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**DECARBONISING
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EU GREEN WEEK

HYDROGEN

**METHANE
EMISSIONS**

Includes editorial contributions from:



Clara de la Torre

Deputy Director-General
DG Climate Action
European Commission



**Marian-Jean
Marinescu**

MEP, EPP Speaker in
TRAN Committee



Andris Piebalgs

Part-time Professor,
Florence School of Regulation



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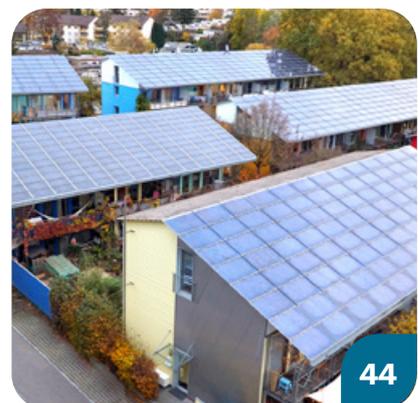
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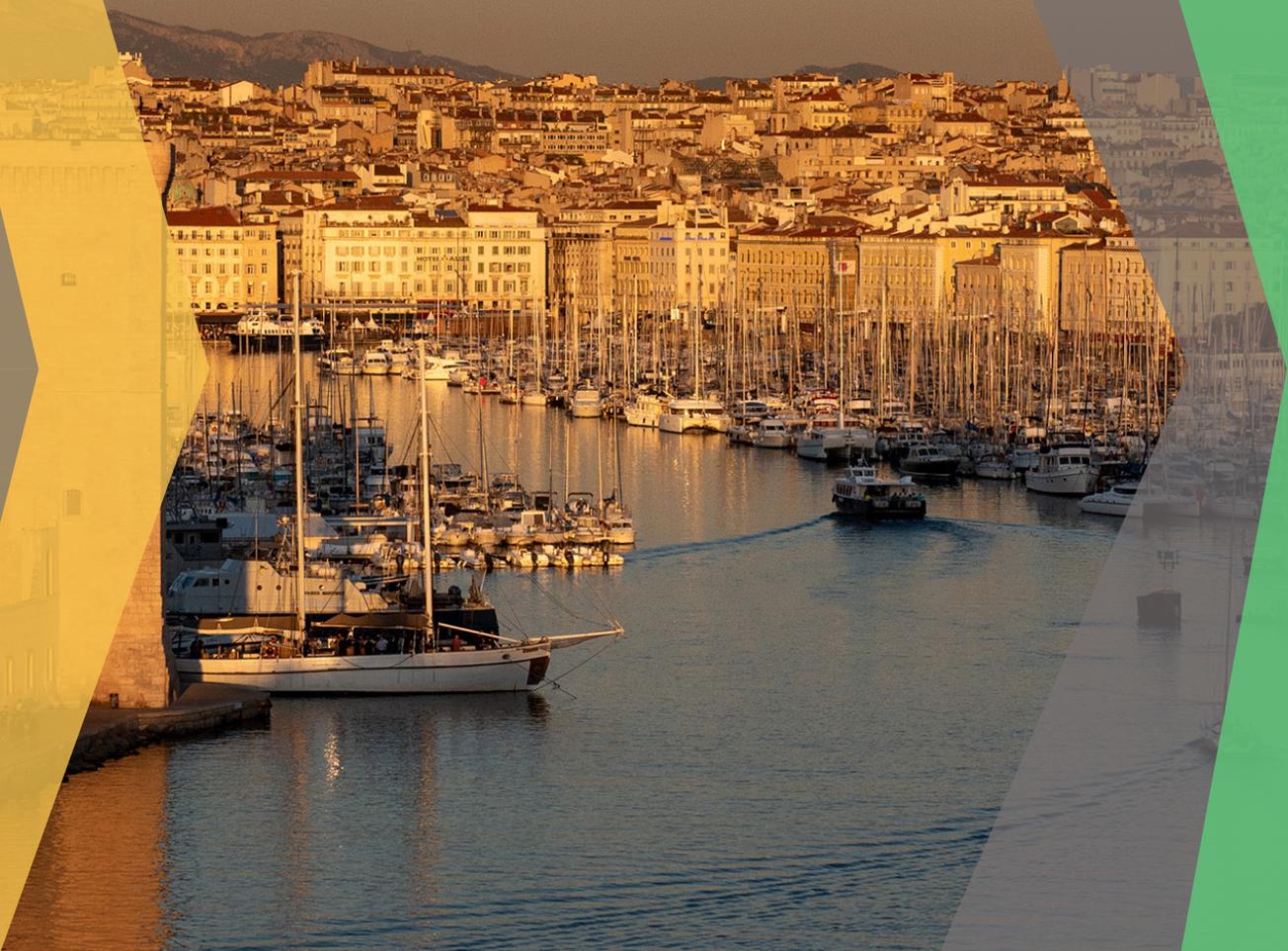


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Tel: +44 1923 286238
www.europeanenergyinnovation.eu

To obtain additional copies please email info@europeanenergyinnovation.eu

Editor

Michael Edmund
editor@europeanenergyinnovation.eu

Business Development Director

Philip Beausire
philip@europeanenergyinnovation.eu

Director of Communications

Sophia Silvert
Mob: +32 4737 30322
sophia@europeanenergyinnovation.eu

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Foreword

At 06:31 GMT on 8 December 2020, nonagenarian Margaret Keenan became the first person in the world to receive a therapeutic dose of a coronavirus vaccine. In this season of goodwill, it is worth taking a look beyond the fanfare and the political grandstanding surrounding such a notable event: to do so offers a glimpse of something beyond precious; something so fundamental that it defines what it means to be human. Covid poses an existential threat to human society, and concerted efforts to confront that threat have achieved a stunning result in an improbably short time. There is a parallel with the challenge posed by another existential threat to human society: a threat made visual by A68a, the trillion-tonne lump of ice that has been floating in the Southern Ocean for three years. And there is good news on that score: US President-elect Biden's commitment to the Paris Accord, and China's aim for 'carbon neutrality by 2060' underpin the hope of a concerted response to climate change. Divided, we shall surely burn with the planet.

With that sombre thought in mind, we are delighted that Clara de la Torre, at DG Climate Action, has written about decarbonising transport. She discusses the scope of Europe's climate-neutrality ambition: a 90% reduction in emissions across road, rail, aviation and waterborne transport by 2050. She highlights the role of the EU in driving innovation (hence the "Partnership on Clean Aviation", which aims to accelerate deep decarbonisation) and reminds us that the sector accounted for almost 4% of all GHG emissions in 2017. She also acknowledges that progress must outpace the growth in air traffic, which is likely to increase again after the pandemic. Taking up the theme, Marian-Jean Marinescu MEP discusses the significance of aviation, both within the context of the pandemic and beyond it. His position could not be clearer, arguing that "freedom of movement and a well-functioning European transport sector is the cornerstone of growth and employment in the EU, especially during the current COVID-19 pandemic and the future European recovery." He asserts that transport must contribute to EU emissions reduction targets, while remaining affordable, since mobility and transport are fundamental to future prosperity. He calls for several specific measures, including EU-level coordination of travel restrictions, hygiene and health protocols; the bolstering of carbon offsetting; incentives to replace older aircraft, and a public investment plan for sustainable aviation fuels.

Hydrogen offers a potentially important route to greener transport, and Martin Lambert refers to the EU's "bold vision" of 40GW of electrolyser capacity by 2030, and a further 40GW of capacity supplied as hydrogen. His excellent article explores "blue" hydrogen from reforming natural gas, which has the added benefit of capturing the carbon it contains; and "green" (renewable) hydrogen, which is effectively a means of energy storage. Lambert also places the 40GW target in context: it equates to around 15 billion cubic metres (bcm) of natural gas, whereas demand in Europe is estimated to be around 400bcm by 2030m. The strategy he adds, is "strong on ambition, but light on implementation...", and needs commitment to the required investment.

Where does all this leave other life on the planet? We asked the World Wildlife Fund – and Katie Treadwell pulled no punches. "Fossil fuels", she says, "have no place in a just transition to climate neutrality". She argues that EU ambition of climate neutrality by 2050 is not nearly ambitious enough. Though she has high expectations of the EU's €17.5 billion Just Transition Fund, designed to "support high carbon regions in Europe as they move to a diversified, climate-neutral and sustainable economy", she questions the influence of the gas sector.

