussion forum, which looks to facilitate collaboration between the tech sector and the utilities. Jeremy Sung of the IEA takes a deeper look at how digitalisation of our homes and businesses is modernising energy efficiency. He explains that, underpinned by the growth of high speed communication systems, it is a question of how data is gathered, how it is analysed and how it is then acted upon, using technologies such as smart metering and intelligent building energy management systems. Meanwhile, he mentions the latest IEA cross-agency initiative that will explore the impacts of digitalisation on energy efficiency and the implications for policymakers.

Brigitte Hasewend reminds us of the urgency with which we need to take climate action, and seeks to explain the factors influencing the rate of change. Among the obstacles that she explores are policy and governance issues at national rather than global level, and the lack of climate-relevant synergies between energy and other utility grids. The solutions she proposes include a more holistic approach involving strategic corridors for innovation; and new education and training models designed for new skills and job profiles.

With new IMO Global Sulphur Cap legislation imminent, we feature a timely reminder from Isabelle Ryckbost. She says that the recent europe-wide elections, which will usher in a new Commission with new priorities, represent an excellent opportunity to set new priorities for the port sector. ESPO has published a memorandum to this effect. "More than a shopping list", she says, it seeks to explain how ports can be a strategic partner in Europe's digitalisation and decarbonisation.

We clearly need to act on climate change: atmospheric levels of CO_2 continue to rise remorselessly, while the BBC recently reported warnings that "Greenland's massive ice sheet may have melted by a record amount this year." It is a grim irony that all that extra water should become available as our house is burning.

And there is a lot more for you to read inside...

Michael Edmund
Editor

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

CIVITAS PORTIS

Port cities deal with some unique challenges, from getting cruise ship passengers to the city center, to routing truck traffic, to docking ships. Given their multi-modal nature – road, air, rail and sea – they are the perfect place to try out new solutions encompassing all aspects of mobility.

CIVITAS PORTIS – "Innovative and sustainable urban mobility solutions for European port cities" is implementing a number of initiatives in five geographically, culturally and climatically diverse port cities in Europe, located on the North Sea (Aberdeen and Antwerp), the Mediterranean Sea (Trieste), the Black Sea (Constanta), and the Baltic Sea (Klaipeda), as well as in a follower port city in China (Ningbo).

The five living laboratories are testing 49 innovative mobility solutions ranging from newly-emerging technologies to policy-based and soft measures in four areas: better city-port cooperation; healthier and more sustainable port cities; integrated, clean mobility systems; and more efficient freight transport.

But the living laboratories are not the only ones who will benefit from these measures: CIVITAS PORTIS helps cities work together to generate and build innovation, while assessing how effective their efforts are. It transfers the most useful innovations to other port cities and marketplaces. The brand new second edition of the CIVITAS PORTIS innovation brochure is available for download at the CIVITAS PORTIS webpage.

CIVITAS PORTIS has already brought about some significant changes with consistent gains for public transport, walking and cycling in all cities' living laboratories.

The umbrella brand, "Smart Ways to Antwerp", involves a huge number of partners and stakeholders working together to create a shift towards sustainable mobility, aimed at informing, raising awareness, supporting the development of innovative mobility solutions and achieving behavioural change. In Aberdeen, the way people approach travelling in and around the city has been re-defined and road space for collective and active travel modes has been recovered. Trieste is developing a sustainable urban mobility plan, centered on new opportunities arising from the recent incorporation of the "Porto Vecchio" area, a city within the city. Real civic involvement and participation in the field of sustainable mobility has been set up in Constanta, while in Klaipeda, the transport system has been improved and alternative transport modes have been promoted. All of the measures implemented thus far are already having positive effects on the modal split of the cities involved.

Thanks to improved mobility and the re-development of public spaces, CIVITAS PORTIS will also contribute significantly to employment and economic growth in the ports and their surrounding areas. The living laboratory areas are expected to attract more than 300 new businesses and at least 3,300 new jobs.

For further information please have a look at https://civitas.eu/portis or contact:

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POSEIDON MED II LNG BUNKERING PROJECT

Sailing on the LNG era

Full speed ahead! The Poseidon Med II project paves the way for cleaner, greener and sustainable sea transportations thanks to LNG. LNG (Liquefied Natural Gas) is already available, safe and environmentally friendly alternative fuel. The Poseidon Med II Project ensures a sustainable LNG supply chain for shipping in Southeastern Europe and the Eastern Mediterranean Sea and delivers studies for the design of new ships and the conversion of existing ships to run on LNG. At the same time, it supports port infrastructure development as well as the establishment of an effective regulatory framework for LNG bunkering operations and appropriate financial schemes to attract necessary investments.

The project is co-funded by the European Union and for its implementation three countries - Greece, Italy, Cyprus - and twenty-six partners of the public and private sector have joined forces. Six European ports are participating in Poseidon Med II (Piraeus, Patras, Heraklion, Igoumenitsa, Limassol and Venice) as well as the LNG Terminal in Revithoussa.

Poseidon Med II has launched a new era for shipping in the Eastern Mediterranean Sea.

www.poseidonmedII.eu

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Fuel cells and hydrogen (FCH) technologies in Europe: Looking towards 2020

The Fuel Cells and Hydrogen Joint Undertaking (FCH JU) has achieved a lot in the eleven years since its inception, as it strives to make hydrogen and fuel cell products an everyday reality in Europe.

The Fuel Cells and Hydrogen Joint Undertaking (FCH JU) is a public-private partnership with a focused objective: to bring European Fuel Cells and Hydrogen (FCH) technologies to the point of market readiness by 2020. To develop clean, efficient and affordable solutions for our energy and transport systems, the partnership has invested in total €1.73 billion[1], with some 246 hydrogen demonstration projects benefitting from EU funding since the Joint Undertaking was launched more than ten years ago.

Market uptake from public authorities, major companies and citizens alike has boosted confidence in these clean technologies, establishing hydrogen as a cornerstone of Europe's energy transition. The Hydrogen Europe Roadmap shows that hydrogen can contribute towards 24% of final energy demand, reduce 650 million tonnes of CO_2 and create 5.4 million jobs in Europe.

European leadership

The Paris Agreement creates opportunities to drive research and innovation in renewable energy, energy efficiency and other low carbon technologies. In our partnership, the research excellence of our projects has led to industry innovation and growth.

For example, Europe is the becoming world's leader in innovative electrolyser technologies, thanks in part to the pivotal role of the FCH JU in supporting the development of cutting-edge research projects in the field. The capacity of the electrolysers has increased from 100kW, with project Don Quichote in 2011, to 6MW in the 2016 H2FUTURE project and we will not stop there. Scaling up is key in all our activities. In July 2019, construction has started on the world's largest PEM electrolyser – a 10MW one – at the Shell Rheinland refinery in Germany (through the REFHYNE project). The plant will produce up to 1,300 tonnes of hydrogen per year when operating at peak rates. Such projects give the opportunity for the European electrolyser industry to develop and to build equipment that meets the strict standards of the refining industry. They will help reducing the CO_2 footprint of large industrial processes through the production of green hydrogen.

For the EU to maintain and exploit its advantage in clean energy technology, it will need to further support start-ups and investors to take innovations to the market. The FCH JU is helping SMEs involved in the development of FCH technologies to create and market cutting-edge green solutions.

Hydrogen driving regions growth

Not only hydrogen is one of the best technologies to decarbonise transportation, providing an attractive alternative to many cities and regions struggling to combat air pollution, but investing in fuel cell and hydrogen technology pays off, as it provides a mature, safe and competitive zero-emission solution for all their energy needs. In the past years, we looked at developing and implementing an integrated approach for the ramp up of hydrogen in different European regions ("the hydrogen valleys"). By linking individual projects and developing local hydrogen infrastructure, establishing Hydrogen Valleys represents the next development stage towards a local hydrogen economy in the long term. FCH technology is the only option available today to store renewable energy on a large scale and use it for

all energy needs – from transport to building heat and power to industry, thus enabling sectorial integration.

The development of the hydrogen valleys can foster economic growth in the European regions while answering to the local energy needs and reducing pollution, and that's why they are a priority in our last call, which made available 20 million Euro for one region to develop and implement the concept. The winner will be announced later this year.

Decarbonising transport

Fuel cell (FC) electric buses represent a key zero emission transport solution which helps tackle climate change challenges and clean cities air.

Through the JIVE and MEHRLIN projects, some 300 fuel cell buses and their hydrogen infrastructure will be deployed in 22 cities across Europe – the largest deployment in Europe to date. To put things in perspective – there are currently more than 50 FCH JU-supported fuel cell buses on the road around Europe and this number will rise to 365 with the JIVE projects.

The FCH JU is supporting the wider market uptake of fuel cell electric vehicles (FCEVs) by addressing both cost and infrastructure challenges through a series of projects. The H2ME initiative is creating a pan-European hydrogen refuelling network, deploying 49 hydrogen stations and more than 1,400 vehicles. HyFIVE put 185 hydrogen vehicles into operation, along with 6 hydrogen stations across three geographical clusters: London, Copenhagen and a wider area comprising Innsbruck, Munich, Stuttgart and Bolzano.

A heavy duty

Hydrogen can provide a green solution for sectors that are otherwise hard to electrify. A new study commissioned by the FCH JU and Shift2Rail Joint Undertaking (S2R JU) shows significant market potential for FCH technologies in the rail environment. The technology provides a flexible, zero-emission and potentially cost-competitive solution underpinning clear business cases to replace diesel trains, within certain contexts.

Heavy-duty trucks account for just 4% of road vehicles on European roads while releasing 27% of road transport CO_2 emissions. Now the FCH JU is demonstrating that hydrogen and fuel cells can be used for trucks and heavy-duty vehicles. Results will help to decarbonise the EU's truck sector by paving the way for the deployment of fuel cell lorries in Europe.

The maritime sector is also a big contributor to CO_2 emissions. The FCH JU is promoting research to develop and integrate efficient hydrogen-powered fuel cells on ships and boats. Aviation is not overlooked either, with a new joint study foreseen, which will guide us through the different scenarios for achieving cleaner air travel with hydrogen.

Investment that counts

Our continued investment in cutting-edge projects has been reinforced during the past years and has enabled the acceleration of technological development to the point where real-world fuel cell hydrogen solutions are on the verge of wide-scale distribution. We trust that by 2030, through the JU's support, fuel cells and hydrogen will make a big contribution to EU targets to reduce greenhouse gas emissions by 40%.

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Openness enables utilities to invest smarter

By Henrik Mørck Mogensen, Senior Vice President, Kamstrup

The reality in which power utilities operate today and the responsibility they are expected to assume in the future are changing rapidly. The keyword is having the flexibility to continuously make the investments that generate the most value.

Within smart metering solutions for power utilities, openness has long been the answer. However, only recently has it become clear what the real question is. It's about how utilities can buy enough flexibility into their business to enable them to meet both their current and future business needs.

A NEW REALITY FOR UTILITIES

The path to this clear-sightedness has been paved by especially two market tendencies seen over the last few years. The first one is the consolidation challenge many utilities are facing today, where efficiency demands drive utility companies to merge only to find themselves struggling to operate efficiently in a morass of IT systems that must somehow magically co-exist.

The second is the current state of change of the power utility's role – which, from a political point of view, includes a key role in the green transition. Areas such as integration of renewables, balance responsibility and effect challenges are still so complex and undefined that for a utility to lock themselves in with a certain technology for the next decade is becoming increasingly unimaginable. According to a recent report, renewables are expected to make up 90% of the electricity mix in Europe by 2040, with wind and solar accounting for 80%. Without knowing even just five years down the road which regulation will apply, what demands utilities will have to meet and which technologies will surface or die out, why would they?

Instead, utilities need the flexibility to be able to gradually upgrade (or replace) their meters and to implement new technology in the lots, order and pace that deliver the most value.

NEXT STOP INTEROPERABILITY?

On the system level, CIM has become the de facto standard for integration between HES and MDM systems not just for Kamstrup but for everyone else as well. As a result, we see that in the systems that are installed today, the HES is, in practice, operated through the utility's other business systems.

On the meter level, the industry hasn't reached the same level of interoperability. DLMS is the widespread standard among meter suppliers, but it's not Plug & Play, it always requires an integration effort and even then, a utility can only expect basis functionality based on the lowest common denominator. However, for the majority of utilities, being unable to boast 100% interoperability is not a problem if they are just smart about their investments.

MAKING SMARTER INVESTMENTS

Based on our experiences with customers, 20% of a utility's metering points may hold 80% of the potential in terms of supplying the detailed and frequent data necessary to gain deeper grid insight and optimise operations. Hence, this is where technology is needed most, while daily billing data will often suffice from the rest. A utility about to invest in a new system should, therefore, focus on upgrading that 20 %, while the value of upgrading the remaining meters can be assessed if and when the need arises.

This, of course, makes demands on the supplier of their business critical meters, meter reading system and data analytics to not only provide the necessary flexibility to handle other meters as well but also cooperate in the necessary partnerships to continuously ensure better utilisation of data in an uncertain future.

Ultimately, there is no longer any doubt that openness is the way forward for utilities. But how they use it, will determine how fast they will go.

kamstrup.com

Strive for more at home to lead in the world

By Isabelle Ryckbost (pictured), Secretary General, European Sea Ports Organisation (ESPO)

Between 23 and 26 May, the citizens of 28 EU Member States cast their votes in the European elections. The outcome of those elections marked the beginning of a new European Parliament, that started its mandate in July and will lead to a new Commission, a new political agenda and new policy priorities for the next five years.

Mid July the European Parliament confirmed the candidacy of the German Christian Democrat politician, Ursula von der Leyen, and so gave support to her political agenda and priorities, which are brought together in a document entitled "A Union that strives for more". While I am writing this, we are waiting for the full list of incoming Commissioners and their respective portfolios. We therefore have no clear picture yet of which concrete initiatives in the fields of interest to European ports, such as transport,

environment, energy and trade, will be taken by the Commission in the forthcoming years.

However, the agenda of the President-elect already clearly shows the direction the Commission will be taking and it must not come as a surprise that reaching "**a European green deal**" comes as a first of six headline ambitions of Mrs von der Leyen. Her ambition in that field is high: the President-elect wants a proposal within the first 100 days of office and wants to enshrine the 2050 climate-neutrality target into hard law. Europe must become the first climate-neutral continent and should even move towards zero-pollution.

The **European elections are** for policy organisations like the European Sea Ports Organisation **an ideal moment to reflect and set priorities both for ourselves as well as for the incoming European policymakers**. We have been running this exercise over the last months and the result is **a memorandum** we presented during our annual conference in Livorno on 23 May. The document is more than just a shopping list of what Europe needs to do or not for European ports. We want to explain new policy makers how European ports can be a strategic partner in achieving Europe's goals, in particular in terms of digitalisation and decarbonisation. In the first place, we want policy makers to understand the complex role of ports as entry gates for trade, being at the crossroads of supply chains, hotspots of energy, industry, innovation and digitalisation. Moreover, we want to emphasize that more than ever before, ports in Europe are "hybrid".