Coronavirus does not recognise national borders; and, as Clara de la Torre observed, neither do the drivers of climate change and biodiversity loss. Surely, in this season of goodwill, we can also look beyond the current squabbles over fish quotas and state subsidies – so that the descendants of pioneers like Margaret Keenan will have a world worth living in.

...and there is a lot more to read inside.

Michael Edmund, Editor



Decarbonising transport

By Clara de la Torre, Deputy Director-General, DG Climate Action, European Commission

The ability to fly was for centuries one of humankind's greatest aspirations. With the invention of the aeroplane and the advent of civil aviation, that dream became a reality. Air travel connected people across continents and opened up new horizons for many. Yet, as aviation has expanded, so it has become clear beyond any doubt that climate change is not only real, but an existential threat. Heatwaves, extreme drought and fierce storms are already making themselves felt and underline the urgent need to take action to preserve the health, prosperity, and well-being of people in Europe and around the world.

In the EU, this urgency to lead the global fight against climate change is now clear. We are developing climate policies in line with the Paris Agreement goal of keeping global temperature increase well below 2°C and pursuing efforts to limit the increase to 1.5°C. In December 2019, the Commission adopted its Communication on the European Green Deal with the objective of reaching carbon neutrality by 2050. More recently still, the European Commission's plan on Stepping up Europe's 2030 climate ambition sets an economy-wide greenhouse gas net emissions reduction target of at least 55% by 2030 compared to 1990¹, with all sectors of the economy contributing their fair share to the efforts.

Transport is the only sector of the economy where greenhouse gas emissions have gone up since 1990 and continue to grow. As such, we must achieve a 90% reduction in emissions across road, rail, aviation and waterborne transport by 2050 to achieve climate-neutrality. Aviation cannot be left out of this equation. In 2017, CO₂ emissions from the

sector accounted for 3.8%² of the European Economic Area's total greenhouse gas emissions. While efforts to decarbonise are underway, we must redouble and sustain them to achieve the climate goals of the European Union. Our progress must outpace the sustained growth in air traffic, which increased by 60% between 2005 and 2017³, and is likely to increase again once the impacts of the COVID-19 crisis subside.

To fulfil its Green Deal commitments, the Commission is now working on a proposal to revise the EU Emissions Trading System for aviation. This will see a move towards increased auctioning so that we can make the carbon price a more effective signal in the sector as well as allowing for a fairer system among operators and implementing the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Further policy measures such as energy taxation and the ReFuelEU Aviation initiative are being considered as part of the range of measures needed for the sector to decarbonise and better internalise external environmental costs.

It is clear that the aviation sector will need to scale up efforts to improve the efficiency of aircrafts, their operations and to increase the use of sustainable alternative fuels. Such fuels are a key to the decarbonisation strategy. Aviation needs to contribute to the decarbonisation of transport in a smart way, preserving the competitiveness of European industry and satisfying the mobility demands of citizens. Civil aviation has been one of the major catalysts of the integrated European single market, territorial cohesion and a more inclusive society. The industry represents an important share of GDP and jobs in Europe and is indispensable for the competitiveness

of the European economy as a whole. Aviation is part of a wider mobility system, which needs to be more efficient, to become more interoperable and to embrace the digital transformation.

The European Union's role in decarbonisation is to drive innovation through strong incentives. The Horizon Europe framework paves the way for aviation research and development in crucial fields from hydrogen, electrification, advanced airframes and digitalisation to sustainable aviation fuels, green airports and improved efficiency both on the ground and in the air. The "Partnership on Clean Aviation", envisaged under Horizon Europe, aims to accelerate the development and demonstration of integrated aircraft technologies towards deep decarbonisation while ensuring safety and security.

Non-CO₂ climate impacts generated by aviation must also be factored in. The effect of these emissions on temperature increases is around double that of CO₂ emissions according to a recently published scientific study⁴.

In Europe, we are the beneficiaries of a world-leading aviation industry, and it is here in Europe that the industry is leading the way in decarbonisation. The global momentum towards a more sustainable aviation sector offers massive commercial opportunities to the first movers and lead innovators that put their businesses on a new path to sustainable growth.

We are determined to drive this transition. The European Green Deal together with the recovery package and Horizon Europe will support the EU aviation industry in adopting a new model of inclusive growth. This

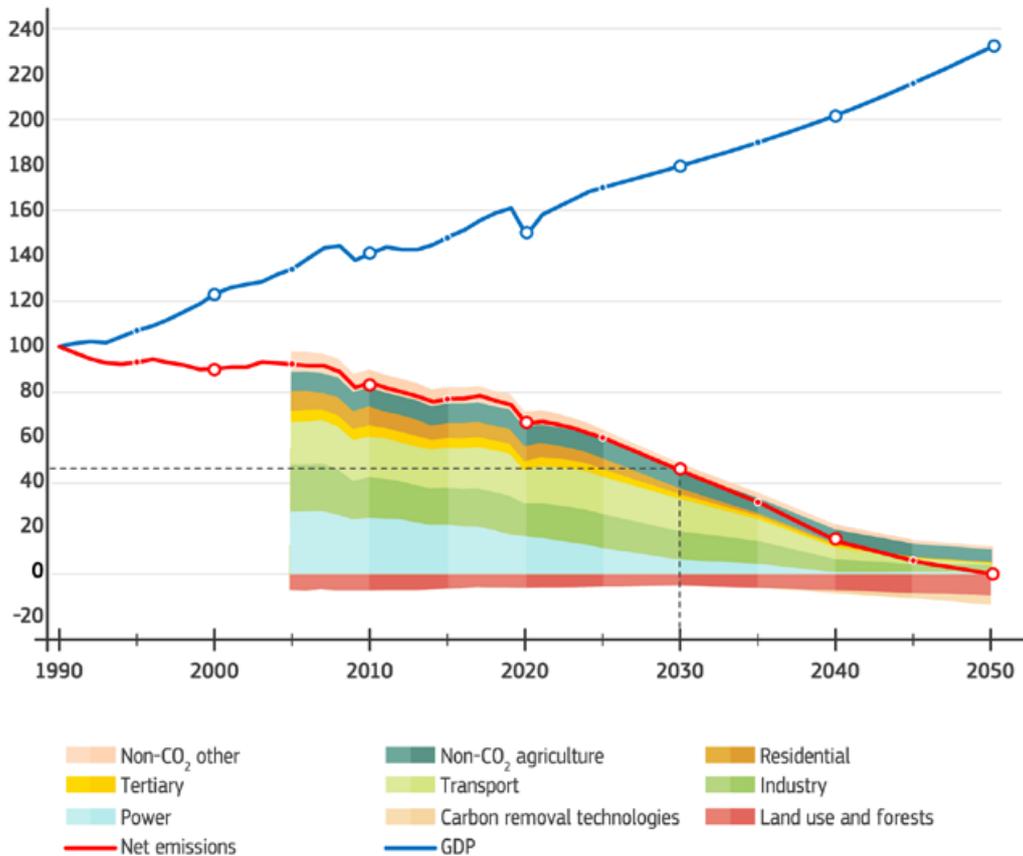


Figure 1 : The EU's pathway to sustained economic prosperity and climate neutrality, 1990-2050 (from 2030 Climate Target Plan)

will bring with it a true recovery from the current COVID-19 crisis and its severe impact on the sector. In terms of financing, an impressive 37% of Next Generation EU's budget will be spent directly on our European Green Deal objectives. Our efforts must now focus on ensuring investment and disruptive technologies emerge in time for Europe to become the first climate-neutral continent by 2050. This would be beneficial to European industry in the face of fierce global competition.

The efforts of the EU and its Member States to reduce aviation emissions

extend globally to the International Civil Aviation Organization, where negotiations on adopting a Long-Term Aspirational Goal to reduce of CO₂ emissions from international aviation are underway. As was done by the International Maritime Organization, this process should be informed by science and be guided by the temperature goals agreed under the Paris Agreement.

EU action alone will not suffice. The drivers of climate change and biodiversity loss are global and not bound by national borders. That is why the EU is stepping up and

cooperating with our partners to achieve increased climate ambition, economic prosperity and sustainable growth. Reaching climate neutrality in Europe and worldwide will not be easy. It will require enormous investment in technologies, business models, skills, infrastructure and changes in behaviour. Yet, with careful management, the green aviation transition can be of help to modernise our economy, making it innovative, circular and resilient enough to maintain its global competitiveness in the years to come, and this leaving no one behind. ●

1 https://ec.europa.eu/clima/sites/clima/files/eu-climate-action/docs/com_2030_ctp_en.pdf

2 Data from https://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2019_en

3 Data from <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12303-ReFuelEU-Aviation-Sustainable-Aviation-Fuels>

4 Lee et al., 2020. The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. <https://doi.org/10.1016/j.atmosenv.2020.117834>

Digitalisation of district heating delivers

By Steen Schelle Jensen, Head of Business Development, Kamstrup

Investing in remote reading and digitalisation is necessary to ensure EED compliance within district heating but also opens up to new opportunities for utilities, consumers as well as the green transition. Front runners have already delivered great results from combining their resolve with the right solutions and a trusted partner.

The Energy Efficiency Directive (EED) was created with European consumers in mind. It now requires monthly readings of heat meters and improved data availability for end users to ensure energy billing transparency and to empower them to take responsibility for changing their consumption behaviour.

For most utilities, EED compliance involves a considerable investment. However, remotely read meters and frequent data also represent new opportunities for value creation. And once the meters are installed, the additional expense to collect daily or even hourly data is minimal compared to the potential it unlocks.

Data-driven optimisation

First of all, frequent meter data combined with the right tools and analytics can help make district heating the obvious choice wherever feasible. This could include improving customer closeness and motivating further engagement. But having the right data also enables utilities to specifically guide customers on lowering their consumption, monitor the efficiency of their installations or perhaps even offer to take over installation operation entirely.

Secondly, smart meter data provide the very basis for utilities to optimise their core tasks of producing and distributing district heating as well as areas like asset management, design and planning. Also, having frequent data available is key to enabling a cost-effective green transition because that is a prerequisite for lowering distribution temperatures and integrating more renewable energy sources, which impacts costs substantially.

Studies show that cost reduction gradients for renewables and recycled heat, like geothermal, solar or industrial excess heat, are a factor 6-7 more cost-sensitive than for energy sources that are burned, like traditional waste and biomass. In other words, with a heat supply based on clean energy sources, utilities generate much higher savings for every degree they lower their temperatures, and therefore the green transition business case depends on a utility's ability to do so.

Unmistakable results

We are seeing a unique resolve among many European district heating utilities, and several of our customers have already created concrete and measurable results based on frequent meter data and increased digitalisation. They include significantly lowering forward and return temperatures, reducing heat loss and removing hundreds of bypasses – all while also saving their customers money on their energy bills.

For one customer, remotely read meters, frequent data and targeted analytics enabled them to lower

their forward temperature by 6-8°C, cut pipeline losses by 14.5% and reduce annual heat production by 2.5%. Translating new and large amounts of data into actions was a process, but being able to monitor the exact temperature throughout the distribution network allowed them to continuously digitalise and optimise their network and operations, ultimately resulting in an ROI of only 4-5 years.

Same goal. Different journeys.

EED or not, when it comes to digitalisation of the district heating value chain, one size will never fit all. But it does represent both new demands as well as new opportunities that cannot be ignored. At Kamstrup, we pride ourselves on having the competences, solutions and experience from mature district heating markets to help and support utilities in more immature markets on their same journey. A journey that goes beyond EED compliance to utilising and benefitting from the data-driven value creation it also enables.

[kamstrup.com](https://www.kamstrup.com) ●



First Dall Energy plant in France built on time

In the Autumn 2019 issue of European Energy Innovation we presented the Dall Energy technology and their first order in France – a 20 MW Furnace for Dalkia.

In this issue we focus on how the project has progressed and look at the initial results.

The Dall Furnace has disrupted biomass combustion technology and the design has managed to include several advantages

- Reduction of dust and particle emissions by more than 90% and NOx by 30%.
- Lower maintenance costs (no technical difficulties, low power consumption)
- Very wide load window (fast and easy modulation between 10 and 100% load without problems)
- 100% load without problems)
- Reduction of fuel cost as the technology is very fuel flexible.

Dalkia – a subsidiary of EDF, the main electricity company in France – started to work on the Dall Energy Furnace technology in 2015.

After several meetings between Dalkia and Dall Energy and a test of French fuel, Dalkia decided in 2018 to purchase a first Gasifier unit from Dall Energy for the city of Rouen in France.

The plant will supply up to 17 MW of heat for 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



Dall Energy site manager Jes Siegrist, at the startup burner.

demands on the network.

Support from Horizon 2020

Dall Energy have received funding from the European Union's

Horizon 2020 Research and Innovation Programme under Grant Agreement no. 811529, to upscale and demonstrate their technology.

Constructed on Time – despite of COVID-19

In March 2020 all of Europe was hit by COVID-19 and it affected this project:

The site in Rouen was closed on the same week as Dall Energy was supposed to deliver and install both the Furnace and Boiler.

Dalkia and Dall Energy agreed to store

the equipment at the sub suppliers. In June the site was reopened, and a new timeline was agreed upon.

The timeline was very ambitious: despite the COVID-19 situation, the plant should still be commissioned in 2020.

In many ways it has been an incredibly challenging project, but we succeeded, due to a very good collaboration. The plant started up at the beginning of December. The initial results are promising. The inauguration will take place on December 10 in the presence of the CEO of Dalkia and the Danish Ambassador.

The final commissioning will take place at the beginning of 2021. ●

Sustainable aviation in times of pandemic

By Marian-Jean Marinescu, MEP, EPP Speaker in TRAN Committee

On its Position Paper on Transport – Mobility and Transport until 2030 – published on 22 October this year, the EPP Group in the European Parliament underlined that freedom of movement and a well-functioning European transport sector is the cornerstone of growth and employment in the EU, especially during the current COVID-19 pandemic and the future European recovery.

This is why, as the EPP speaker in TRAN Committee, I called for the application of one simple rule during

similar crises: open borders for the transport of goods. All EU citizens have to enjoy mobility, as is one of their rights provided by the EU Treaty. By setting up a stronger, more resilient and sustainable transport network, Europe will be able to overcome future crises and master challenges.

The COVID-19 outbreak has caused an unprecedented crisis, resulting in the collapse of air connectivity and putting at risk the future of the entire aviation chain– with far-reaching consequences for the civil aeronautical industry and their supply chain, as well as for the competitiveness of the aeronautics industry. Due to collapsing demand, Original Equipment Manufacturers (OEMs) had to reduce their production levels.

This has major impact not only on the OEMs and their workforce but also on the many supply chain companies including mid cap suppliers and SMEs that often have no big financial buffer to weather this perfect storm. Without public support millions of jobs are at risk. But even with public support, the path to recovery will be long and might take between 3-5 years to get back to pre-COVID levels.

In addition to this challenging economic situation in the short and medium term, civil aviation is facing the longer-term challenge of decarbonizing and advancing in the greening of the sector. It is therefore essential to link COVID recovery with the need for continued investment into actions that help the decarbonization of civil aviation in the

medium and long term. Moreover, the current low demand levels are also an opportunity to accelerate the digital transformation of the industry and civil aviation. Due to the current economic crisis, public support will be essential since many companies face cash flow problems and are therefore only able to sustain longer term investments if they get public support.

LESSONS OF THE PANDEMIC: EU-LEVEL COORDINATION OF HYGIENE AND HEALTH PROTOCOL

The pandemic has created a real crisis for both airlines and plane manufacturers. What have we learned from it? That we need an EU-level coordination of travel restrictions, hygiene and health protocols. The Recovery and Resilience Facility should include a Project of European Added Value for the aeronautics industry's recovery to facilitate the replacement of fleets with new and more sustainable products.

On the other hand, the aviation needs to adapt to the climate change. The same as the pandemic, climate change is global. A global challenge that needs a global solution. Therefore, the EU needs to support efficient and viable international initiatives in all areas including transport, especially in the aviation and maritime sectors.

STRATEGICALLY THINKING OF AVIATION'S DECARBONISATION

Aviation needs to advance the deployment and ensure ambition in the international carbon offsetting scheme, known as CORSIA. To achieve this, the Union must speak



with one voice in the International Civil Aviation Organisation (ICAO).

Alternative aviation fuels need to increase market share in order to contribute to emissions reduction. Therefore, we underline in EPP Transport Position paper that a thorough assessment of the life-cycle emission of these fuels is needed. Further emissions reduction may be achieved with the adoption and implementation of the legislation on the Single European Sky 2+.