Over the last decades, encouraged by the EU, almost all ports have developed their governance model towards being more commercially driven and being more financially autonomous. At the same time, port managing bodies are increasingly taking up – or are asked to take up – wider societal responsibilities. They need, amongst others, to invest in projects that serve wider environmental imperatives, even if there is no direct return on investment for the port and even if the port itself is not responsible for the environmental problems. Port managing bodies understand these responsibilities and are happy to engage. I would even say that this engagement has never before been so strong. However, they ask policy makers to understand the difficulty for port managing bodies in Europe to try to be competitive and commercial as any other European company on the one hand and to serve the wider societal responsibilities like a public entity on the other.

With this in mind, the memorandum outlines a series of priorities and recommendations for the next five years. Let me highlight those that touch on climate, energy and environment more in general.

Decarbonisation comes of course first on this list. Ports are directly feeling the impact of extreme weather conditions; on average 40% of the commodities going through European ports are sources of energy. As ports are at the crossroad of transport and supply chains, clustering industry and energy, they are of the place where lots of CO_2 sources come together.

European ports therefore ask policymakers to support investments that implement the decarbonisation strategy of the port as well as investments aiming at enhancing the resilience of the port to climate change.

We further want policymakers to recognise that ports can really be a spider in the web for guiding Europe's economy through the energy transition. We also hope that the target for shipping set by the International Maritime Organisation (IMO) in 2018 will be followed up as soon as possible by concrete emission reduction measures for shipping.

We furthermore underline that investments to be made on the port side to support the transition to cleaner fuels are time and cost intensive. Measures requiring ports to invest in certain facilities should come with corresponding obligations for the users. We believe however that stimulating new technologies should not lead to strict legislation hampering the sector to adapt to the ongoing technological innovation. Finally, we are conscious that our decarbonisation targets might need to be assessed in the light of the outcome of the discussion on the EU 2050 long term strategy for a climate neutral economy. The "von der Leyen agenda" shows a lot of ambition in that regard.

A second important priority in the field of environment is air pollution. ESPO's environmental reports (see graph) have shown that over the last four years air quality has been the number one environmental priority for Europe's port managing bodies. 91% of European ports are urban or close to an urban area. Air pollution is the single largest environmental health risk in Europe causing around 400 000 premature deaths per year. Ports cannot ignore the call for cleaner air, regardless of who is responsible.

To address this major concern and to safeguard the public acceptance of port activity in the years to come, we ask a gradual but mandatory transition plan towards cleaner fuels for shipping. Such a plan should deliver both on air quality and carbon savings. We also ask European policy makers to start the discussion on an EU wide Emission Control Area (ECA) in close cooperation with all stakeholders. In addition, we want the new Commission to take away the current disadvantage for the use of onshore power supply (OPS), by

providing OPS the tax exemption that currently applies for electricity generated on board of vessels. We hope that this can be taken on board in the announced review of the Energy Taxation Directive. Finally, we express our support for the EU proposal to the IMO to take prompt and harmonised action with regard to the impact of liquid discharges from scrubbers on water quality.

Besides these two big priorities, the ESPO memorandum stresses the importance of sustainable hinterland connections and the engagement of European ports to be more transparent when it comes to their environmental performance. We finally also see digitalisation as a way to make better use of both transport infrastructure and means of transport and we believe that digitalisation can enhance the knowledge about the environmental performance of supply chains and help shippers to make more responsible choices.

The environmental ambitions spelled out in the ESPO memorandum are high and will demand a lot of goodwill and cooperation between stakeholders of the port ecosystem. Von der Leyen's climate and green agenda is equally ambitious. For me, the most important message of the President-elect is that Europe should "strive for more at home in order to lead in the world".

This is exactly why we should be ambitious, but that is also exactly what we have to keep in mind when designing the path to achieving these ambitious goals. **We must deliver, but must do it in the right way in order to achieve promising results both for the environment and the people's well being, but also for the future of Europe's ports and Europe's economic and sustainable leadership in the world.**

We must combine bottom up engagement of the port sector with a right set of policy choices. ESPO and its members hope to be a strategic partner for the European decision makers in delivering their agenda.

evolutionary engine technologies for a sustainable tomorrow

The LEC is Austria's leading research institute for large engine technology and a global frontrunner in researching and developing visionary concepts for sustainable energy and transportation systems.

e-fuels as key enabler for emission reduction

The aim is to develop technologies capable of making drastic carbon dioxide reductions and to build large engines that are virtually emission-free. In this context, the LEC investigates and optimizes e-fuels, i.e. regenerative fuels such as hydrogen and hydrogen carrier gases e.g. synthetic natural gas, methanol or ammonia. “We are focusing on the development of combustion processes for large engines that are emission-free, highly efficient and flexible in terms of the fuel type used," stated Andreas Wimmer, CEO of the LEC.

Storage presents major challenge for the energy transition

Volatility and the storage of electric power over a longer period of time are a major challenge when switching to renewable energies. Power to Gas (PtG) and Power to Liquid (PtL) are technologies which convert electricity into gaseous (e.g. hydrogen) and liquid (e.g. methanol) fuels respectively. These fuels are obtained by electrolysis with excess wind or solar power. A hot topic for LEC is currently the combustion of 100% regenerative hydrogen for power generation and propulsion.

HyMethShip sets new standards on the way to zero-emission shipping

The EU-project HyMethShip is a showcase example of drastic emission reduction by using renewable fuels for *de facto* zero emission ship propulsion. HyMethShip has the potential to eliminate air pollutants and greenhouse gas emissions and sets new standards for the emission-free shipping.

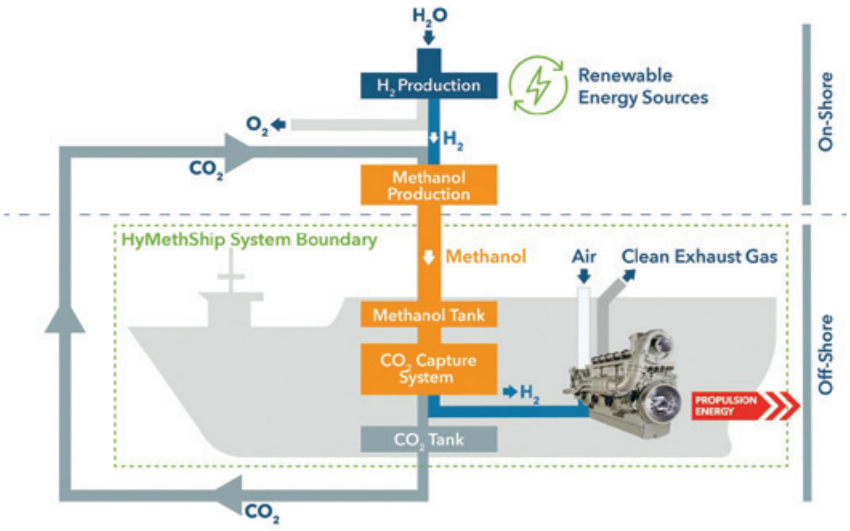
The HyMethShip concept innovatively combines a membrane reactor, a CO_2 capture system, a storage system for CO_2 and methanol as well as a hydrogen-fueled combustion engine into one system. Methanol is reformed to hydrogen, which is then burned in a conventional reciprocating engine that has been upgraded to operate with multiple fuel types and specially optimized for hydrogen use. The drastic CO_2 reduction is the result of using renewable methanol as the energy carrier and implementing pre-combustion CO_2 capture and storage on the ship. The HyMethShip system will achieve a reduction in CO_2 of more than 97% and practically eliminate SO_x and PM emissions. NO_x emissions will be reduced by more than 80% significantly below the IMO Tier III limit. The energy efficiency is expected to be more than 40% better than the best available technology solution (methanol as fuel coupled with conventional post-combustion carbon capturing). The renewable methanol fuel bunkered on the ship


Andreas Wimmer, CEO & CSO of LEC. ©LEC GmbH

is ideally produced on-shore from the captured CO_2, thus closing the CO_2 loop of the ship propulsion system. The basic engine type is the same as the one currently used on the majority of ships. The system will be developed, validated, and demonstrated on-shore at the LEC in Graz, Austria, with an engine in the range of 1 to 2 MW.

The cost effectiveness of the system will also be assessed for different ship types, applications and use cases. For medium and long-distance waterborne transportation, the HyMethShip concept is considered to be the best approach available that achieves this level of CO_2 reduction and is economically feasible.

The HyMethShip concept. ©LEC GmbH



For further information on the LEC and on the project visit www.LEC.at or www.hymethship.com

Big Waves to Surf

By Malte Siegert, expert for shipping and ports at German environmental NGO NABU (Nature and Biodiversity Conversavation Union)

The maritime business in times of sulphur cap 2020, digitisation and upcoming designation of new emission control areas (ECA)

From January 1st 2020 the maritime business world will change fundamentally. Some people say the changes may be comparable to the invention of fax or email. Others still ignore the upcoming development, hoping perhaps that it represents more of a regular high tide rather than a giant wave; and wishing the discussion would disappear. They seem to believe the new IMO regulation on global sulphur cap 0.5 will not come into force next year, that it will be postponed and the current situation, with its maximum sulphur limit of 3.5 percent in international waters, will remain – at best forever. But that is not likely to happen.

There will be enough for all

The wave of change will come. But it is not some unforeseen tsunami following an unpredictable earthquake: maritime business, crude oil producers and refineries are professionals; and they have all had time to see the signs from as far back 2016. Now they will have to catch the wave and surf it as best as possible. However, not all the consequences of the new IMO regulation are easy to predict: a price for new kinds of fuels for use from January 2020 was still unavailable as late as the end of July 2019 . That is why shipping companies have neither bought nor locked in prices for compliant fuel. Furthermore, it remains to be seen whether shipping companies will prefer to buy a real 0.5 high quality distillate, or if they will go for blends

of low sulphur distillates and fuel oil, the so-called Low Sulphur Heavy Fuel Oil (LSHF). Nobody really knows if blended fuels will work properly, or if they might ruin engines: a lot of testing and training is still required, especially since different engine sizes, ages and types of use mean that only heavy duty-only operation will prove their suitability. There is an argument for opting out of the risk altogether, as it is not yet fully known whether the fuel supplier or the shipping company will ultimately be responsible for any consequent damage. Fear of a shortage of a compliant fuel is creeping down the aisles of some headquarters, but an estimated 600 refineries globally are most probably capable of producing either a compliant distillate fuel or LSHF-blends in sufficient quantities and, hopefully, quality. Nevertheless, the question remains as to why early worldwide adaptation plans and investment in refining techniques have not been implemented – there might as a consequence be local or regional differences in availability, even though experts suggest that there will be enough compliant fuel for all.

Scrubbed away by reality?

Scrubber technology removes sulphur from the exhaust from the combustion of regular heavy fuel oil, and is therefore an option for compliance with the 2020 Global Sulphur Cap. Could a major increase in scrubber installations reduce or absorb the potential effects of fuel shortages? They might have taken some pressure out of the market, but after a steep growth in installations (especially in 2018), there now seems to be limited interest among ship owners. One reason appears to be the unpredictable impacts upon the marine environment of open loop scrubbers, which drain a toxic mixture of sulphur, heavy metals and particles into open water. Scientists, producers, NGOs and authorities are debating the short- and long-term consequences of this, while various studies commissioned by the IMO, national maritime authorities in several states, NGOs, as well as the scrubber producers have together indicated wide availability of adequate discharge facilities for close loop or hybrid scrubber systems in many ports throughout the world. Ship owners currently seem to be hesitating because of uncertainty over where and how the final political decisions are to be made, and what regulatory framework might be implemented. Indeed, ports or nation states, the EU, or even the IMO might even ban scrubbers altogether. Just recently, China announced that it is to ban the use of open loop scrubbers within its 12 mile zone (DECA) from 2020 onwards. Additional energy demand and operation supervision might also affect the economics of scrubbers and so their business feasibility. Conversely, increases in refining capacity over the past decade have slowly decreased the annual global availability of HFO, which could in turn lead to insufficient availability for a huge fleet of ships equipped with scrubbers. Such a situation would cause massive economic disadvantages among those who install scrubbers. Currently less than five per cent of the global fleet of 100,000 ships is equipped with scrubbers. This technology might therefore be thought of as a niche product.

New emission control areas at the horizon

The designation of new emission control areas with a maximum sulphur limit of 0.1 percent is currently being prepared by China and Mexico for their waters, and by France for the Mediterranean Sea. It remains to be seen if and when nitrogen oxides are also addressed. A further consideration is that HFO is not usually compatible with the use of new selective catalytic reduction systems (SCR). Furthermore, NOx-reduction will become mandatory for new-built ships in the North and Baltic seas from 2022, which will most probably decrease further the production of HFO, so making the installation of scrubbers even less interesting for shipping companies.

Future Fuels

Some major companies consider LNG (liquefied natural gas) as a bridge fuel. Container shipping company MSC has already ordered eight large ocean going vessels (OGV) ready for dual fuel, and Hapag Lloyd has recently retrofitted one of its larger ship as an experiment. More might follow. Some cruise companies such as AIDA, Costa, MSC and others already have LNG-ships in operation or are awaiting delivery from shipyards. More than 30 will be sailing by 2025.

However, the overall climate impacts of LNG are difficult to assess because of the methane emissions that arise

arising during exploration and through the supply chain, as well as the CO_2 associated to combustion. The maritime industry is also looking at other technological developments, such as synthetic fuels like methanol or ethanol from hydrogen; and fuel cell-powered ships are increasingly feasible options. Wind-powered ships might even make a comeback, while more efficient technology (such as propeller and hull design) and optimised operation can save large amounts of energy. It will take time for large-scale operations to become financially valid and energy efficient. But the past has shown that if there is sufficient pressure, development can be surprisingly quick: fortunately some companies have performed well as front runners.

The only certainty is constant change

In addition to the global sulphur cap and designation of more ECAs to protect human health, the International Maritime Organisation (IMO) has promised to reduce maritime green house gases (GHG) emissions by 50 percent by 2050. This is a demanding target that requires significant efforts from a sector that was not even part of the Paris-agreement of 2015. Slow steaming might be one way to cope, but that will surely not reduce emissions sufficiently. meanwhile, these inevitable changes will happen while the business model of ports, shipping, production and global logistics is transformed by digitisation.