The EU already supports research in aviation (Clean Sky Joint Undertaking) and this should continue and intensify to provide technological solutions including for alternative fuels. Solutions stemming from such research, like the use of satellites and the complete deployment of the Single European Sky Air Traffic Management Research (SESAR) should be completed as soon as possible throughout the EU.

A revision of state aid rules for airports is also necessary in order to significantly decrease emissions and travel time, while increasing efficiency. Therefore, we called on the Commission to incentivize aircraft manufacturers to adapt future production to European short distance, single-leg flights suitable for electric solutions. Airports should be systematically connected to cities through (high-speed) train lines. Airports must use only zero-emissions vehicles.

As we have stated in the conclusions of the 5th Aeronautics conference organized under the umbrella of “Sky and Space Intergroup”, Member States should include in their national recovery and resilience plans investments in cross-border and multi-country projects, which can contribute to the economic recovery and generate European Added Value, while supporting the Union’s

2050 climate neutrality objective with respect to aviation. In addition to this, a European Aviation and Aeronautics Recovery Plan should be set-up to support a sustainable aviation roadmap and a future competitiveness in order to ensure that Europe remains a leader in terms of sustainable and green recovery of the aviation sector.

The EU should implement a green incentive scheme for aircraft operators to replace older aircraft (fixed wing and helicopters) with more modern and environmentally friendly aircraft; use public funds dedicated to the recovery to provide such incentives to aircraft operators. On average, new aircraft models are 20%-25% more fuel-efficient.

Moreover, we should set up a European public investment plan for Sustainable Aviation Fuels (SAF) in order to increase their market share and contribute to emissions reduction. Last but not least, there is a need to investment in green airport and heliport infrastructure. We also need to invest in research and deployment of sustainable fuels for the aviation sector as well as the corresponding charging points in airports or logistics platforms. The new fifth window for strategic European investment within the financing programme of InvestEU and next Connecting Europe Facility should contribute to this objective. Digital transformation of the industry must remain a top priority for the EU, and the fast and ambitious implementation of the EU Digital- and Data Strategy is more important than ever.

DON'T FORGET THE PASSENGERS

Transport must provide the best conditions for passengers. The EPP Group is calling for a fair system of passenger rights in all modes of transport. The European Commission should provide a

legislative framework for multimodal, “door to door” ticketing, booking and payment services. Effective solutions are needed to manage the pressure put on the transport network and the environment without generating heavy costs and administrative burden for users. Transport must be fit to cope with new environmental, socio-economic, technological developments as well as public health, requiring significant investments in new mobility models, digitalization, research and innovation, alternative energy sources and energy efficiency.

Transport must contribute to reaching the EU emissions reduction targets in a technologically neutral way, while making sure that transport remains affordable. It can hugely benefit from research and the Union’s research policy has to be geared towards strengthening the sector’s competitiveness, environmental performance and maximizing its benefits.

CONCLUSION

Mobility and transport are a precondition for prosperity, wealth and opportunities. Mobility brings individuals and consequently all of Europe closer together. Therefore, the EPP Group is committed to making our European transport system affordable, reliable, digital and sustainable. We want to keep the transport costs per household at the current levels, forge a borderless Single European Transport Area and reduce pollution and emissions through technological progress, efficiency and investment. Low levels of aviation funding in the EU’s next multi-annual financial framework (MFF) are not sufficient to advance firmly and in due time towards the EU’s increasing climate goal ambitions set in the European Green Deal (55% CO2 reductions by 2030, climate neutrality by 2050). ●



FLEXCHX develops flexible combined production of power, heat and transport fuels from renewable energy sources

The share of variable renewable energy, wind and solar, is strongly increasing and is expected to become the main source of electricity production in Europe by 2050. Thermal power plants are facing challenges in the changing energy system and should be operated flexibly. These changes will be challenging for CHP-systems, which have been the backbone of the district heating in many countries of North-Europe. The FLEXCHX concept offers new business possibilities in combining fuel and heat production and by presenting a hybrid production concept which can integrate the use of biomass and solar or wind energy.

Main features of the process

FLEXCHX-process is a flexible and integrated hybrid process that combines electrolysis of water with gasification of biomass and catalytic liquefaction. This process produces heat, power, and an intermediate energy carrier, Fischer Tropsch (FT) wax, which can be refined to transportation fuels using existing oil refining equipment. FLEXCHX plants can be integrated with various combined heat and power production systems, both industrial CHPs and communal district heating units.

In the summer season, renewable fuels are produced from biomass and hydrogen; the hydrogen is produced from water via electrolysis that is driven by low-cost excess electricity from the grid. During the dark, winter season, the plant is operated with just biomass in order to maximize the production of much-needed heat, electricity and FT wax. Most of the invested plant components are in full use throughout the year – only the electrolysis unit is operated seasonally.

Validation of the key enabling technologies

The main focus of the FLEXCHX

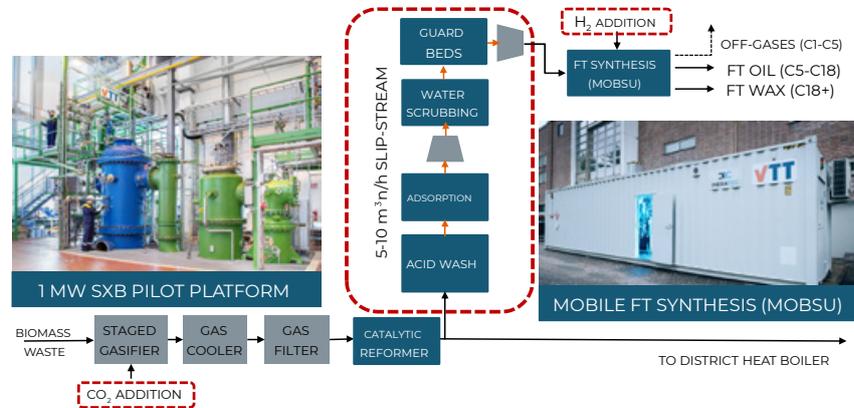


Figure 1: The staged fixed-bed (SXB) gasification pilot plant at VTT, Finland.

project is on the development of flexible gasification, robust gas cleaning and compact synthesis technologies, which are developed at the 0.5 MW, pressurized, staged fixed-bed gasification pilot plant (SXB-Pilot) located at VTT's piloting Centre Bioruukki, Finland (Fig.1). The gasifier was equipped with a special hot filter unit followed by a catalytic reformer, where tars and hydrocarbon gases are converted to H₂ and CO. A slip-stream of the reformed gas was further purified in the novel ultra-cleaning process before leading the syngas into the FT unit.

The FLEXCHX project is currently in its third year and all critical experimental activities have been successfully completed. The SXB-pilot plant was operated with various residues of forestry and agriculture for ca. 350 hours and all novel enabling technologies of the FLEXCHX project were developed and successfully tested. Consequently, the entire process chain from biomass gasification up to FT liquids production has been validated to TRL5. Biomass residues were converted to FT-hydrocarbons, which can be further refined to renewable transport fuels. Currently, the technical, economic and environmental feasibility studies are on-going to support the experimental

development and plans for follow-on demonstration.

The new technologies of the project are expected to reach demonstration phase in around 2022 - 2023. Potential production sites are assessed together with the industrial partners especially in Lithuania and Finland, where biomass-based district heating plays an important role. ●

The The FLEXCHX is a 3-year (2018-2021) project funded by EU's Horizon 2020 research and innovation programme under grant agreement No 763919. The consortium comprises ten partners from four countries; VTT (Finland), Lithuanian Energy Institute (Lithuania), DLR (Germany), Enerstena (Lithuania), Johnson Matthey (UK), Neste Engineering Solutions (Finland), Kauno Energija (Lithuania), Helen (Finland), INERATEC (Germany) and Grönmark (Finland). The project is coordinated by VTT, Finland.

More information at:
<http://www.flexchx.eu>

Compact gasification and synthesis process for transport fuels

COMSYN project develops a new BTL production concept by means of a compact gasification and synthesis process. Biofuel production costs will be reduced by up to 35% compared to alternative routes. This means less than 0,80 €/l production cost for diesel. The production concept is based on distributed primary conversion of various kinds of biomass residues to intermediate liquid products with small-to-medium scale units located close to biomass resources.

The primary conversion will be integrated to local heat and power production resulting in 80% energy efficiency in biomass utilization. The FT products will be refined to high quality drop-in liquid transport fuels

at existing oil refineries, bringing the benefits of economy of scale to the overall process. In addition, the novel gasification technology will enable the use of wider feedstock basis.

Biomass residues to Fischer-Tropsch products

In COMSYN project, the production of biofuel by gasification of biomass residues was successfully validated in two 80 hours tests campaigns in 2019. The focus was to study and verify the performance of the gas cleaning train, and especially the entire synthesis process, with real wood-derived gasification gas. Crushed bark was gasified in a fluidized-bed gasifier, the raw gasification gas was filtered with advanced metal filters of GKN.

Tars, and light hydrocarbon gases were reformed using the staged reformer concept developed by VTT. Final cleaning of the reformed synthesis gas was realized through a robust sorbent-based cleaning process developed by VTT. The ultra-clean syngas was compressed and led to mobile synthesis unit, MOBSU, which utilizes the innovative compact FT-technology of INERATEC. Two products, the FT- wax and FT-oil streams, were collected (Fig.1) and refined to high-quality transport fuels by UniCRE, assisted by VTT. Based on the achieved results, industrial-scale plants in the range of 25000–50000 tn/a will be designed. Techno-economic and environmental assessments and business case studies will be also carried out by



Figure 1. Collecting FT-wax from the synthesis unit MOBSU. Crushed bark, FT liquid product and FT wax.

Latest results of COMSYN & FLEXCHX projects will be presented at Webinar
“Compact Gasification and Synthesis for Flexible Production of Transport
Fuels and Heat”
on 19 January 2021, 10:00-12:20 CET.

Registration is open at: https://www.lyyti.in/comsyn_flexchx



COMSYN is a 4-year (2017-2021) EU Horizon 2020 project under grant agreement No 727476. The project consortium: VTT, coordinator (Finland), DLR (Germany), UniCRE (Czech Republic), INERATEC (Germany), Wood (Italy), GKN Sinter Metals Filters GmbH (Germany) and AFRY (Finland). <https://www.comsynproject.eu/>

Mobility as a Service – Wind of Change for Urban Mobility

By Piia Karjalainen, MaaS Alliance

The mobility sector has been strongly hit by the COVID-19 crisis with dramatic societal and economic impacts. During the lockdown periods the transport demand in almost all

affected countries has gone down drastically and then in the phase of gradual de-confinement, cities and transport operators face new challenges in matching demand, capacity and space needs while

trying to comply with the social distancing requirements. The long-term impacts and their gravity are still difficult to predict; the most argued topics are the willingness of users to return to high capacity (high





50%
Vehicle-km
reduction
potential of
MaaS

30%
CO₂
reduction
potential of
MaaS



- by **2050** in scenario of **accelerated uptake of shared modes** combined with **public transport** and **strong regulation**.

Source: ITF Transport Outlook 2019

MaaS in transport decarbonisation tool kit

occupancy) mass transit systems and unforeseen consequences related to general economic uncertainties.

What is clear though, is that after this pandemic our world will need comfortable and smart mobility solutions more than ever before. Mobility as a Service (MaaS), which offers a mobility “one-stop-shop” for the user via smart phone app, can understand and match the demand and available supply based on the personal preferences of the users and the prevailing circumstances. Providing users with various public, private and shared mobility options and an optimised offering for every single journey with a good real-time information about safety and security measures at place, MaaS can be a valuable asset in re-building user’s trust in public and shared mobility services.

MaaS has the potential to be the positive game changer in our everyday mobility. MaaS cannot only help our societies by making transport system more integrated

and resilient, but it also has a great potential in making cities less polluted, less congested and more liveable. This potential was also acknowledged by the EU Green Deal presented last year. Expected environmental benefits have been also one of the reasons for strong buy-in from politicians and decision-makers; opposite to many other policy measures, like congestion charges, road tolls, taxation and urban vehicle access restrictions that mainly offer stick instead of carrots to the users, MaaS brings new services and perception of freedom and control of your own mobility. With an enabling push from the regulators we can make this European digital mobility innovation to deliver in wide-scale making our transport system more sustainable (with reduced emissions) and efficient (by optimising resources and operations of transport system), but also more resilient and agile for possible forthcoming crisis and disruptions.

So, in practise, what should be done?

By encouraging more sustainable mobility mix:

- From single-occupancy to shared vehicles / rides
- Better information on active mobility options
- Making multimodal combined trips more predictable, easy and attractive
- Providing better info & access to tourist, to public transport networks, and services



By making transport network operations more efficient:



- Less vehicles – less urban space needed for vehicles – less traffic & congestions related to search of the parking space
- “Fleet effects” (B2B market): Easier to implement measures through agreement with fleet operators
- Data gathered by MaaS app used for predictive traffic management services and network and capacity management

Mechanisms on how MaaS change the world

Public transport is the backbone of European MaaS model. The most efficient public transport systems benefit from the idea of complementarity of services where the mass transit solutions are complemented by various shared and on-demand services. When allocating stimulus funding, digitalisation of public transport ticketing and payments systems would be high-value investments, improving also their readiness to be combined with other services.

For Mobility as a Service, open data policies accompanied by appropriate platform regulations that ensure access to market, fair competition and a wider choice for the consumer are the first building blocks. With the ITS Directive and other initiatives such as the Data Strategy, the European Union has already taken steps in the right direction. Eventually the success of data policies will depend on how well the interest of data providers and data users can be aligned; in that regard there is still a need for a creation of new incentive models and data sharing schemes to create a dynamic and fair data economy.

However, open data alone is not enough. A further development of MaaS-market requires a non-discriminatory access to essentials assets and services, such as public transport. The public transport ticket resale should be enabled for MaaS platforms that are acting as intermediaries. This is particularly important when the transport service provider is in a dominant market position at local, regional or national level providing essential services, such as services to regional or national railway networks or public transport services within a city or a region, that establish a high-capacity core service for a certain area or corridor.

While elsewhere in platform economy, it is typically the platform that benefits from a stronger bargaining position than the underlying service providers, in the Mobility as a Service business, the situation is rather the opposite, due to the characteristics of the transport services market. A digital platform can be a tool that adds transparency and market dynamics and facilitates freedom of choice for users. Thus, when analysing the

platforms from a MaaS point of view, in the context of the ITS Directive and the Digital Services Act, one of the main questions is how to regulate platforms so that they mitigate rather than amplify the monopolized characteristics of the transport service market itself.

In the current development phase of MaaS, the regulation is, first and foremost, a tool to build trust within the industry stakeholders, setting a clear framework facilitating the development of the industry and creating a predictable environment for the investments both for public and private sector. In addition, an important task of regulation, especially at EU level, is to decrease the market fragmentation and support the development of scalable services beyond isolated city islands. Although people mostly move and operate within one city or region, covering only one area is not enough to fulfil all their mobility needs. Seamless MaaS services support the accomplishment the European vision of a single European Transport Area and the free flow of people and goods also across borders. ●

sailing on the LNG era

Poseidon Med II sets the LNG pathway for the Eastern Mediterranean decarbonized future

Poseidon Med II is a key European project co-funded through the Connecting Europe Facility (CEF) aiming to accelerate the adoption of LNG (liquefied natural gas) in the Eastern Mediterranean marine transportation. Poseidon Med II encompasses all the technical, regulatory, operational, and financial parameters to establish a viable, efficient, and sustainable supply chain in the region, unlocking the necessary investments for the establishment of the small scale LNG (ssLNG) infrastructure in the area.

Under increased pressure to follow a greener “pathway” towards a decarbonized future, the shipping industry needs to turn climate change targets into tangible action. LNG as marine fuel can reduce GHG emissions, thus improving air quality at ports, while paving the way to an environmental neutral shipping with the use of liquefied biomethane (LBM) and liquefied synthetic methane (LSM).

The increasing numbers of the LNG fueled vessels and LNG bunkering vessels (the latter expected to rise from seven operating in the EU to almost fifteen vessels by the end of 2021), testify to the growing recognition of LNG environmental benefits as a marine fuel. These investments along with the expansion of the shoreside LNG infrastructure, provide the critical last-mile delivery of LNG to ships.

In 2020 the Greek Ministry of Maritime Affairs gave the “green” light to the Port of Piraeus to start LNG bunkering operations, either from ship-to-ship or truck-to-ship in specific locations inside the port area, whenever the necessary investments are in place.

Since Revithoussa LNG Terminal has a key role as the “logistical spring

board” of the ssLNG supply chain in the wider region, investments on small scale facilities on the terminal are underway. A truck loading station, for bunkering and off grid consumers’ supply, is currently under construction and will be operational by Dec 2021. Moreover, the basic engineering design of a new ssLNG jetty has been completed. The facility will accommodate vessels from 1.000m³ to 20.000m³ and is expected to be operational by Sep 2022.