Today, whenever we talk about the maritime business, we should keep in mind that the next wave of change might rise even higher and more forcefully than the one presented by these challenges. China may no longer be the global workbench, while Europe risks getting old and stagnant. Africa is on the move: its population is predicted to grow to one billion; and its people are young, often ambitious and always underestimated. 3D printing, KI and tailor-made production technologies are helping to bring change to global logistics and the transport sector. There may be fewer containers and more dry bulk such as granulates from metal, plastic or renewable sources. What will be the resulting impacts on ship building and operations?

In this context, we may one day look back and remember the financial crisis of 2008 and its long term consequences as something of a small wave accompanied by a light breeze as the forthcoming developments move the maritime business into turbulent waters again. For industry to be prepared for rough seas, heavy waters or even a tsunami, it has to rely on the maritime sector itself. But there is reason to believe that lessons from former crises have been learned: Spot the wave in time, hop on board and ride it as best as possible.

TEMPO

Digitalisation in district heating networks: the TEMPO-project

Digitalisation is becoming increasingly intertwined with everyday life, from transport, to communication, sports or education. Also in the energy sector, more and more digital solutions are present. Currently, the investments in digital energy infrastructure sum up to about 50 billion dollars, higher than the global investments in the gas power sector. In comparison to the electricity sector, digitalisation in heating and cooling networks has not taken off to the same extend yet. Nevertheless, in the transition towards the next generation of networks, digitalisation will take a very important role.

Digitalisation will make our networks more sustainable: it will increase the share of renewable and excess energy and it will enable the reduction of temperature levels in the networks. It will also make networks more reliable, by opening opportunities for better safeguarding systems. Finally, it will make networks more profitable, since it can lead to lower heat losses, reduction of expensive fossil fuel consumption and more optimal usage of heat pumps and CHPs.

The European Horizon 2020-project TEMPO is a project in which we experiment with digitalisation in district heating networks. The question of course is what is meant by a 'digital heat network'. What makes a heat network a digital heat network? It should be stressed that there is no univocal definition for this (yet), but some criteria or conditions should be fulfilled, in our opinion. A digital heat network is a network with a large number of sensors present in the network. Also, a digital network includes automated recording, transfer and storage of data, whereby the data is analysed automatically. Finally, these analyses are not only used for billing purposes, but also to optimize the operation of the network. The analysis and visualisation of data is a very important feature of digital heat networks since data as such, a stream of numbers, is of little interest. Instead, to get interesting, data must be transformed into information. In this form, it can be interpreted by humans. This is something that engineers do all the time: translate numbers into graphs, tables etc. But instead of doing it manually, in digital heat networks this is automated, e.g. by machine learning or data mining algorithms.

In the TEMPO-project, digitalisation is the common thread. In the project, six technological innovations are developed and tested: an automated on-line supervision platform to detect faults in DH substations; visualisation tools for expert and non-expert users; a smart network controller to maximize sustainable energy consumption and minimize the return temperature; an innovative piping system; building installation optimization; and decentralised storage buffers.

These technologies will be demonstrated in existing and new district heating networks, in rural as well as urban areas. With excitement the project team is looking forward to the coming winter, when the technologies will be tested for the first time. All information can be found on our website (https://www.tempo-dhc.eu). Stay tuned for the first results!

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Smart technologies are key to making Europe's energy transition work

The European Energy Union strategy aims to guarantee accessible, affordable, secure, competitive and sustainable energy for all Europeans.

To achieve these objectives and meet our carbon targets, the European energy market must undergo fundamental changes. We need to rapidly move from a market driven by fossil fuels designed around big central controllable generation units to a 'demand-driven' energy system, integrating renewables and more local generation and storage solutions where customers are at the heart of the system.

The timing of electricity management, related to when and where electricity is needed on the grid, will matter far more in coming decades due to an increasing reliance on distributed energy resources and the integration of large and small renewables.

Moreover, consumers will have the right tools to increase their consumption during supply peaks and reduce it when the system is on a low supply or when there is high demand. The number of prosumers will grow, along with the flexibility of consumption increasing. However, this will only be possible if customers have access to systems that work for them. It is crucial to prevent unplanned downtime that could impact the flexibility and energy supply.

Smart metering systems and access to real time energy data are both indispensable to empower the consumer and to ensure a good management of the whole system.

WHY SMART TECHNOLOGIES ARE CRUCIAL TO ACHIEVE THE ENERGY TRANSITION

For a fundamental change to happen in Europe's energy system, the policies need to be formulated with the consumer in mind. The system needs to be designed for consumers to receive accurate and timely information, to enable them to acknowledge and change their consumption patterns, to encourage them to engage in energy generation, demand response, and to protect their rights and privacy.

Smart metering represents the greatest tool for consumer empowerment to reach the energy industry in the last 100 years. For the first time, consumers will be able to see exactly how much energy they consume, when they consume it and how much it costs. The ability to monitor and control consumption is the pre-requisite for market-based pricing and network optimisation.

Smart metering benefits such as savings on energy bills and reduced meter reading costs are a welcome economic relief, but in the long run an invaluable benefit will be the transition of our outdated energy system to a smart, demand driven, flexible and greener one.

The successful deployment of this technology across the EU is the first step in achieving this aim. The next steps require additional services and technologies that need to be available and to work with the smart meter data.

HOW CAN POLICY-MAKERS HELP IN MAKING THE NEW ENERGY MARKET A REALITY?

Achieving the full benefits of smart meters means considering the associated impact of

communications technologies, flexible demand, data, security, interoperability and consumer engagement. Therefore, we need to work together to:

1. **Create the right market conditions:** Regulatory barriers, a lack of practical experiences and slow political processes still hinder the transition towards a digitalised, decentralised, consumer focused energy system. It is important to have a clear understanding of the roles, responsibilities, processes and infrastructure that are needed in the new energy market structure

2. **Place the consumer at the heart of the energy system:** An intelligent metering system is a prerequisite to the active involvement of consumers in the energy market.

3. **Guard the privacy and security of energy data:** The set-up of digital flows connecting assets, organisations and people, will require a fully secured value chain. The protection of consumers' privacy and the protection from cybersecurity threats has to be an integral part of smart energy management infrastructures.

4. **Implement the existing regulatory framework:** The Clean Energy Package6 is an important step on the way to achieving the energy transition. This legislation contains crucial provisions to create the right markets conditions, to involve the consumers and ensure privacy and security of energy data.

"The energy transition towards a cleaner, more flexible and consumer-focused energy system cannot happen without smart technologies. And having them in place is not enough – policy makers need to understand the realities of the market and what is needed to make smart technologies fit for Europe's ambitious energy and climate goals."

Frances Williamson, ESMIG Chair of Regulation and Policy Group and Head of Communications and Industry Engagement at Chameleon Technology

About ESMIG

ESMIG was created to advance the uptake of smart meters in Europe, by ensuring the appropriate legislation and framework are in place to permit their deployment and maximise benefits for consumers, the grid and society as a whole.

In order to realise the full benefits of smart meters, our activities have evolved and now focus on systems for smart metering, consumer energy management and safe and secure data transfer. Our members provide products, information technology and services for multi-commodity metering, displayand management of energy consumption and production at consumer premises. ESMIG drives the timely introduction of efficient and scalable consumer- friendly products and services fundamental to the participation of end-users in the smart energy system of Europe's future.

We work closely with EU policy makers to make Europe's energy system cleaner, reliable, more efficient and to keep the European consumers informed, empowered and engaged. We have worked intensively in this capacity with the European Commission and Member States to advance the smart meter roll-out and to understand what needs to be done when the roll-out is complete, if we are to realise the expected benefits.

Simultaneously, we have worked with our members to find innovative solutions to address the challenges of interoperability, security, consumer tools and data management.

For more information, insights and concrete proposals, please check our website: www.esmig.eu

Studying the impacts of digitalization and further societal trends on energy demand

By Heike Brugger & Wolfgang Eichhammer

Digitalization has the possibility to fundamentally change the current ways things are done. From the digitalization in private households (as for example voice control systems, smart thermostats and streaming operators), to digitalization in the transport sector (autonomous electric cars with smart loading infrastructure), to increasingly digitalized processes in the industry which can be highly optimized through automation.

While most of these processes are getting more and more efficient, not all of them are designed in a way that reduces energy. If we take the example of autonomous cars: the cars themselves will most certainly be more efficient, drive in a more efficient manner and by themselves create less accidents and less traffic jam. However, the more comfortable autonomous driving gets and the more advantages it copies from the current transport mode of train riding (e.g. being able to use the travel time to work, read, sleep), the more likely it is that people who can afford it will switch to this mode of transport. Thereby increasing their absolute energy demand, rather than decreasing it. The effects of autonomous driving on energy demand are thus manifold and it is not straightforward to access their overall impact. In their current study, Wadud et.al (2016) conclude that depending on the scenario the total road transport energy in the US might be reduced by 40% or increased by up to 100% until 2050 through automation.

Another example is the development of mobile phones. While getting more efficient the additional services of today's mobile phones need substantially more energy, including increasing energy demand of datacenters. On the other hand today's mobile phones do not only provide new services, but also make previous commodities unnecessary (such as cameras, Walkmans, recorders, etc.) thereby reducing the number of appliances and their lifetime energy demand.

These examples show that the ways in which digitalization and automation effects energy demand are not trivial to access. At the same time, trends such as digitalization – but also other trends like the sharing economy, the circular economy or urbanization – have huge potential to influence energy demand – negatively or positively – depending on their characteristics. In particular, new societal trends could lead to an increase in energy demand if they are not countered by measures with a strong focus on saving energy.

The objective of energy demand scenarios is to model future demand. These usually consider efficiency improvements and policy measures. So far, they do not systematically include the effect of above described societal trends.

Therefore, in 2018 Fraunhofer ISI conducted the “Study on Energy Savings Scenario 2050”. The aim of the study was to develop European energy scenarios that consider potential societal trends in order to quantify the changes in energy demand resulting from them.

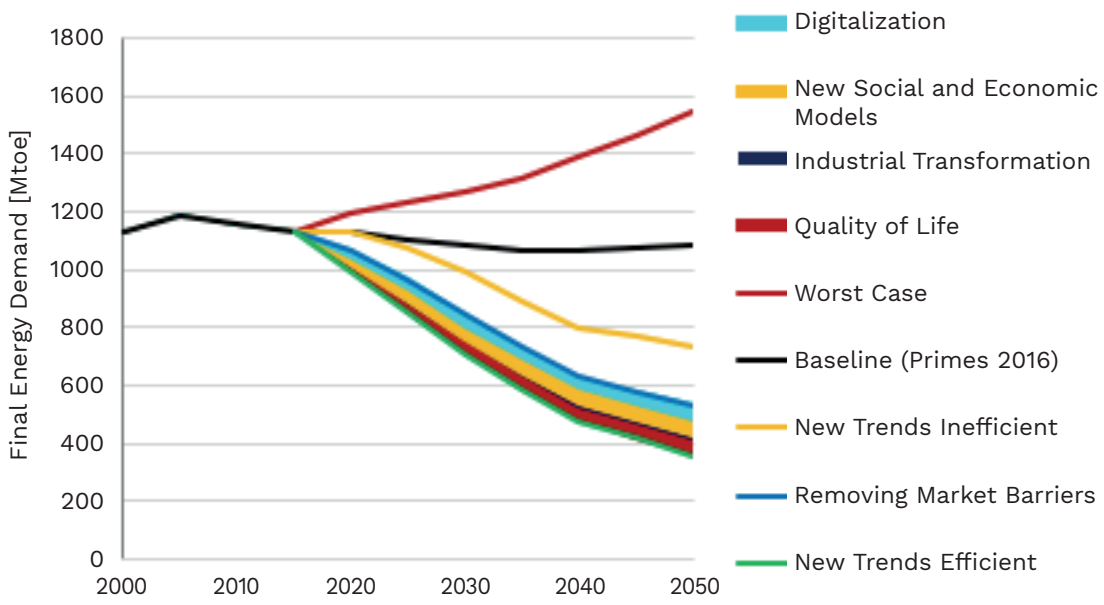
Here fore, energy-relevant societal trends were selected and quantified as far as possible based on detailed studies and on extensive stakeholder consultation at the European level. The following three scenarios were developed:

1. In the Removing Market Barriers Scenario, it was determined which (techno-economic) energy efficiency potentials could be realized by (almost) cost-efficient investments.

2. The New Trends Inefficient Scenario is characterized by strong, non-linear societal trends that can result, for example, from rebound effects of the sharing economy and digitalization. In a “worst case” variant of this scenario, the trends cause increasing energy demand without the techno-economic energy efficiency potentials being exploited.

3. The New Trends Efficient Scenario is also characterized by strong, non-linear societal trends. This scenario determines how much energy demand could decline if trends contribute strongly to reducing energy demand.

Final energy demand (EU28) for all sectors in the three scenarios and the variant (Worst Case). The graph shows also the contribution of the four large Trend Clusters in the case of the New Trends Efficient Scenario



Key findings:

- If the techno-economic potentials - including the ones arising through digitalization - are realized (in the Removing Market Barriers Scenario), final energy demand in Europe could decrease substantially by up to 51% (relative to the reference scenario).

- If there is no focus on reducing energy demand when developing societal trends (New Trends Inefficient Scenario), this will counteract reductions achieved due to the techno-economic potentials. This means, the scenario only achieves a 32% reduction of European energy demand. This is for example the case when digital processes become more and more efficient, but also drastically increase in volume, therefore leading to an increased energy demand (as compared to the Removing Market Barriers Scenario).

- If, in addition, the techno-economic potentials are not realized, for example due to a hesitant energy efficiency policy (worst case variant), then final energy demand could increase substantially by 42%.

- If, in contrast, new societal trends are supported by a strong focus on energy demand reduction (New Trends Efficient Scenario), energy demand could be up to 67% lower in 2050. This scenario is only achievable if the trends unfold in a way that puts a decreasing energy demand first (supported by the respective legislation).

The work conducted for the “Study on Energy Savings Scenario 2050” summarizes existing knowledge on the correlation between societal trends and energy demand in a pioneering study. It clearly reveals the strong influence that new trends can have on energy demand. The “Study on Energy Savings Scenario 2050” was published in January 2019 and forms the prelude to more intensive research on the impact of new societal trends on energy demand.

Brugger, H.; Eichhammer, W.; Dönitz, E. (2019): Study on Energy Savings Scenarios 2050. https://www.isi.fraunhofer.de/content/dam/isi/dokumente/ccx/2019/Summary_Energy-Savings-Scenarios-2050.pdf

Wadud, Z., MacKenzie, D., Leiby, P., 2016. Help or hindrance? The travel, energy and carbon impacts of highly automated vehicles. Transportation Research Part A: Policy and Practice 86, 1–18.https://doi.org/10.1016/j.tra.2015.12.001

Dall Energy to supply turnkey boiler island for Dalkia in France

Dall Energy has developed a new, disruptive biomass furnace that reduces dust and particle emissions by more than 90% and can easily meet the demands in the new directive, and offer a whole new set of other benefits to outperform current state-of-the-art, the well-known grate combustion technology:

- Lower investment (much simpler design with very few moving parts)
- Lower maintenance costs (no technical difficulties, low power consumption)
- Very wide load window (fast and easy modulation between 10 and 100% load without problems)
- Reduction of fuel cost as the technology is very fuel flexible, enabling conversion of a wide range of low-value fuels such as wet and dry biomass, organic waste streams, willow, pellets, etc. in the same furnace

A new EU directive tightens emission values, puts forward demands for emissions monitoring. Today's technologies cannot meet the demands set forth by the directive by any other means than adding expensive emission reduction systems to their solutions.