Capitalizing on these achievements, an LNG bunkering vessel registered at the Piraeus Port, loading LNG from the nearby Revithoussa Terminal, will be operational by 2022.

Moreover, licensing procedures of the small-scale LNG facilities at the peripheral Ports of Patras and Igoumenitsa have passed to their 2nd phase regarding approval of the final environmental impact assessments by the responsible Ministries, while the approval of the updated Master Plan of the port of Heraklion is expected.

In Cyprus, PMII is financing the studies for the construction of a permanent berth for the docking of LNG bunkering vessels, opposite to the jetty for the FSRU berthing in Vassilikos area.

Furthermore, with shipping companies investing on assets that bring them in alignment with the IMO and EU environmental targets, PMII is once again pioneering by supporting the design studies for the retrofitting of ten conventional fueled vessels to LNG powered vessels. Additionally Cost Benefit Analyses have been performed for all Ports and the ten selected vessels.

At the same time, the construction of an innovative Semi Ballastable Barge



Transporter (SBBT) has been launched in Italy (scheduled for delivery in 2021), which will operate in the Mediterranean and the Adriatic Sea.

On the regulatory framework, the “umbrella” legislation regulating the safety of the LNG bunkering operations at the Greek Ports has been published last year in the Government Gazette (Presidential Decree 64/2019). Additionally, PMII has drafted a Practical Guide to Port Authorities on how to maintain safety during LNG bunkering operations.

In order to establish an economically viable supply chain, PMII financed a number of studies assessing the LNG bunkering logistics’ cost, as well as synergies with other sectors, such as supply with natural gas the industrial and/or the urban network of Western Greece (Patras & Igoumenitsa) and Vassilikos (Cyprus).

Poseidon Med II, has already laid the foundations for LNG bunkering in Eastern Mediterranean, setting the example for a cleaner, more effective, competitive and sustainable marine transportation towards a zero-carbon future. With Poseidon Med II Eastern Mediterranean is sailing into the LNG era.

poseidonmedii.eu



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Urgent action needed to implement European Hydrogen Strategy

By Martin Lambert, Senior Research Fellow, The Oxford Institute for Energy Studies

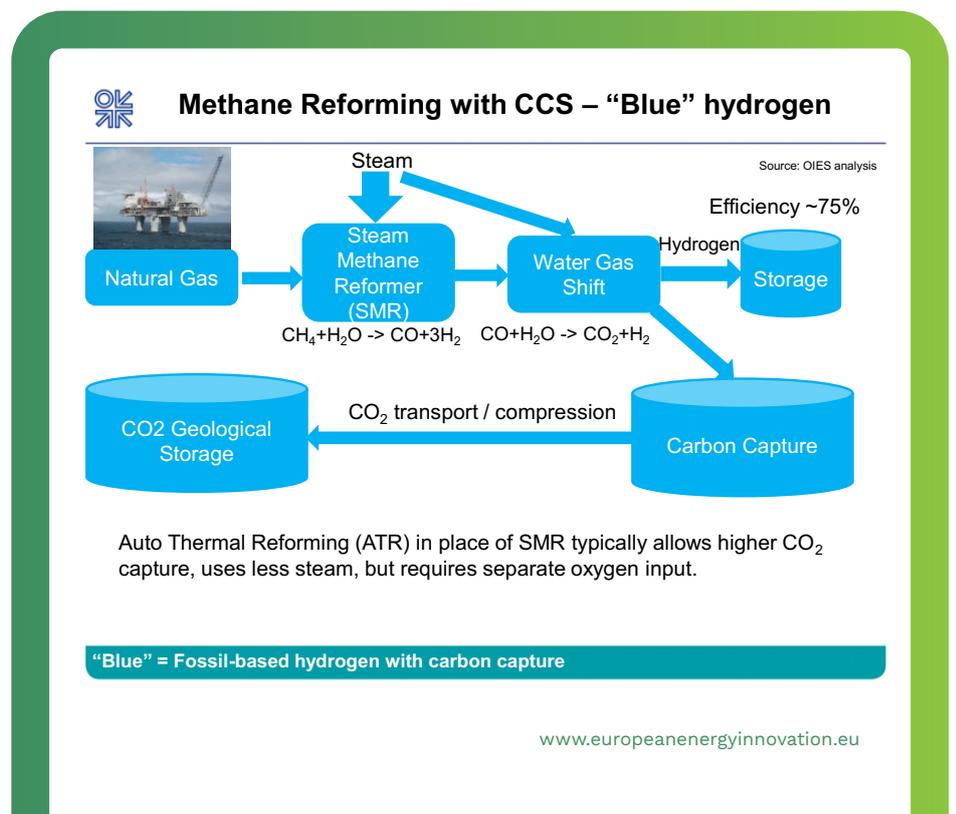


In July 2020, the European Commission published its landmark Hydrogen Strategy, together with its closely related Energy System Integration Strategy. Both documents represent an important step forward on the journey towards “net zero” emissions across Europe (and hopefully more widely across the globe) by 2050. The hydrogen strategy sets a bold vision of achieving 40GW of electrolyser capacity in Europe by 2030, and a further 40GW of capacity able to be supplied to Europe as hydrogen imports. To focus actions in the near term, it sets perhaps an even bolder target of having 6GW of capacity onstream by 2024. The strategy is strong on ambition, but light on implementation plans, so the challenge now is to set in train concrete steps to commit to the required investments.

To provide context for the scale of the ambition, it should be noted that the largest electrolyser currently under construction in Europe is 10MW, being built at Shell’s Rheinland refinery in Germany at a cost of around €20 million. The 6GW target would require 600 such projects to be operational by 2024. At this stage, there are a handful of projects up to 100MW under development (for example Gigastack in the UK, and Westküste 100, Element Eins and Hybridge in Germany), but none has yet reached a final investment decision. With an approximately 2 year construction period, any project to be in production by 2024 will need to have started construction two years from now at the very latest. There are also plans for GW-scale hydrogen

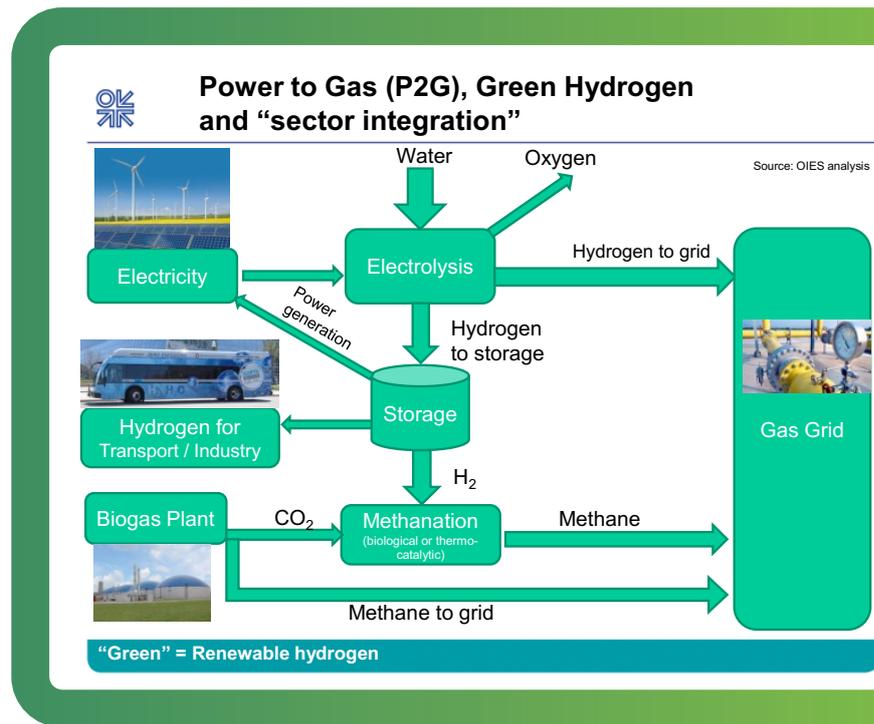
production, notably the NorthH2 project using a dedicated windfarm to be built offshore the Netherlands, but even on current planning that is not expected to be onstream until 2027.