The new directive will be a strong driver for Dall Energy, as Dall Energy technology meets these new demands at no extra cost.

The low emissions and the fuel flexibility was the main reasons why Dalkia – a subsidiary of EDF the main electricity company in France - in 2015 started to investigate the Dall Energy Furnace.

After several meetings and a fuel test of French fuel, Dalkia decided to purchase a first Gasifier unit from Dall Energy for the city of Rouen in France.

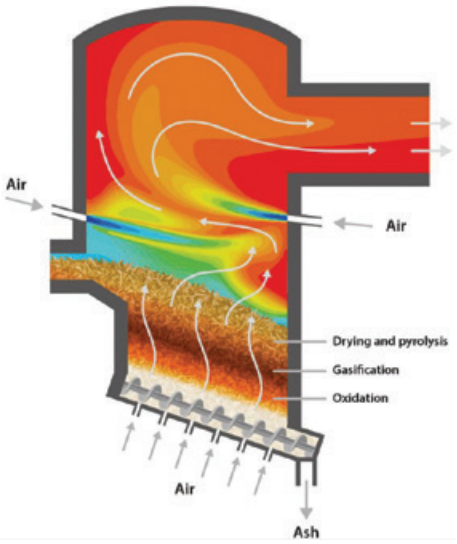
The new heating plant in Rouen is based on the Dall Energy gasification technology in order to comply with the city's requirement for reducing its environmental footprint.

Dalkia's selection of Dall Energy´s technology was based on two main reasons; Firstly the patented gasification system allows for a cleaner combustion ensuring air emissions to be significantly lower than what can be obtained with traditional grate incineration system. Also, the furnace design contains no moving mechanical parts which limits the extend of maintenance works over the lifetime of the plant.

Support from Horizon 2020

Dall Energy have received a received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement no. 811529, to upscale and demonstrate their technology.

The plant will supply up to 17 MW of heat to the network and run for more than 7 000 operation hours per year. A seemingly straightforward demand, however, the constraint is that the district heat network has no buffer tanks for hot water storage.



Thus the new heat plant needs to be able to respond and adjust accordingly to fluctuating daily heat demands on network.

Construction underway

The fifth biomass gasification plant project for Dall Energy, the Rouen plant will be the largest of its kind to date. The company has previously built and commissioned three biomass gasification plants in Denmark and one in the United States in the range from 2 to 9 MWth.

The procurement and construction is ongoing according to the project time schedule. The plant will be put into operation in 2020. ●

How digitalisation is modernising energy efficiency

By Jeremy Sung, Energy Analyst, IEA

From binge-watching television series, to locating and renting a car through a smart phone, our lives increasingly rely on digital technologies. Digitalisation – the growing interaction and convergence between the digital and physical worlds – is an inevitable process, driven by increasing volumes of data, advances in our ability to analyse that data, and greater connectivity.

The energy sector is no different, with digitalisation changing both the way energy is supplied and consumed, as the IEA reported in *Digitalization and Energy*.

The growing impact of digital technologies on energy demand has been widely publicised: From estimates that streaming a film online consumes the same amount of energy as making 60 cups of tea, to others suggesting Bitcoin's daily electricity consumption rivals that of a medium-sized country.

Jeremy Sung

However, much less has been said about digital technologies' potential to improve energy efficiency and potentially reduce energy use.

How can digitalisation improve energy efficiency?

Underpinned by the rollout of high-speed communications networks, the digitalisation of our homes, businesses and transport systems offers the potential to increase energy efficiency through a combination of technologies that perform three essential tasks:

1. Gathering data. This includes technologies such as smart meters, which gather high-resolution energy consumption data from homes and businesses, as well as technologies that collect a range of data related to energy use, such as sensors that record light levels, temperature, or location (e.g. GPS tracking).

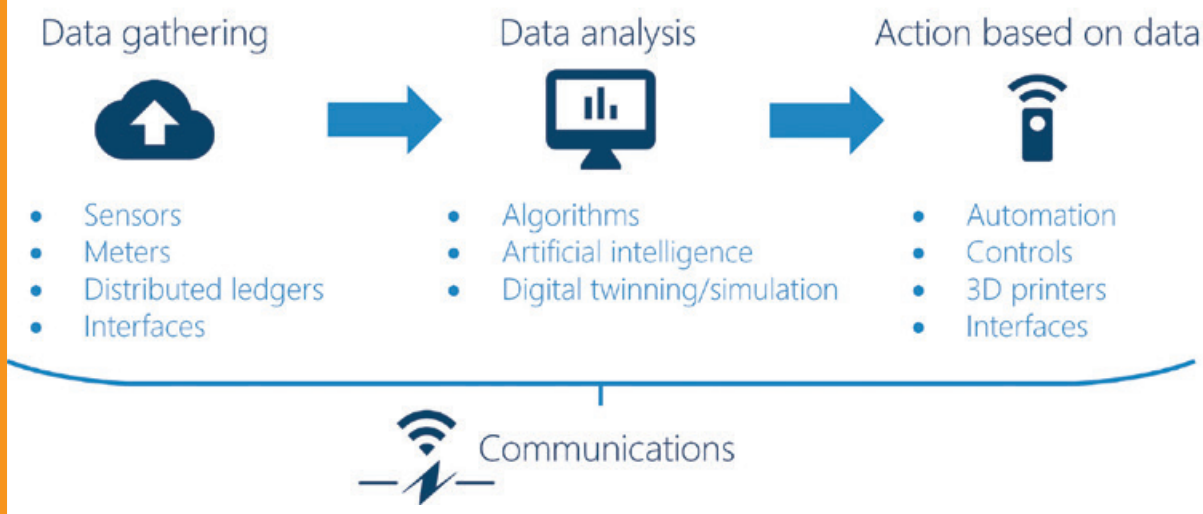
2. Analysing data. Powerful computers, combined with increasingly 'intelligent' software algorithms, allow for the processing and analysis of data to produce insights into how energy can be used more efficiently. Examples include building information models in commercial buildings, 'digital twins' of industrial plants, and the on-board computer in a car.

3. Changing the physical environment based on data analysis. Increasingly, our connected devices and equipment are enabled with technologies that can optimise energy use instantly, based on digital signals. In buildings, connected devices such as lighting systems, heating and air-conditioning equipment, and water heaters can be programmed to optimise energy use, depending on the time of day and occupancy levels. In industrial facilities, smart actuators and drives can be controlled via advanced industrial energy management systems to make subtle changes to optimise energy use while increasing safety and reducing production costs.

A modern office building (or 'smart office') provides a good example of how digital technologies can combine to boost energy efficiency. Increasingly, offices are equipped with intelligent building energy management systems (i-BEMS), which collect data from sensors throughout the building: from light sensors, to thermostats, and occupancy sensors. These data are combined with other data from the electricity grid (collected via a smart meter), as well as data on factors such as weather conditions (gathered from the cloud). Artificial intelligence algorithms process the data, and these algorithms 'learn' over time to optimise energy efficiency, while also considering comfort and potentially responding to signals from local grid operators.

As individual devices in the office are fitted with their own sensors and smart switches, the i-BEMS can tailor energy consumption to the precise needs of the workers within a specific zone of the office, and switch devices off automatically

Fig 1: Examples of digital technologies that when combined, can have an impact on energy efficiency.



when offices are unoccupied. The i-BEMS also allows for two-way communication with the grid, providing flexible load that can be sold to the grid operator, creating an additional revenue stream for the building manager and helping to increase the penetration of variable renewables into the electricity system.

The impacts of such systems can be significant, with some commercial buildings reporting energy cost savings and revenue generation equivalent to more than 10% of annual on-site energy costs and GHG emissions reductions of up to 40% thanks to load shifting and energy efficiency improvements.

Digitalisation can improve both end-use and system efficiency

The example of the smart office shows the power of digital technologies to improve the efficiency of energy end-uses like lighting, heating and cooling, and water heating, but also to unlock distributed sources of flexible load, generation and storage.

As a result, digital technologies can increase the efficiency of the entire energy system by reducing the need for expensive energy-intensive sources of power to cater for peaks in demand, reducing energy transmission and distribution losses, and helping bring more renewables into the generation mix.

By joining up end-use energy efficiency with distributed flexible load, generation and storage, digitalisation is helping to redefine the term 'energy efficiency' to encompass both end-use and system efficiency.

The IEA's work on digitalisation and energy efficiency

The IEA has launched a cross-agency initiative to explore the potential impacts of digitalisation on energy efficiency and implications for policy makers. We are looking at how digital technologies enable greater control, optimisation and analytics, and how this in turn enables greater end-use and system efficiency, especially when combined with the right policy frameworks and innovative business models.

In June, we launched a digitalisation resource library at www.iea.org/efficiency and in late October, we will publish our flagship tracker of energy efficiency trends, *Energy Efficiency 2019*. This year's report contains a range of digital technology case studies and a set of policy principles for energy policy makers that want to increase the use of digital technologies for energy efficiency.

As digitalisation transforms energy efficiency and the broader energy system, the IEA will continue to support energy policy makers around the world to harness its benefits.

Digitalization and decarbonisation: two megatrends poised to evolve hand-in-hand

By Géraldine de Decker, Advisor Business Development on Innovation, Eurelectric

Artificial intelligence (AI) is transforming our world, our society and our industries, as the steam engine or electricity have done at the time of their creation.

In its recent Strategy, the European Commission recognises AI as one of the most strategic technologies of the 21st century, underlining its transformational potential to tackle some of the most pressing environment challenges.

The power of AI in supporting the decarbonisation of society

Industries are currently under pressure to transform their business models and accelerate the shift to a low-carbon future. Many of them have already been impacted and transformed by AI. This technology has the unique power to support the decarbonisation endeavours by driving energy efficiency through smart grid systems. It plays a key role in the deployment of deep predictive capabilities that optimise the integration of renewable energy sources.

AI is an excellent solution for a better coordination of decentralised energy networks, improving overall operational efficiency and reducing energy waste. AI and the Internet of Things (IoT) have gained traction thanks to their ability to measure, manage and optimise the energy use. Furthermore, these technologies are reliable assets to monitor the state of energy infrastructures. Not only can they signal the need for maintenance through early fault prediction, but they can also forecast external disruptions such as hurricanes and earthquakes, thus allowing for a better preparation.

Beyond these benefits in the sphere of electricity infrastructure, AI and IoT will accelerate the electrification of transport. As algorithms improve the battery energy management and increase the mileage of each charge, the anxiety range of drivers will substantially reduce.

Through its multiple applications, AI could contribute to the UN's Sustainable Development Goals by ensuring access to affordable, reliable, and clean energy for all.

The growing energy need of data centres

The advancements of the AI technology, and especially its deep learning subset, are heavily reliant on the development of energy intensive data centres. Therefore, in the near future, it is very likely to register an increased energy demand, as data growth will outpace the improvements in computational power. Europe is a flourishing environment for data centers. In the past ten years, their number has grown to such an extent that they now account for 3-4% of EU's power consumption.

Today, the AI technology is leveraged to optimise the energy consumption of data centers. To harness their full sustainability potential, it is crucial that the growing demand of data centers is met with clean electricity sources.

The power sector's commitment to clean energy supply

The future electricity mix will hence be crucial to ensure overall carbon emissions reductions, as AI developments and applications increase the electricity use. A recent study from Eurelectric, representing the interests of the electricity sector in Europe, shows that it is feasible to meet increasing demand while fully decarbonising the power sector well before 2050 in a cost-effective way. Renewables are said to represent more than 80% of electricity supply by 2045 driven by rapid cost decline, increasing capacity factors, and large untapped resource potentials.

Eurelectric's upcoming AI forum

Deep decarbonisation will require huge efforts towards electrification. The use of clean electricity in final energy consumption should indeed reach 60%, versus 22% today. Understanding the role that AI could play in reach this objective, Eurelectric launches an AI discussion forum. While learning from the disruptions that AI produced in other industries, the forum will aim at helping utilities benefit from this technology. The forum will address numerous questions ranging from how to leverage the power of data in the electricity sector to designing the AI and data-driven utility of the future.

The AI technology won't be developed and applied by the tech sector alone. It needs our collaboration. Hence, the Eurelectric forum should develop a unity of views and actions for the European electric utilities, allowing the power sector to successfully find its way in the AI global race.

RAISELIFE project extends the lifetime of functional materials for Concentrated Power Technologies

Several functional materials, with a main focus on reflectors, absorbers and structural materials, are being developed and tested within the RAISELIFE project. System simulation tools are being used to carry out a techno-economic analysis over the lifetime of the plant for the most promising material developments.

Concentrated Solar Power (CSP) technologies in combination with Thermal Energy Storage (TES) provide flexibility to the electrical grid, which is especially important as the share of fluctuating wind and photovoltaic power generation continues to grow in the energy mix. CSP has experienced a high learning rate in the past years, being able to provide renewable electricity at prices as low as 6 c€/kWh including storage for 6-15 hours. For these reasons the worldwide installed CSP capacity has increased by a factor of 10 in the past decade, reaching 5.5 GWel today, and further growth being expected.

The first generation of CSP technology consisted of direct-steam receivers without storage. The second generation CSP plants integrate TES in molten nitrate salts; either at 400°C for parabolic-trough collector or at 565°C for solar tower technology (see Fig.1). The commercial deployment of 1st gen. CSP plants started in 1984, while 2nd gen. plants were first implemented commercially in 2008.

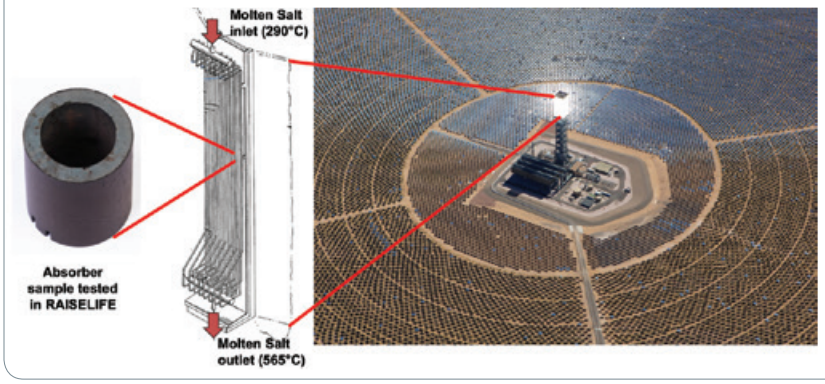
The large initial investment for CSP plant construction does not come without risk: degradation of components and materials can hinder the plant's profitability. CSP plants are typically designed for a life span of 30 years, requiring the materials to withstand extreme thermal loads as well as harsh desert environment with high radiation and dust erosion levels.

The RAISELIFE project aims at developing novel materials with extended lifetime and performance for parabolic-trough and solar tower CSP plants. In addition, improved testing and qualification methods to simulate in-service conditions in different climates are being developed.

With regards to parabolic-trough CSP plants, a novel absorber coating for non-evacuated line focusing systems has been developed based on cost-efficient sol-gel technology. The coating achieves excellent optical performance and high durability (α=95.4%, ε=7.8% at 250°C, stability >15 months in furnace at 400°C without degradation). In addition, an improved anti-reflective (AR) coating has been developed for evacuated line focusing systems, reaching 2.5 higher abrasion resistance compared to the state of the art. The novel AR-coating has already been deposited in a commercial receiver tube factory.

With regards to solar tower CSP plants, four different types of novel absorber coatings for temperatures up to 750°C have been developed. Durability testing of those coatings is being carried out in two sets of tests under high solar flux (reaching up to 700 kW/m²) and in several climatic chambers to mimic both, operation conditions at high temperature and environmental corrosion and erosion at ambient temperature during night time or plant shutdown. Fig. 2 shows one of the two employed on-sun testing facilities. Two of the tested coatings were identified as very promising: they showed similar optical performance as the state of the art Pyromark 2500 absorber coating but significantly higher durability. In addition, protective coatings to prevent corrosive attack from the molten salt on the inner side of the metallic tube substrates have been developed. The coated samples showed only negligible mass losses during furnace testing in solar salt at 580°C for 10,000 hours, opening the pathway to use low-alloyed steels in combination with

Fig. 1: Schematic of molten salt receiver panel in solar tower plants (only for illustration purposes; the image on the right shows the Ivanpah solar tower plant in California, which operates with steam instead of molten salt.)



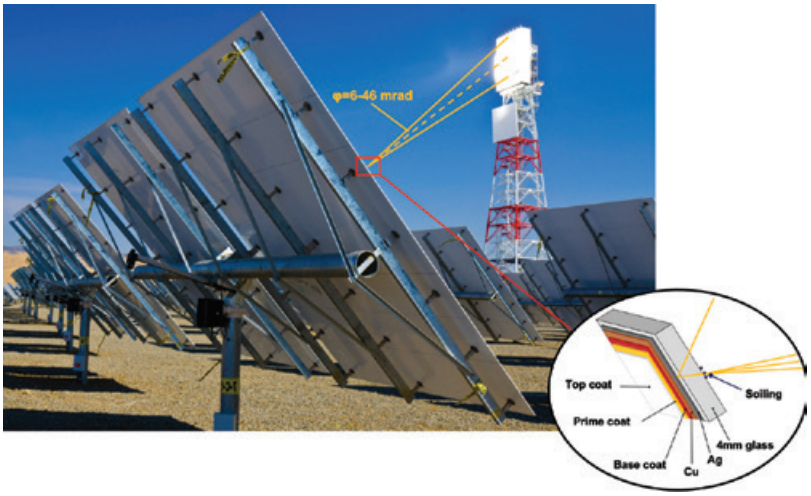
coatings for the molten salt storage and piping systems, which will allow for further cost reductions compared to the use of expensive nickel base alloys. The corrosion rate of different uncoated substrate materials has been evaluated as reference: for the ferritic steels, Vallourec's VM12 performed significantly better than T91. Low corrosion rates were measured on nickel base alloys Inconel617 and Haynes230.

CSP plants make use of silvered-glass mirrors to focus the solar radiation towards the receiver (see Fig.3). Traditional glass mirrors have a thickness of 4 mm and the silver layer is protected on the back by a thin copper film and 3 protective paint lacquers. Within RAISELIFE, different options to replace the 3-coat protective lacquers by a more cost efficient 2-coat system are being explored. Six types of novel 2-coat lacquer systems are being tested in an extensive outdoor exposure campaign at 11 sites, as well as in a set of accelerated climate chamber tests. Five of the tested mirror types (one of them completely lead free) seem suited for dry desert sites of low corrosivity, allowing to reduce mirror cost below 12 €/m². In addition, 8 types of anti-soiling coatings to reduce mirror soiling and therefore the cleaning cycle are being tested. Furthermore, a thin-glass heliostat prototype was built and tested in Israel. The composite backing structure proved to provide stability against high wind loads and sufficient resistance against shape deformation caused by gravity or temperature differences. The reduction of glass thickness from 4 mm down to 200 µm has the potential to increase mirror reflectance from 94.5% (state of the art) up to 96.0% due to reduced absorptance losses in the glass.

A public workshop to disseminate the RAISELIFE results will be held on 21st of November 2019 at the Vallourec Research Center Germany. Interested guests may register free of charge under https://www.raiselife.eu

Fig. 2: Accelerated aging testing of different absorber coatings in the dish concentrator test bench at Plataforma Solar de Almería.

Fig. 3: Schematic of silvered-glass mirror mounted on heliostats to reflect solar radiation towards the receiver



The research leading to these results has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 686008, project RAISELIFE.

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One-stop-shops – or integrated renovation services
A wealth of promising experiences in Europe

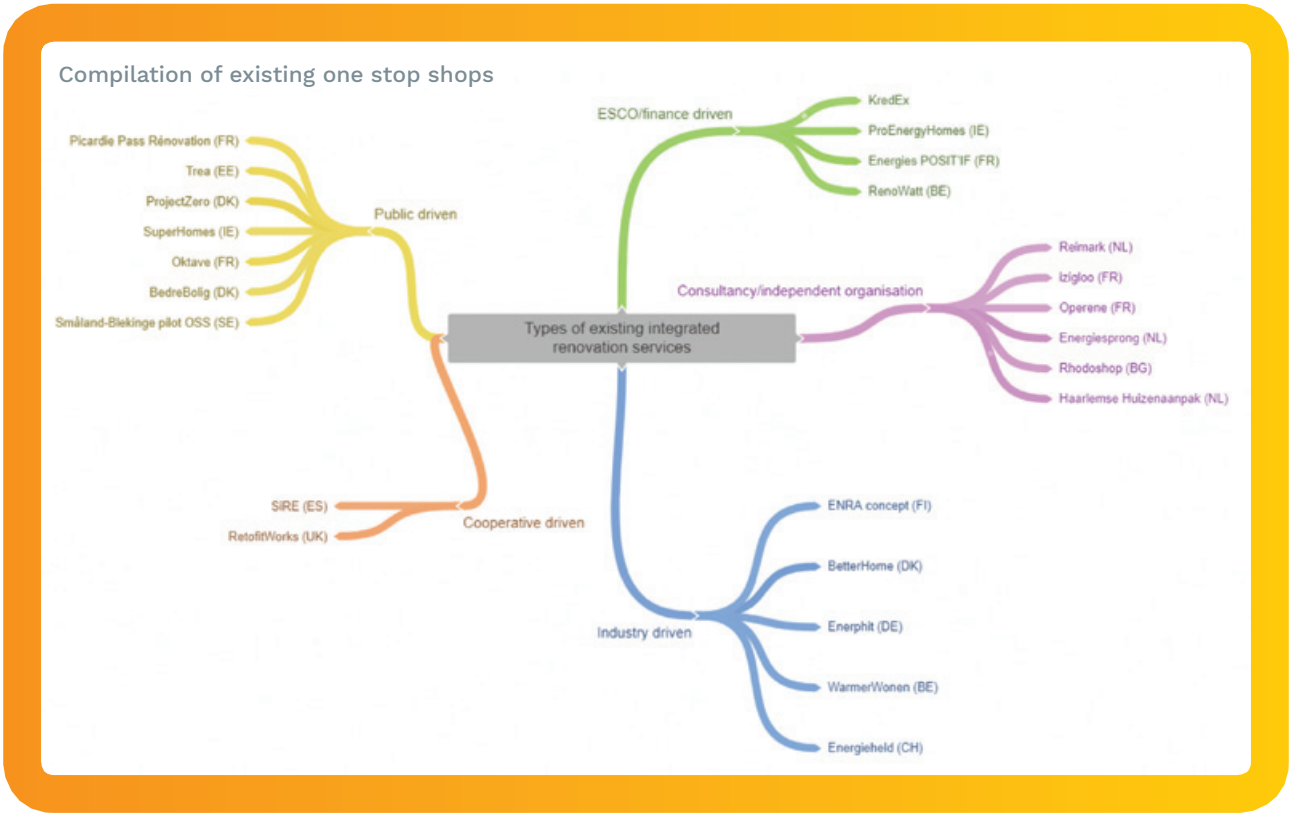
By the Buildings Performance Institute Europe (BPIE)

Renovation of existing buildings can lead to significant energy savings and play a key role in EU's clean energy transition. At the same time, the construction sector is crucial to Europe's economic growth and its employment sector. In 2011, it was responsible for 7% of EU's gross domestic product and over eleven million people were directly employed in the building sector, making it the single largest contributor to employment in Europe[1].

The renovation value chain differs from other sectors', as it involves multiple actors within a single process. The fragmented value chain makes it difficult for the owner to predict renovation works and estimate their cost. A high-level overview of the traditional construction sector from a life cycle perspective shows the conventional actors involved at different stages[2].

Policymakers[3], researchers and companies have concluded that by simplifying the renovation process for owners, demand for energy renovations can increase, especially with integrated renovation services where the new business models align multiple services and actors.

BPIE launches a report for the Horizon2020-funded Turnkey



Retrofit project[4], outlining existing research on one-stop-shops and integrated renovation services. The benchmarking exercise presents nine integrated renovation services, deriving lessons-learnt and guidelines for the Turnkey Retrofit service with a focus on: target audiences; offered services; relations between involved stakeholders; data required; financial model; number of supported projects and more. Key aspects are presented here, highlighting promising examples from across Europe.

One stop shops (OSS) provide integrated renovation services for existing buildings. The interest for them increased after the recast of the *European Performance of Buildings Directive* [2010/31/EU], which called for improved advisory tools for consumers. To fill the void between the supply and demand side and unburden the customer, innovative user-oriented services began to emerge in Europe.

OSSs offer a turnkey solution for clients, better communication, knowledge-sharing and the potential to minimise the risk of errors in the process.[5] Most focus on residential buildings, including single-family houses, multi-family buildings, as well as social housing and public buildings, while commercial buildings are less often subject to them. The existing integrated renovation services focus on six central aspects (see table below).

Nine integrated renovation services launched in the past 6 years are studied in the report: Operene, izigloo, Oktave, SiRE, SuperHomes, ProEnergy Homes, BetterHome, Energiesprong and Retrofitworks.

Most still struggle to achieve enough scale, required to lower costs, reorganise and streamline the value-chain and become the natural go-to solutions. First results include: Izigloo reached the largest number of supported projects but the model supports smaller renovation measures. Operene supported deep renovation of around 4.000 dwellings, Energiesprong around 3.886 net-zero energy renovations, SiRE 74, BetterHome 1182, Oktave 180, SuperHomes around 200, RetrofitWorks 250. As for ProEnergy Homes, it has just started and no renovation has been completed yet.

The services were initiated by a heterogenous group of actors. Izigloo and Operene are both governed by independent private organisations, while Oktave and Energiesprong are governed by a mix of private and public actors. ProEnergyHomes and SiRe are private membership associations, while BetterHome is governed by four private manufacturers (Rockwool, Danfoss, Velux[6] and Grundfos). SuperHomes is governed by a regional energy agency.

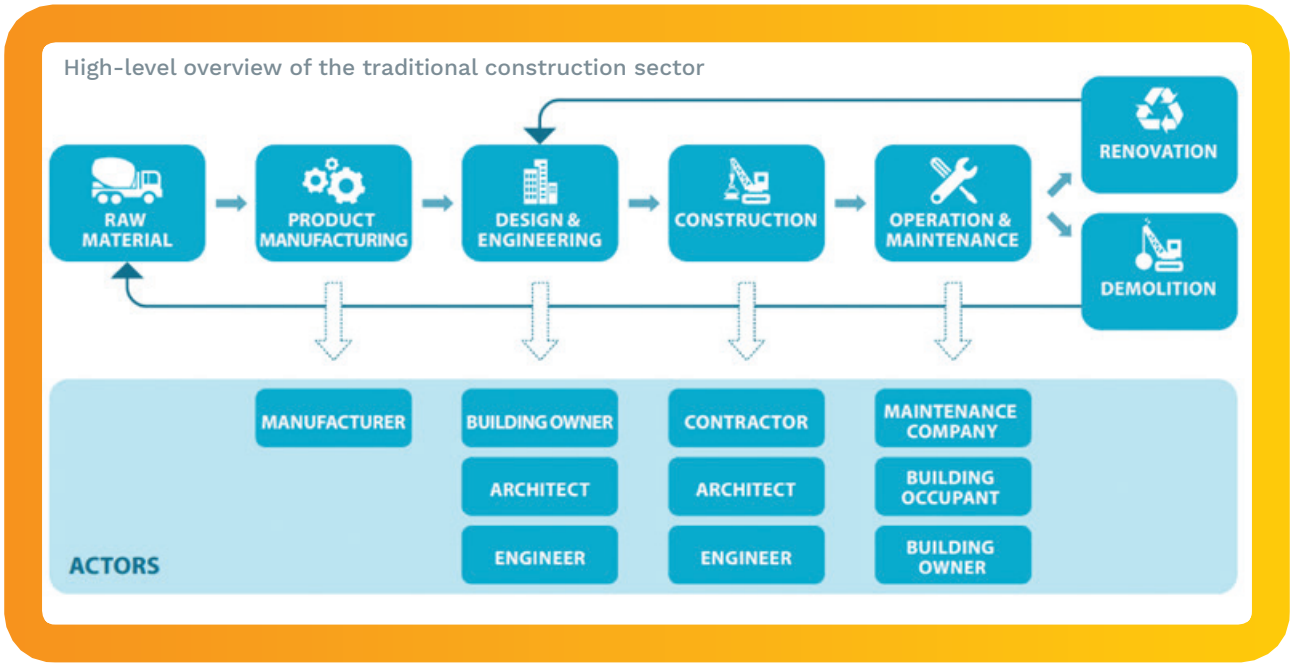
An integrated renovation service needs to align the work of multiple actors, such as architects, energy experts, contractors and installers. An effective collaboration is key to a successful implementation of the works.