It is, however, important that a way is found to realise the ambitious targets, to be on track towards meeting the “net zero” objective. The 40GW target for 2030 (assuming around 4000 running hours per year – which some may view as optimistic) equates to hydrogen production equivalent in energy terms to around 12-15 billion cubic metres (bcm) of natural gas. By comparison, in 2030 total natural gas demand in Europe is estimated to still be in the order of 400bcm, whereas unabated natural gas will need to be nearly zero by 2050.



Given the current production costs and lack of a commercial business case for investors, the EU strategy recognises that government-backed support schemes will be required for some time. In particular, it suggests that Carbon Contracts for Difference and competitive tenders for market-based support schemes will be implemented. Some tenders and commitments of support are now starting. For example, in August the Westküste 100 project announced that it had received €30 million funding approval from the German Ministry of Economic Affairs and Energy. In October 2020, the EU and France both opened submissions for hydrogen project tenders. Hopefully, the coming months will see a significant acceleration in the announcement of such schemes.

The undoubted long-term objective of the EU strategy is the establishment of large-scale hydrogen production by electrolysis using renewable electricity. Given some of the cost and scale up challenges indicated above, it was pleasing that the strategy also recognised a role “in the short and medium term” for other forms of low-carbon hydrogen, presumably from methane reforming with carbon capture and storage (CCS). This is entirely logical, since nearly all of Europe’s current hydrogen production, around 10 million tonnes (roughly 350 TWh or 30 bcm of natural gas equivalent) is derived from methane reforming. In the production process around 100 million tonnes of CO₂ is emitted, so addition of CCS to some of that production will be a key step towards meeting carbon budgets. In many European countries, CCS faces significant challenges around societal acceptance. Norway and the UK are the most likely locations for early deployment of CCS, which would enable production of low-carbon hydrogen. In Norway, the Northern Lights project has been approved by commercial partners (Shell, Equinor,



Total) but is dependent on approval by the Norwegian government which is expected to fund around 2/3 of the total €2.5 billion cost. In the UK, the industrial clusters of Merseyside, Teesside and Humberside are all developing plans for CCS projects and the government has committed £800million to support two projects, although plans to allocate the money have not yet been confirmed.

These challenges around scaling up significant low carbon hydrogen production are without doubt the priority area to be addressed in the near term. There are many potential applications cited for renewable hydrogen (existing industrial applications, new applications like steel making, trucks, rail, inland waterways, maritime, aviation and other transport modes, electricity

balancing, heat for residential and commercial buildings, blending in the natural gas network). Some of these applications are more likely to make economic sense than others, but discussion of that is beyond the scope of this short article. Suffice it to say that focussing on decarbonising existing industrial uses of hydrogen, with expanded use perhaps for steel making and electricity grid balancing developing around such industrial clusters, will drive the hydrogen industry for at least the next 10 years. In the longer term, pan-European hydrogen networks and hydrogen imports may start to emerge, but these will add additional complexity and challenge. Addressing the current priorities, in order to meet the ambitious scale up targets by 2030, will already be challenging enough! ●

Martin Lambert is a Senior Research Fellow at the Oxford Institute for Energy Studies (OIES), an independent think tank researching and advising on the future of energy. He has published several papers on decarbonisation of gas, including the potential for hydrogen. This article is based on a paper “EU Hydrogen Strategy, A case for urgent action towards implementation” published in July 2020. All OIES papers can be found at www.oxfordenergy.org.

The influence of energy policies on the development of geothermal energy in Europe

Dr Vipin Pillai, TWI Ltd, Cambridge, UK

The Horizon 2020 project S4CE implements technologies needed for successfully identifying and managing the risks associated with sub-surface geothermal operations such as emissions, micro-seismic events, enhanced gas recovery and carbon sequestration. Within the S4CE project, a thorough study is carried out to determine the influence of energy policies on the development of geothermal energy in Europe. It is observed that policies and incentives introduced to encourage investment in geothermal specifically have met with varying degrees of success e.g. many have ignored the major commercial risks in the exploration and drilling phases in favour of supporting the operational phase of a project. Latterly, this has been corrected with policy instruments such as loan guarantees and drilling failure insurance exerting a more positive influence. However, concerns persist about the administrative efficiency of permitting, licencing etc.

In the European context and as a clean technology, geothermal energy falls within the ambit of the EU energy policy. During 2019 and 2020, the EU has signalled its intent to become a net-zero bloc by 2050 by launching several large strategic initiatives intended to decarbonise all aspects of life. The 2020 pandemic has accelerated the implementation

of these measures, with the EU seeing decarbonisation as the means not only of economic recovery, but also of sustainable growth thereafter.

The European Green Deal and European Green Deal Investment Plan (EGDIP) have the potential to be transformative for the geothermal industry. A positive indication of this is the approval this month of a €150M investment in Romania to construct or upgrade a series of district heating generation and distribution systems to be powered by renewables, including geothermal.

In parallel, the European Geothermal Energy Council (EGEC) has launched its 'Geothermal Decade' initiative which aims to facilitate the rapid expansion of geothermal growth over the next ten years. EGEC's Secretary General, Phillipe Dumas, recently highlighted four other funds linked to the Green New Deal that geothermal is suited to: Clean Energy for EU Islands, Coal Region Transition, Just Transition Fund, and the Innovation Fund.

As well as direct development funding of geothermal programmes, policy interventions to reform European wholesale energy markets are being called for. The geothermal industry via the EGEC and others is growing increasingly vociferous in

its criticism of the European Green Deal for allegedly disregarding the decarbonisation of heating and cooling (a geothermal strength) as well as electricity generation.

Heating and cooling is claimed to represent 50% of the total energy demand in the EU and is produced largely by gas-fired power plants. Phillipe Dumas called recently for the creation of a competitive and transparent European wholesale heat market. This would replace the current gas market with its perceived 'direct and indirect subsidies' that impede the development of geothermal as a viable renewable generation technology. EGEC believes that gas is unduly favoured in other areas of EU energy policy too, such as the EU's Hydrogen Strategy with its perceived reliance on 'blue' hydrogen (i.e. derived from methane) as an interim technology while 'green' hydrogen scales up.

The influence of energy policies should be seen in light of the effect of pandemic as well. The S4CE study observed that Covid-19 has had a limited and short-term effect on geothermal energy with neither operations nor new build significantly affected. This is in common with the whole renewable sector. The pandemic notwithstanding, geothermal is set to grow by 7% by



The half-day webinar event on

"Geo-Energy Operations - opportunities and challenges"

by TWI Ltd. on December 16, 2020, features an interesting program and great line up of speakers.

2022, with most growth seen outside the EU. Significant growth within the EU is inhibited less by Covid and more by challenges concerning project risk, and operational efficiency and flexibility. The firm direction the EU has set out on in pursuit of a net zero bloc by 2050 presents opportunities that could advance geothermal significantly. The study recommends that reform of wholesale markets to accommodate renewables may be needed to realise geothermal's potential. ●



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Developing a global green hydrogen market

An agenda for international cooperation

Why hydrogen?

Hydrogen is currently at the centre of the political and business discourse as a key pillar for decarbonisation strategies. Following the approval of the Paris agreement and the development of nationally determined contributions (NDCs), it started to appear clear that scaling up existing solutions and energy carriers will go a long way towards a decarbonised energy system. However, not far enough to achieve full decarbonisation.

Electricity currently represents ca. 20% of final energy consumption. The rapid increase in electrification to ca. 50% of the energy consumption will also deliver significant efficiency gains. For instance, heat pumps and electric vehicles are at least three times more efficient than the technologies they replace, and they can be powered by renewable electricity.

For sectors where direct electrification is challenging – like, among others, chemical industry, iron and steel, shipping and aviation – bioenergy has been so far the main renewable solution. However, although significant, sustainable bioenergy potential is limited.

Hydrogen from renewable energy (green hydrogen) can be complementary to electrification with renewables and bioenergy in achieving a fully decarbonised energy sector in the coming two to three decades.

Why green hydrogen is so important?

Hydrogen from renewables, also known as green hydrogen, is the only zero-emission option

compatible with full decarbonisation. Other low carbon options, like blue and turquoise hydrogen, are potentially important, but ultimately incompatible with a zero-emission energy sector, therefore they have a role to play in the energy transition as long as they do not lead to long term emissions lock-in. To this end, and to enable a liquid global market, standards and certification of emission intensity of hydrogen will be a fundamental piece of the regulatory puzzle, especially as long as green hydrogen remains more costly than fossil-based alternatives.