Several models (Oktave, Operene, SuperHomes, ProEnergyHomes) have employed project managers while the actual construction work is conducted by an external partner. Other models (Izigloo, BetterHome, RetrofitWorks, SiRe) focus on matching the renovation project with the right installers and contractors and leaves them the project management.

Many use an online portal. The key activities provided by the models include technical and financial aspects of the renovation service. Most integrate training for experts to be able to give reliable information about energy renovation alternatives

Existing integrated renovation services – key focus aspects

Identification of the market demand	›	Find a suitable entry point in the value chain of the market such as initial inspection and assessment, guidance to homeowners, financing advice and options, quality guarantee and post-renovation monitoring
Marketing	›	Marketing of the business and capturing the attention
Skills and expertise	›	Setting up of a delivery network with skilled personnel/ organisations
Restructure the renovation process	›	Streamline renovation process and management of services
Stakeholder involvement	›	Build a network of stakeholders that together can offer a better service.
Provision of post-renovation information and services to customers	›	Post renovation check, follow-up building check or phone call to ensure process developed as expected



and/or how to best approach the customer.

The diversity of revenue streams in the nine models illustrate how differently the business models have been developed. The most common is to get a compensation for every completed project. A couple of projects take out membership fees. Several receive support funds from third parties. Energy performance contracting is another revenue stream for larger projects.

The Horizon2020-funded project Turnkey Retrofit will be a new OSS offering an integrated renovation service for both single-family and multi-family buildings using the solutions and infrastructure of Izigloo and Operene and incorporating best practices and learnings from the cases referred to above.

It will develop and replicate an integrated home renovation service operated in France, Ireland and Spain, transforming the complex and fragmented renovation process into a simple, straightforward and attractive process for the homeowner. It will include the initial technical and behavioural diagnosis, technical offer, contract development and agreement, structuring and provision of financial support, as well as the on-site coordination of works and quality assurance.

Accessible through a digital platform (Solutions4Renovation), it will address drivers of building renovation beyond reducing energy bills and increasing asset value, such as home improvement, increased comfort, enhanced health and quality of life.

Most successful OSSs have a strong network in the markets they are active in and should be embedded in a larger policy framework in order to be effective. Some food for thought for future work!

Contact information

For more information on BPIE's work visit **www.bpie.eu**

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6 Velux later left the BetterHome board

How to kick-start the EU hydrogen industry to achieve the EU climate goals?

By Jorgo Chatzimarkakis, Secretary General, Hydrogen Europe

The necessity to have a low carbon society and push for an effective and affordable energy transition has become a global priority. Europe should be at the fore front of the fight to decarbonise the energy system and, in this context, hydrogen has a key role to play due to its multi-talented characteristics: it's an energy carrier, a fuel and a raw material at the same time.

With these important targets in mind, the European Commission is working to help industry achieve the climate goals via the Important Project of Common European Interest (IPCEI) which is a specific possibility to find aid compatible with the internal market.

IPCEIs are about disruptive and ambitious research and innovation, beyond the state of the art in the sector; followed by first industrial deployment, which is in the short period where very important R&D&I are still necessary (e.g.: to scale up a pilot line); actions by beneficiaries to generate positive spill-over effects – throughout the EU – on the knowledge and results they generate in the IPCEI beyond their business as usual (quantitatively and qualitatively).

Hydrogen has been selected as a strategic value chain and, therefore, one or even several IPCEIs on hydrogen are being prepared. This includes a significant number of projects in all the areas important for the sector such as:

- generation of green hydrogen from renewable energy sources;
- transportation of hydrogen e.g. via dedicated pipelines;
- zero-emission mobility;
- industry applications e.g. based on hydrogen as a decarbonised chemical feedstock;
- energy applications e.g. large scale and seasonal storage of renewable energy;
- housing sector e.g. via residential fuel cells and
- end user driven applications.

Many of the technologies are well developed, but applications are – as of today – not yet commercially viable, because of the supply demand dead-lock which does not bring hydrogen prices down to the necessary level at the desired locations to drive big volume applications. In order to break this deadlock, a kick-start for the involved technologies and a massive investment in green hydrogen production is necessary. On 09.10.2019 Hydrogen Europe and DG GROW are organizing the "Hydrogen for Climate Action" conference (www.hydrogen4climateaction.eu) that should serve as the initial step of a hydrogen launch platform in order to better determine the most promising applications and to bring together the relevant industrial actors in the EU as well as the relevant financing sources from all European regions.

About Hydrogen Europe

Hydrogen Europe is the European association representing the interest of the hydrogen and fuel cell industry and its stakeholders. We promote Hydrogen as the enabler of a zero-emission society. With more than 130 companies, 70 research organisations and 17 national associations as members, our association encompasses the entire value chain of the European Hydrogen and fuel cell ecosystem collaborating in the Fuel Cell Hydrogen Joint Undertaking. We are a Brussels-based association fostering knowledge and pushing for fact-based policy making ensuring that the European regulatory framework enables the role of Hydrogen in our society. For more information, please visit www.hydrogeneurope.eu and follow us on Twitter @H2Europe!

Leading by example – Public buildings in Upper Austria

The transformation of the public buildings sector can serve to set an example for citizens and businesses. In Upper Austria, the regional government proactively chose to lead the way in the energy transition by improving its own public buildings: strong energy efficiency criteria and stringent NZEB standards were integrated into all refurbishment and new construction projects. This led to a 23% reduction of the energy demand per m² for heating and hot water in public buildings between 2005 and 2017, despite the increase of building technologies and services such as ventilation, cooling and IT.

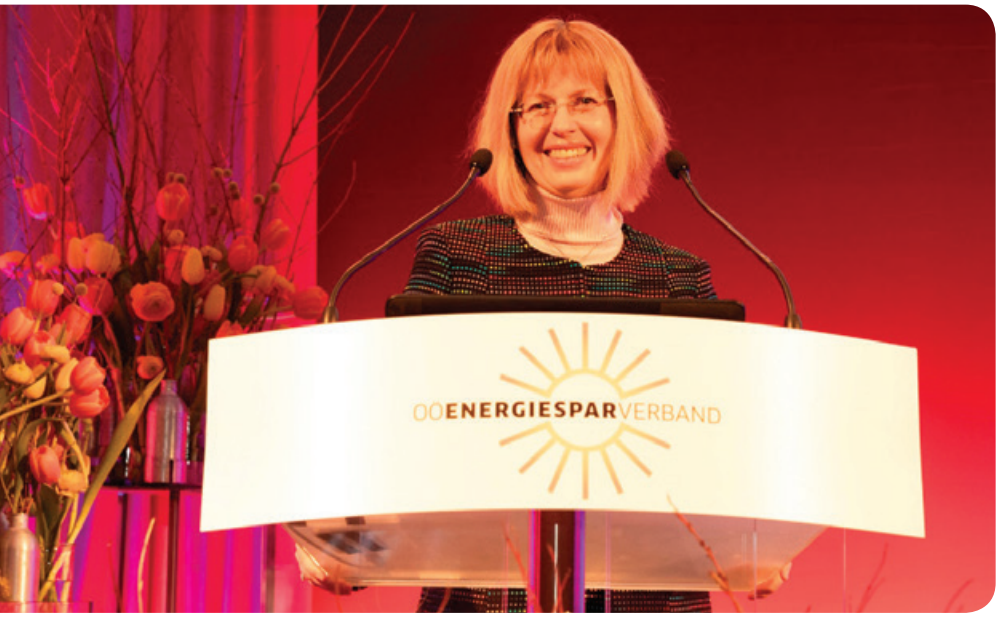
In Upper Austria, a European leader region in the clean energy transition, greenhouse gas emissions in the entire buildings sector were reduced by a significant 41% in the last 10 years. This was achieved through a smart combination of energy efficiency and renewable energy.

The progress seen in Upper Austria is mainly attributed to the clear vision pursued by the regional government for over two decades, supported by the OÖ Energiesparverband (ESV), the regional energy agency. The government's "leading by example" approach was also a strong contributing factor.

Making energy efficiency the norm

In Austria, due to the country's federal structure, building legislation and the implementation of the European Buildings Directive are regional matters. This offers the regions flexibility in choosing which measures to apply to achieve energy and climate targets. One approach used in Upper Austria has been to offer subsidies if certain levels of building performance are achieved. With time, regulatory building standards are gradually tightened and the required performance level for subsidies is raised. This has permitted to progressively increase the overall energy efficiency of the building stock while driving innovation.

Christiane Egger – Deputy Manager OÖ Energiesparverband



To encourage the transition in the public sector, stringent NZEB standards are applied to refurbishments and new constructions of public buildings and a regional law obliges that renewable energy sources be prioritised. Upper Austria was also among the first European regions to introduce mandatory energy accounting for space heating, hot water and electricity in all public buildings (regional and municipal).

True leaders lead by example

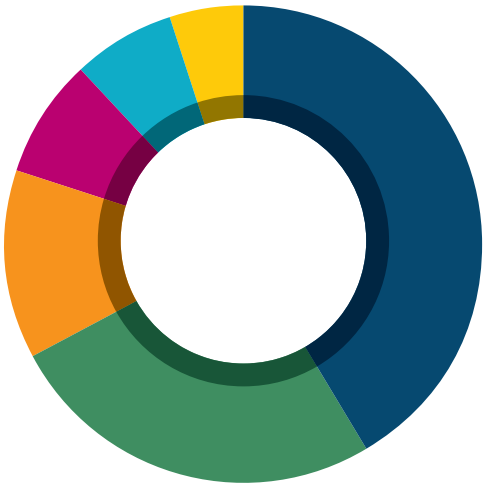
According to the motto "leading by example", the region of Upper Austria implemented a comprehensive and ambitious approach to drive the energy transition in its own buildings. The region's large public building stock consists of several individual buildings – serving a wide variety of functions – with a total surface of almost 1,000,000m². It includes schools, administrative buildings, cultural buildings, technical maintenance buildings and nursing homes.

Already two decades ago, the regional government put in place a standardised "energy accounting and monitoring system" for all its public buildings. Tracking the energy consumption and costs has since become an integrated part of standard everyday facility management tasks – representing limited additional efforts for the staff. Key aspects of this approach are

the ability to closely follow energy consumption and costs, identify saving potentials and prioritise measures of action. Buildings with poorer energy performance are given priority for refurbishment. This leads to achieving the highest possible impact in energy and costs savings first. When energy consumption increases occur, immediate actions are taken to identify the cause and address them with appropriate measures, thus assuring sustainable, long-term energy savings.

This approach has resulted in significant improvements in energy efficiency and a strong uptake of renewable energies. Today, only 20% of public buildings are still heated with natural gas, heating oil or direct electricity, in comparison to over 50% with district heating and 26% with biomass. Although the heated floor area of public buildings increased by 19% between 2005 and 2017, the overall energy consumption (heating and hot water) decreased by 9%. The consumption of heating oil has been reduced by nearly 90% and natural gas by 42%. Over 130 solar systems are installed on the region's public buildings, accounting for a total of 4,600m² of solar collectors – half being PV and half solar thermal systems.

Types of public buildings by percentage of total floor area (m²)



To overcome the high upfront investment costs, Energy Performance Contracting (EPC) is widely used. EPC also offers many other benefits. It helps assure successful project implementation and enables the investment of public money on other projects and measures. Since 2003, 15 ECP projects encompassing more than 40 buildings were implemented. The energy performance of the building stock was significantly improved and, whenever possible, fossil fuels were replaced by renewable energy sources. These 15 projects alone permit annual savings of around 4.5GWh, 1,500t CO_2 and €340,000.

Early adopters and shining examples

The OÖ Energiesparverband (ESV), the regional energy agency, is a central driver of the energy transition in Upper Austria. Its portfolio of services for the public sector includes targeted training courses, energy advice services, support in developing and implementing energy action plans, technical support for triggering energy-related investments and the development and management of regional policies and programmes related to buildings and renewables.

The transformation of the public buildings sector is well on its way in Upper Austria. The ESV strives to showcase the efforts and achievements of the regional government and forerunner municipalities since they play a valuable role and help set the trend in the region and abroad.

To learn more about Upper Austria and exchange with energy and building experts from around the world, the OÖ Energiesparverband invites you to join the next edition of the World Sustainable Energy Days in Wels/Austria from 4 – 6 March 2020.

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ExcEED

From data to information to knowledge for better buildings

ExcEED is a research project funded by the European Commission Horizon 2020 programme, started in 2016 and standing for European Energy Efficient building district Database: from data to information to knowledge. The ExcEED consortium is composed of research institutes, non-profits and consultancies with ample expertise in data monitoring and analysis, energy systems, policy and more.

The project

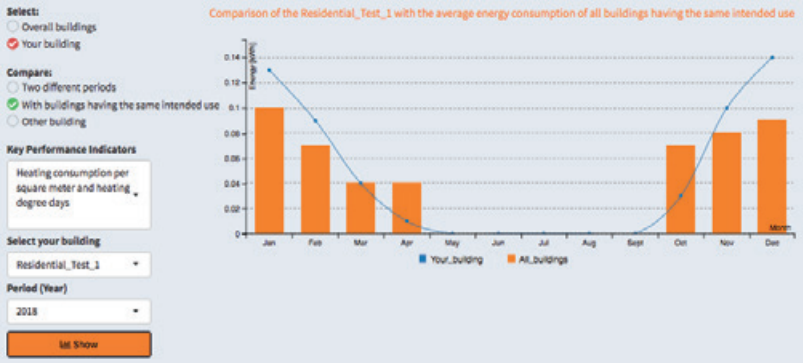
ExcEED answers the need for transparency and comparability of energy performance calculations, through its buildings data platform and associated tools. Data coming from buildings is converted into information and then into knowledge to impact the four key figures in the building sector (real estate, building managers, designers and policy makers). The loop is closed with the impact that the generated knowledge has on the existing buildings and on the next generation of buildings, through improved control and design and new policies.

The ExcEED platform

In June 2019, ExcEED launched its free collaborative platform that gathers, categorises, visualises and benchmarks multiple building data coming from its users. The buildings' monitoring data uploaded by the users are transformed into knowledge with energy performance indicators, benchmarks and air quality surveys. This, in turn, benefits building users all well as other stakeholders from the building sector and civil society by improving the efficiency of their buildings.

The ExcEED platform thus offers many and diverse functionalities, including:

- visualisation of the energy and comfort data of the building;
- highlights of energy performance trends with several levels of resolutions;
- evaluation of building performance through the use of 27 Key Performance Indicators (KPIs);
- benchmarking by comparison of buildings and building clusters with similar functionalities uploaded in the platform;
- a Post-Occupancy Evaluation survey, to get regular feedback from building occupants regarding their perception of the indoor environment;
- a geo-clustering tool, clustering buildings according to the selected KPIs using machine learning algorithm and visualising the resulting clusters in a map.



Benchmarking function in the ExcEED platform

The platform was first tested with Casa Hoval, ExcEED demonstration case and headquarters of the project partner Hoval. The nearly-Zero Emissions office features a monitoring system which continuously feeds the ExcEED platform with measured data, to keep track of the performance and provide real-time analysis.

Why contribute to the ExcEED platform?

By adding building measured data and metadata, any user can access the clustering and benchmarking tools, compare building performance with reference values using dedicated indicators able to normalise different context conditions, get a better understanding of their building's performance and easily evaluate potential energy and cost savings.

The ExcEED platform key is a novel collaborative approach, that enables to keep data anonymous, safe and trustable, while sharing information for an overall enhancement of knowledge. As such, the benchmarking and clustering tools use anonymised and aggregated data. Also, the visualisation of buildings on the map prevent other users to identify the precise location of other buildings.

The ExcEED platform responds to the need of handling actual buildings performance, extracting knowledge to improve building stock management, and consequently design more energy efficient buildings, in the framework of the transition to a decarbonised construction industry.

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Growing insight into the future of mixed forests

By Dr Andrés Bravo-Oviedo, Chair of European mixed forests network. Senior Research Scientist. Dept. of Biogeography and Global Change. Spanish National Research Council. Spain

A COST-funded network has deepened knowledge about mixed forests that could feed into efforts to counter the effects of global warming while protecting biodiversity and valuable natural resources.

Comprising multiple tree species, mixed forests have the capacity to better resist – and recover from – pests and phenomena related to global warming, such as drought. They can also store more carbon than their monoculture counterparts.

To tackle this issue, the COST Action 'European mixed forests – integrating scientific knowledge in sustainable forest management (EuMIXFOR)' fostered collaboration between 153 researchers, forest managers and companies from 42 countries between 2013 and 2017.

"This COST Action was very timely because of concerns about global warming and loss of biodiversity," says Andrés Bravo-Oviedo, a senior research scientist at the National Museum of Natural Sciences in Madrid who chaired the Action. "To my knowledge, it was one of the first times that such a large number of researchers from across Europe and outside Europe sat down together to discuss silviculture and management of mixed forests."

The network resulted in published research, an ongoing EU-funded ERA-NET project about mixed forest resilience and helped improve a forest management app.

Branching out

The network produced a 2018 Springer reference book for students, researchers and policymakers entitled Dynamics, Silviculture and Management of Mixed Forests. It also led to at least 35 peer-reviewed articles published in a range of journals, including the Annals of Forest Science, Forest Ecology and Management and the Journal of Ecology.

Furthermore, the Action was an opportunity to develop additional

research initiatives such as the ongoing EU-funded REFORM project, which involves many of the network's partners. Its focus includes advancing understanding of the resistance and resilience of mixed forests to climate-driven risks, such as pest outbreaks or droughts.

Network members also took part in informal testing of the Smartelo forest management app, helping to improve its functionality. The app serves as a teaching tool, allowing students to practise applying different silviculture guidelines such as the virtual marking of trees.

On track

Bravo-Oviedo – who was an early career investigator (ECI) and enrolled in the Centre of Forestry Research at Spain's National Institute of Agricultural and Food Research (INIA-CIFOR) while at the helm of the network – credits COST with helping him harness his ambitions and propelling his professional life forward.

"I want to find ways to optimise mixed forest management in the context of social and environmental change, as well as to fully understand the resilience of forest ecosystems," says the now 43-year-old who assumed his leadership role just three years after completing his PhD.

Bravo-Oviedo believes COST was pivotal in helping him secure both his current tenure-track position and a prestigious 2019 Organisation for Economic Co-operation and Development research fellowship to analyse mixed forests in collaboration with the US Forest Service. Its goal is to inform policymakers and help shape sustainable mixed forest management practices.

In terms of other career milestones, Bravo-Oviedo says having COST on his CV helped him become a research group coordinator with the International Union of Forest Research Organizations.

"Thanks to my COST experience, I'm closer to reaching my professional goals," he says.

cost
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View the Action:
https://www.cost.eu/actions/FP1206/#tabs|Name:overview
View the Network website:
http://www.mixedforests.eu/

European coal regions prepare for a low-carbon economy

A European Commission Platform provides regions with technical assistance to support their transition away from coal

Ask those involved in the European mining industry and the response is the same: extracting coal is a difficult job. It requires long-hours underground, toiling in make-shift tunnels, breathing in dust, surrounded by heavy machinery. It is physically and mentally demanding. Working in these harsh conditions – the heat, the noise, the risk of accident – tends to give birth to a bond between workers.

Coal mining becomes not just a job,

Bound by the heritage of the region, its historical dynamics, its numerous cultures and the leading role of industry, and yet recognizing Silesia's intellectual and artistic background, Muzeum Śląskie provides a space for dialogue with the past and the achievements of modernity to further explore Silesia, Poland and Europe. (Source: https://muzeumslaskie.pl/en/about-us/). *Photo by Tookapic.*

but an identity. It connotes a certain character, a certain way of living. The regions in which coal mining is a major industry are subject to a sort of geographic version: they too become defined by the tunnels and the coal.

Coal is mined in 41 regions across 12 EU countries, with coal activities providing jobs to about 237,000 people. Around 24 percent of the European power generation mix is based on coal. All of this means that when drastic, disruptive change is necessary, it does not come easily.

Calling for change in the name of decarbonisation is more than just asking men and women to switch machines, to upskill, to move to another type of employment – it is asking them to change a deep-rooted sense of who they are and what their profession means. It is asking a region to abandon its economic model and to try and carve out a new position in an aggressive global market place.

Zdeněk Karásek, Deputy of the Governor of Moravia-Silesia, a major coal mining region in the Czech Republic, knows the challenges first hand. “Our region has been in transition for thirty years. The main challenge is to completely change the identity of the region. These regions of coal and steel have a reputation for hard work, a lot of pollution, but also high salaries and people of a specific nature,” he said. “During the transition process it’s necessary to change this image in a bid to find new sources of economic development.”

These are significant challenges, but they are challenges that must be faced. Despite coal’s current importance within the European power generation mix, it is indisputable that the future of European energy does not lie in fossil fuels. The EU’s Joint Research Centre estimates that two thirds of the current coal mining workforce will be directly affected by changes in the power sector during the next decade, with the largest job losses experienced by the Czech Republic, Poland and Germany. Indeed, in many regions the waning demand for coal has already led to an exodus of young people.

For those regions that make the change, however, the rewards can be great, such as new companies setting up locally, a revived economic prosperity, and a renewed international interest in the region.

The EU has undertaken a long-term strategy to achieve net zero emissions by 2050, titled A Clean Planet for all. This strategy sets the direction for EU climate and energy policy, outlining European contributions to international targets, such as the Paris Climate Agreement and the UN Sustainable Development Goals.

Part of this strategy is weaning Europe off of its dependence on fossil

fuels. This will require an economic and societal transition, one that has the potential to leave certain segments of EU citizens and regions behind.

The EU has said that any transition should be "clean and fair", meaning that a transition that results in large swathes of a region becoming long-term unemployed or that destroys communities or cultures would be unacceptable. An economic transition that benefits many, as opposed to enriching a select few, is to be pursued.

To help those regions that are economically reliant on coal, the EU has established the Platform for Coal Regions in Transition. The Platform offers targeted advice to coal and carbon intensive regions, providing technical assistance in the fields of strategies and governance, as well as project design and development. It strongly promotes the growth of low-carbon industries that have the potential to benefit local residents.

"A significant challenge in the spirit of decarbonisation is not only to diversify the energy systems of a region, but also to ensure that there are economic opportunities for the communities and the residents within the region," explained Robert Pollock, Senior Advisor within the Secretariat of the Platform for Coal Regions in Transition.

"A big challenge – and there are many – is to understand how the transition can impact the regions, understand how they can benefit from it, how they can create new industries, or find new ways of developing that can bring jobs," said Aleksandra Tomczak, Policy Coordinator with the European Commission's DG Energy. "The ideal scenario would be that in five years we already see concrete projects that have been implemented [in coal regions] that citizens have seen the benefits of."

One of the most important aspects of the Platform Secretariat's work is its efforts in convening representatives from coal regions across the continent to share good practice.

Both digitally and through face-to-face events, coal region stakeholders are given the opportunity to exchange with peers, establishing a commonality in the difficult task facing them. This realisation that no region is facing these issues entirely alone helps to build a sense of community.

In true miner fashion, it is hoped that by bringing people together the Platform for Coal Regions in Transition will give birth to a bond of its own.

To find out more about the Platform for Coal Regions in Transition, visit coalregions.eu or contact secretariat@coalregions.eu

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European Utility Week POWERGEN EUROPE

12-14 November 2019 | Paris, France

European Utility Week and **POWERGEN Europe**, a three-day event that spotlights every part of the energy ecosystem, is coming to Paris.

From the 12th to the 14th of November, the influencers, disruptors, and innovators in Europe's energy sector will meet at the Paris Expo Porte de Versailles to highlight the strategies and technologies that will deliver their shared vision of a fully integrated and interconnected European energy system.

A packed conference programme will deep dive into the trends and future direction of each aspect of the sector – from generation to grid to end-users – while a bustling exhibition floor will give visitors the opportunity to see the latest technologies first hand, exchange ideas and share knowledge.

Hot topics will include storage and integration, digitalisation, grid edge technologies, and the challenges facing a changing power generation mix.

This unified event offers a one-of-a-kind opportunity to be at the heart of Europe's energy transition and join decision-makers and thought-leaders to plan the path to a zero-carbon economy.

Digitalising European Energy

The shift towards a low-carbon economy – especially the deployment of renewable sources of energy and the decentralisation of energy generation – calls for increasing digitalisation of the energy system.

The digital developments (big data, the internet of things, smart grids, smart metering, smart homes and buildings, smart charging solutions for electric vehicles, and the more recent artificial intelligence, 5G and high-performance computing) **impact multiple aspects of the European energy landscape.**

The greater use of digital technology contributes to using energy more intelligently and efficiently and to optimising transmission, distribution and consumption (energy efficiency). Moreover, the increased use of digital in energy production, transport and distribution is making cybersecurity a key concern, thus calling for appropriate consideration of this challenge in the development of solutions.

The energy sector is a good example of where digital products and services can provide new opportunities for consumers and European companies, thus creating high value-added employment and offering new business opportunities based on technology, research and innovation.

H2020 has put together basic elements in addressing some of these challenges and in putting the basis for the creating of a market for energy services (by notably supporting the creation of partnerships and critical mass in addressing such challenges). However, the establishment of such market and the further creation of innovative solutions and services is still a challenge that calls for an elevation of the European efforts with

emphasis (in parallel to research and innovation) on measures aiming at the creation of better conditions for access to knowledge, infrastructure and services deployment.

The urgent need now is to scale up innovative solutions and ensure large-scale deployment of digitally-enabled markets for energy services. This requires an interoperable ecosystem. The European Commission aims to foster and facilitate this nascent development via the plans recently put forward for the next MFF. The ambition is to bridge research and innovation to be supported by Horizon Europe, with investments in smart grids and the operational digital platforms, which will contribute to the digitalisation of energy, under the new CEF2 programme and the large-scale deployment of services envisaged under the Digital Europe Programme.

In the EU funded projects area during European Utility Week, projects that address these challenges will be presented. There will also be discussions and presentations grouped in various sessions, with the aim to discuss common challenges and to map measurable and mature achievements of the projects, which can represent the basis for achieving a functional, fully digitalised, cyber-secure, interoperable and sustainable energy ecosystem and which can be potentially interesting for investors, contributing thus to the ambitious deployment goals of the next MFF.

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Speeding up energy transition in Europe

By Brigitte Hasewend, Director of the European Sustainable Energy Innovation Alliance – eseia, on new partnerships and cooperative learning formats

Greta Thunberg knows. Deep down we all know. We need to act now to preserve life on our planet for coming generations. We even know how to make this change happen but for some reason our societies are slow when it comes to implementing change. Why? This article tries to pinpoint some of the obstacles and highlight promising pathways to accelerate change.

1. Obstacles to energy transition

Faced with melting glaciers and increasing climate related death tolls, governments and industries and civil society are paying lip service to the climate cause. However, our societies continue to be run predominantly on fossil fuels and climate action is slow. The obstacles to energy transition are manifold:

- **Policy and Governance:** Except for the EU and international policy levels, climate policies are predominantly national, regional, or local which makes them patchy where they need to be more interlinked to create global traction for climate development.
- **Organisations:** People are confined to their organisations with clear unbreakable boundaries, which hinder joint activities across institutional borders. There is not enough real interaction between governments, industries, research, education, and civil society actors.
- **Community groups** are often ambitious but their impact remains limited because they often work in isolation.
- **Resources:** Our industries still exploit resources without limits because there is no holistic resource planning behind. Planning is for short or medium-term following the need of profitability.
- **Technologies:** Climate neutral technologies are well advanced but their systemic implementation is still not adequately explored, neither from a technological nor from a societal point of view.
- **Infrastructures** are being planned, built and managed separately without using climate relevant synergies. For example, energy grids do not communicate with heat grids or water grids.
- **Education and Training:** Even though interdisciplinarity is required to meet the challenges of our future, academic disciplines are still operating in silos making it more difficult to find innovative solutions. Higher education still does not link very well with stakeholder needs. Skills required linking knowledge from different disciplines is often lacking.

2. Holistic approach needed

'Today we need a much more holistic approach that can break these silos', says Michael Narodoslawsky, TU Graz. EU Policies need to be adjusted for 2030 to accelerate change and regulations need to be implemented at full speed using all means of top-down governance including taxation. EU Policies need to be fully translated into the national, regional and local spheres. New governance models need to benefit multi-actor cooperation across sectorial and organisational boundaries.

Legal competences and governance on all levels need to be enhanced by adequate modelling to create strategic corridors for innovation (Krajačić G. UZagreb). Only when these framework conditions are fully established, does the right to access to sustainable energy unfold its proper meaning. If consumers cannot access clean public transport because it remains unreliable and unaffordable, the right to access

remains meaningless (Heldeweg M., UTwente.

Another factor to create real traction is to support bottom-up market initiatives and integrate them into existing systems. Community groups, especially in lower performing European countries, need to share their best practice, create awareness with all stakeholders, and inspire other people to follow their example. Consumers need price incentives to use sustainable products, save energy, save resources, reuse, and recycle.

We need to realise that the resources on our planet are limited. By considering sustainable usage scenarios of bioresources, for example, industries can add value to agricultural and forest-based production by creating new sustainable materials, products and services. (Krozer Y, UTwente, Narodoslawksy M, TU Graz).

Most importantly, in order to accelerate climate action and to cure our planet, people fundamentally need to change the way they think and act.

For this purpose, new education and training models for new skills and job profiles are necessary linking knowledge from different disciplines. To create an adequate learning environment, new cooperative learning formats needed to be developed.

These cooperative formats are based on real life challenges from industry and regional decision-makers. As Narodoslawsky M. points out in 'Theory and Practice of European Cooperative Education and Training for the Support of Energy Transition', these formats provide students with integrated knowledge and experience they could not otherwise obtain at a higher education institution. In their case study, Arentsen M, Kienberger M and Bauer W, TU Graz, describe their experience with student camps and pilot plant courses, which were especially beneficial to both students and business.

3. Conclusion

Integrating planning, design, technologies and infrastructures requires the cooperation of a multitude of actors. For this purpose new unconventional partnerships and new multiple public-private business models are needed. Once these new partnerships have properly consolidated, the legal framework needs to be adjusted accordingly.

European organisations like eseia have experience with these new cooperative education models operating new learning formats on a European scale. Together with our members we have created the breeding ground to speed up energy transition.

About eseia

The European Sustainable Energy Innovation Alliance is a European non-profit association of leading research and innovation organisations in sustainable energy.

Currently, eseia has 33 members from 13 EU countries from research, academia, industry and government.

eseia strives to become the first European reference for sustainable energy systems innovation and the premier provider of practice-oriented education and training in renewable energies.

The eseia Education and Training Programme (ETP) set up in 2010 creates innovative training solutions to fill the gap in skills development as identified by the EC SET Plan Education and Training Initiative.

To date, more than 500 students and young professionals have received training under the ETP including cooperative training formats, namely International Summer Schools, Student Camps, Pilot Plant Courses, and Professional Training Courses hosted by eseia member organisations.

For further information please have a look at: eseia Publication: European Cooperative E&T for the Support of Energy Transition

http://www.eseia.eu/current-news/news/15917_bet-publication-on-co-operative-european-education-and-training/
https://www.eseia.eu
http://www.etp.eseia.eu

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Capturing and storing CO_2 is part of Europe's transition to a net-zero future

By Guloren Turan, General Manager, Advocacy and Communications, Global CCS Institute

There is a deep sense of urgency when we talk climate change in Europe. This raises many questions and at times creates divisive rhetoric. But it also brings hope for a greener and more sustainable future for Europe.

The European Union (EU) is a leading climate actor advocating for stronger and more ambitious climate action. Strong achievements have come from such efforts but today, more needs to be done. The EU and its Member States must continue to significantly reduce emissions, especially in hard-to-abate sectors, to deliver a net-zero future by the second half of the century.

Many questions remain: How can we deliver net-zero in practice? What does net-zero mean for European industry and its competitiveness, its energy future and last but not least for its citizens?

The IPCC Special Report on 1.5˚C demonstrates that the world needs to get to net-zero emissions by the middle of the century to avoid facing the dangerous impacts of climate change. Alongside renewables, energy efficiency and other important climate measures, carbon removal will play a key role in supporting these efforts. In the IPCC 1.5˚C Report, all four pathways require carbon removal, and three of them include significant amounts of carbon capture and storage (CCS).

The European Commission's strategic long-term vision for a climate neutral Europe released in November 2018 also shows that net-zero is possible and in Europe's best interest. To achieve this ambitious target, the Commission recommended joint action in seven strategic areas, one of them being CCS.

Both the IPCC and the European Commission recognise that carbon capture has an important role in the transition to a net-zero future and that there is no silver bullet to tackle climate change. The deployment of existing solutions and technologies, further research and innovation, and the alignment of the financial flows with the net-zero target will all support this transition to carbon neutrality.

CCS is a proven and safe technology in commercial operation since the 1970s. It is an innovative and versatile technology that can be deployed to rapidly accelerate efforts to decarbonise, and it is available today.

In Europe, about 14% of its annual GHG emissions are from hard-to-abate sectors like cement, steel and chemicals. The demand for CO_2 intensive industrial products will continue with economic growth and growing urbanisation, this to ensure the build-out of renewable infrastructure and roads for example. To tackle emissions from these industries, CCS is an important option especially when addressing process emissions.

This technology can also reduce the stock of CO_2 present in the atmosphere. It can play a role to balance emissions in hard-to-abate sectors, such as aviation, by enabling negative emissions with the deployment of direct air capture or bio-energy with CCS.

CCS can play an important role to scale-up the production of low-carbon hydrogen, a versatile energy vector that can be used for green home heating, power generation and transportation. With this, it can open the door to a new energy economy that will pave the way to a net-zero future.

The reason behind the importance of CCS lies not only in its ability to reduce emissions from a variety of industries and sectors but also in the potential for the technology to support clean growth and bring value to Europe and its economy. CCS has the potential to create new industries, protect existing jobs and create markets for much needed decarbonised industrial products.

Today, there are two operating large-scale CCS facilities in Europe, both in Norway. They have been online respectively since 1996 and 2008. There are an additional nine large-scale CCS facilities in different stages of development in the Netherlands, UK and Ireland. Several of these projects involve capturing CO_2 from hydrogen production. There is no doubt that CCS has been receiving increasing attention across Europe.

These pioneering and innovative

large-scale CCS projects currently under development involve different applications and highlight the versatility of CCS as climate change mitigation technology. Together, these projects will help to decarbonise important European industrial hubs, capture and store CO_2 emissions from a cement and a waste-to-energy plant in Norway, produce vast amounts of low-carbon hydrogen and decarbonise domestic and industrial heating.

In Norway, Northern Lights offers an "open source" CO_2 transport and storage service for industry across Europe. Anchored in the Port of Rotterdam, the PORTHOS CCUS Project will significantly reduce CO_2 emissions from industry in one of Europe's largest ports.

In the Netherlands, a natural-gas power plant will be converted to run on hydrogen fuel mix while its CO_2 emissions are captured and stored safely underground. These are some of most innovative and promising projects paving the way towards climate neutrality in Europe.

So then comes the question: what is needed to accelerate carbon capture deployment in Europe?

We need more ambition and more projects in Europe. Aspirations need to be matched with effective policy to drive deployment. We need political ambition and support from European Member States, especially from those with potential or advanced CCS projects in the making. Where relevant, European countries need to include CCS in their National Climate and Energy Plans along with a clear deployment strategy.

Support for early deployment of CCS infrastructure is needed. Governments should enable the development of shared CO_2 infrastructure. Europe's opportunity to tap into the €10 billion Innovation Fund can support large-scale CCS projects, help further the deployment of CCS and reduce the costs for future facilities.

On September 5th, Commissioner for Climate Action and Energy, Miguel Arias Cañete, and the Norwegian Minister of Petroleum and Energy, Kjell-Børge Freiberg, will meet with EU Energy Ministers and industry representatives at a high-level conference on CCS in Oslo. This will be a crucial moment during the ongoing negotiations on the EU long-term strategy and a unique opportunity to discuss the strategic role and value of CCS in Europe. This event is a strong positive sign that the EU is looking for ways and new opportunities to kickstart CCS. Let's hope more CCS projects in Europe will follow. ●

(Otway facility. Photo courtesy of CO2CRC.)

Clean Water and Clean Energy A dream future for humanity

What we learned at the 2019 edition of Water Innovation Europe.

Water and energy are essential for our society and economy. Both water and energy services are addressed by the 2030 Agenda for SDGs, with remarkably similar goals and targets that centre around universal access, resource efficiency, renewables and reuse, technology and innovation, and international cooperation. To achieve a Water- Smart Society, we need to achieve an Energy-Smart Society, and vice versa.

Thus, it comes as no surprise that Water Europe, the recognised voice and promotor of water-related RTD and innovation in Europe, turned the spotlight of its 2019 annual conference to the Water-Energy Nexus. The conference took place on the 13th of June in Brussels and brought together 230 professionals from the water and energy sector.

Professor Dragan Savic, Chief Executive Officer at KWR Watercycle Research Institute, delivered the opening keynote speech of the day, setting the scene for the conference. He started off his speech by pointing out that water and energy are inextricably linked and those interdependencies can intensify leading to many difficult challenges. However, the emergence of circular economy concepts is a cause for optimism, as this may lead to new business models for combined water/energy markets, zero-emission in both sectors and win-win situations. Professor Dragan also highlighted that climate change awareness promotes green energy and storage, energy optimization, energy recovery and resource efficiency actions, and water can play a significant role in these energy-focused technologies. Therefore, he concluded that clean energy and clean water are not a pipe dream, but a dream future for humanity.

Session 1: Common Challenges for Water and Energy

Dr. Gonzalo Delamara: Head of the Water Economics Department, IMDEA Water Institute

The departure point of the session 'Common Challenges for Water and Energy' was that a sustainable future within existing resources is possible.

The assessment of the best available water and energy technologies makes us well aware that there is leeway for improvement both in terms of macroeconomic performance and social development. Several alternatives within the scope of nexus thinking are compatible with growth and development. The growing demand for limited water supplies puts increasing pressure for the energy sector. In turn, access to energy could exacerbate the water crisis. The basic fact is and has always been that there is no other option for managing water and energy challenges than in an integrated way.

For that to happen, though, institutional, analytical, and technological lock-ins must be unlocked. The first session addressed the 'Common Challenges for Water and Energy' by bringing forward as its first key point that there may well be

Dr. Gonzalo Delacámara

Dr. Floor Brouwer

Dr. Lydia S. Vamvakeridou-Lyroudia

no such thing as energy and water sectors as such – definitely not from a nexus perspective.

Certainly, though, there are common issues standing out to the delivery of water and energy services from a nexus standpoint: the need to decouple energy/water consumption from economic growth and development, etc. What looks like the actual challenge, at this point, is not to optimise interlinkages between energy and water services delivery but rather to progress in terms of resilience, sustainability, and adaptability.

Turning the attention on the work of some European companies beyond Europe, it is hopeful to see that their successful performance shows that further integration of water and energy variables is feasible and desirable. All in all, there is clear evidence of massive savings potential that can not only increase water and energy use efficiency but also deliver dividends in terms of financial returns and wider economic and social benefits.

Session 2: Interlinkages between Water and Energy Services

Dr. Floor Brouwer: Senior Researcher, Wageningen Economic Research

Water and energy services are strongly interlinked. The provision of energy services is very dependent upon the availability of sufficient water of good quality. Similarly, the provision of water services requires energy. The transition towards a low-carbon and green economy will involve energy-saving actions, improving energy efficiency and increasing energy production from renewable sources. 'Is there potential for synergies with the water sector and how could they be achieved?' was amongst the key questions the session on the 'Interlinkages between Water and Energy Services' raised.

With a series of examples of key interlinkages between water and energy, as well as examples regarding water innovations in the transition to a low-carbon economy presented, the panel stressed out the need to find synergies between urban energy challenges and their connection to water, demonstrating examples as energy-neutral WWTPs, cooling capacity from water supply systems, heat from sewers.

The panel also referred to the estimations showing that by 2050, the demand for energy will nearly double globally, while water demand is estimated to increase by over 50%. Undoubtedly, the challenge of meeting growing demand will be further compounded by climate change impacts. Still though, on a positive note, the panel highlighted that there are untapped potentials, that if seized, will manage to improve energy efficiency, pursue energy recovery and reduce water losses, saving both energy and water.

Session 3: Water & Energy Services What can they learn from each other?

Dr. Lydia S. Vamvakeridou-Lyroudia: Watershare Programme Director, KWR Watercycle Research Institute

Water and energy utilities and services are both critical infrastructures, sharing many similarities. Both are subject to similar security (physical and cybersecurity) issues. Both are providers to households and interact directly with citizen customers, in terms of pricing, bills and services.

Both are facing digitalisation for their operational management and both are on the receiving end of climate change impacts that will affect customer demand. When it comes to legislation, both water and energy utilities are facing similar regulatory issues and are supervised by regulatory bodies.

What more would we need to address all these issues in one panel session? The session on 'Water and Energy Services: What can they learn from each other?' explored the practices that would mutually benefit the water and energy services, as well as the main issues that they would need to overcome to be able to develop synergies for data share and data exchange, interoperability, customer awareness campaigns, combined response to threats, risk management.

As highlighted in the panel, the increased fragmentation of the water

> *"Water and energy services are strongly interlinked. The provision of energy services is very dependent upon the availability of sufficient water of good quality."*

sector, together with governance and legal issues appear to be the main barriers to the collaboration between water and energy services. At the same time, a number of success stories, where synergies between the water and energy sector yielded beneficial results for the customers and the environment, were presented in the session, sending out the strong message that synergies and collaboration for water and energy utilities come as the very first and necessary step for the smart city of the future.

Session 4: Building a Water-Energy Smart Society

David Martin: VP & Market Head Belgium & France, VP Government Relations, Europe; ECOLAB

Water availability is a serious challenge for the EU given the fact that citizens perceive water as an unlimited resource and that more than 50% of fresh water is used for industrial purposes. With estimates that total water abstraction in the EU will increase by 16% by 2030, we must plan now to avoid a scenario in which industry, agriculture and people compete for this vital resource. The key is in building a water smart society through integrating the water-energy nexus into EU water and energy policies. It could be said that the EU's Sustainability Agenda can pivot on the water-energy nexus - the important interdependence of water and energy in economic life: Water is needed to produce energy, and energy is needed to treat and transport water. The water-energy nexus includes water treatment, water distribution, energy production (heating and cooling), energy use in industrial processes, and industrial and commercial water reuse, and is therefore central to water availability and planning a water-energy smart society. In an era defined by Climate change that makes imperative changing our behaviour, the water-energy nexus cuts across many of today's challenges -- water scarcity, energy savings and emissions reductions -- making it an opportunity for significant social and economic impact. With this understanding, the panel emphasized the urgency for policy-makers to consider the water-energy nexus in upcoming EU water-related legislation and to make the link with energy use in industry and the EU's energy efficiency policies. The powerful key message of the session was that saving water and energy is both good for the planet and good for business.

David Martin

WIE2019 take-home messages

- There are common issues standing out to the delivery of water and energy services from a nexus standpoint: the need to decouple energy/water consumption from economic growth and development, etc.
- The actual challenge is not to optimise interlinkages between energy and water services delivery but rather to progress in terms of resilience, sustainability, and adaptability.
- By 2050, the demand for energy will nearly double globally, with water demand estimated to increase by over 50%. The challenge of meeting growing demand is further compounded by climate change impacts.
- Switching to a lower carbon pathway could, if not properly managed, exacerbate water stress or be limited by it.
- Synergies and collaboration for water and energy utilities is a necessary step for the smart city of the future.
- The increased fragmentation of the water sector, as well as governance and legal issues are the main barriers to this collaboration.
- To reach our decarbonization target, we need to reduce energy, use greener energy and preserve water as energy is water hungry and water is a finite resource.
- Saving water and energy is good for the planet and is good for business.

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