Hydrogen production from renewable electricity is part of a holistic system integration strategy, where low-cost renewable electricity is used not only to electrify larger shares of demand but also produce fuels that can then be transported and used where direct electricity use is not a viable option. By coupling the power sector to the gas sector, green hydrogen also calls for closer cross-sectoral energy market integration.

Green hydrogen can provide significant flexibility to the power sector through the production and storage of gas and hydrogen-produced fuels and commodities while enabling the further deployment of the most abundant and cost-effective renewable resources – solar and wind. Green hydrogen storage is the only large-scale technology option for long term storage of renewable energy. Although its efficiency as an energy storage solution is among the lowest, green hydrogen for power generation has a role to play in power systems with very high shares of variable renewable generation or high seasonality, both of which are the case in Europe.

By Emanuele Taibi,
International Renewable
Energy Agency (IRENA)

Producing competitive green hydrogen: scaling-up low-cost renewable electricity and electrolysis

Bringing down green hydrogen cost from current levels of 3-8 USD/kg to 1-2 USD/kg requires cost reduction for both renewable electricity generation and for the electrolyzers needed to transform green electricity into green hydrogen.

Renewable electricity costs for the best solar PV and wind projects around the world are already compatible with the production of competitive green hydrogen, as a result of the rapid decline of renewable energy costs over the last decade.

Solar and wind power generation have already experienced a rapid scale-up and cost reduction, moving from marginal resources in need for subsidies to representing the majority of new capacity additions for several years in a row, as well as the cheapest sources of electricity globally.

The situation for electrolyzers is quite different. To achieve competitive green hydrogen at a pace compatible with decarbonisation strategies we need to increase electrolyser manufacturing capacity from around ca 0.2 gigawatts (GW) in 2020 to thousands of GW by 2050.

IRENA, at the request of its member countries, just prepared a report on “Green Hydrogen Cost Reduction: Scaling up Electrolyzers to Meet the 1.5°C Climate Goal”, which focuses on strategies for getting the necessary rapid increase in electrolyzers manufacturing capacity, while reducing costs and increasing performance at once.

Recent policy developments in Europe

The European Commission released its Hydrogen strategy, together with its related energy system integration strategy, on 8 July 2020. This has been thoroughly presented in the autumn 2020 issue of this magazine by Paula Abreu Marques. In the strategy, it is clear that a target for electrolyser was set both to accelerate the necessary scale-up of this fundamental component, as well as to further enhance the strategic technological leadership of European manufacturers in this area. It is also clear that Europe will need to import green hydrogen from other regions to meet its decarbonisation objectives.

In June IRENA established a collaborative framework on green hydrogen, with the European Commission and Morocco nominated as co-chairs for the first year, which acts as a global platform for public-private dialogue among the 160+ Member countries of IRENA and the private sector. International cooperation will be key for the successful establishment of a global market for green hydrogen.

In the last year alone, many other countries released hydrogen-related policies, either as part of a broader set of measures or as dedicated documents. Some countries focus more on the utilisation of hydrogen, others on the production – with an eye to export. For an overview, IRENA released in November a report entitled “Green hydrogen: A guide to policymaking”.

Trading of competitive green hydrogen and the role of the EU: building the foundations for a global market

The year 2020 has been a disruptive one. Not only because of the unprecedented health crisis and the associated economic downturn but also because of the large number of countries announcing green deals and carbon neutrality objectives. Compounding recovery packages with decarbonisation policies can

provide renewed impetus to the energy transition and accelerate its implementation. Vast public resources from recovery packages, if leveraged to accelerate decarbonisation, could mobilize even larger private investments; however, this will not void the need to have the regulatory frameworks in place to provide certainty for such private investments to take place. In the EU, 37% of the recovery funds are already being allocated for the energy transition, with more elements of the regulatory framework being shaped in 2021.

Hydrogen has an explicit role in many of these policies and regulations. However, there are important elements that need to be put in place for the necessary investments in green hydrogen to happen. Two key elements that can enhance the chances of success for green hydrogen, that require the attention of EU policymakers and legislators in 2021:

- **EU Carbon Border Adjustment Mechanism (CBAM).** In 2021, the European Commission will propose draft legislation, to have it operational at the beginning of 2023. This is key not only to avoid carbon leakage but to “tip the scale” in key commodities and goods exporting countries towards green hydrogen. In particular, to shift from current high-carbon hydrogen production to green hydrogen in hard to decarbonise sectors. How such a mechanism will be established will define its effectiveness in driving decarbonisation well beyond Europe, with a potentially global impact on decarbonisation without precedents.
- **Guarantees of Origin for green hydrogen.** Such mechanisms have been developed for green electricity and consensus is building around these becoming a necessary element for the establishment of a liquid global hydrogen market. In such a global market, it is paramount that green hydrogen can be distinguished from fossil-based alternatives

to create the necessary trust from the consumers. Especially if prospective buyers are seeking to source green hydrogen for pursuing decarbonisation objectives, where the carbon intensity of the hydrogen they purchase will have an impact on the national accounting of emissions. Although guarantees of origin for green hydrogen are already more complex than those for electricity (that is, as they build on green electricity and expand the scope), the complexity further increases when such guarantees have to be applied to hydrogen-derived fuels and energy-intensive commodities like metals and plastics, or to food grown using fertilisers produced from green ammonia. This certification can potentially be extended all the way to blueberries (i.e. hydrogen derivatives can increase their yield), as highlighted by the government of Chile in a discussion on standards and certification for green hydrogen on 1 December during the World PtX summit hosted by Morocco. This session was organised by IRENA as part of the collaborative framework for green hydrogen. The discussion highlighted the delicate balance between the complexity of certifying all possible renewable energy vectors, as well as commodities, in a comprehensive framework covering production, transportation and consumption, while being practically implementable and capable of gaining consumers’ trust. Addressing these challenges and trying to find common ground on principles and practices across different regions and countries can be part of an agenda for international cooperation in the area of green hydrogen certification and set the foundations for the development of a global green hydrogen market. ●

CONTACT INFORMATION

Email: ETaibi@irena.org
<https://www.linkedin.com/in/emanuele-taibi/>

Fossil fuels have no place in a just transition to climate neutrality

By Katie Treadwell, Energy Policy Officer, WWF European Policy Office

When Franciszek Zastawnik was a young boy, the beating heart of his village in Rozbark, near Bytom in Poland, was the coal mine. The children's lives centred on the mine, their fathers working there as had their fathers before them. Miners were well paid and their families could live well, so there was no question in Mr Zastawnik's mind about his own career: he too went down the mine, and worked in that role for thirty years.

Today, however, the writing is on the wall for fossil fuels. The **devastating climate impacts** of coal, oil and gas are well known. **Investors and banks** are pulling out of traditional energy assets. The EU has pledged to get climate neutral by 2050 – NGOs like WWF say this should be reached even earlier, **by 2040**, to stand a chance of fighting climate change.

Coal mines and coal-fired power plants across Europe – including those in Bytom – are **closing down**. For Mr Zastawnik, this presents an opportunity.

“Underground mining has no future. But there is an army of people here [...] 30,000 people with technical knowledge. [...] When there is money from the European Union for green energy, it is necessary to use it.”

This opportunity is at the heart of a debate currently preoccupying decision makers. The EU institutions – the European Commission, Council and Parliament – are negotiating the rules for the EU 'Just Transition Fund', whose aim is to support high carbon regions in Europe as they move to a diversified, climate-neutral and sustainable economy.

The amount of money proposed, €17.5 billion, is not enormous: the new EU recovery and resilience facility, for example, is €672 billion. Yet how the Just Transition Fund is used, and what it is allowed to finance, is hugely important.

One reason is because of what it sets a 'just transition' out to be. If the EU allows fossil gas projects to be supported through the Fund – which is the most contentious issue being fought over – it would imply that the EU considers fossil fuels compatible with a socially fair transition to net zero greenhouse gas emissions. For WWF, this would be a falsehood: no fossil fuel can be part of a climate neutral Europe so it makes no sense to invest in them when viable alternatives abound.

What's more, decisions on what will be excluded from – and eligible for – the Just Transition Fund will have a wider impact. They are likely to be applied to the other tools the EU will use to support just transition: the 'InvestEU' guarantee and a public loan arm, together expected to leverage up to €65 billion. So including fossil fuels in one would risk their being included in all three branches.

Finally, the Just Transition Fund will impact future investment choices in Europe's regions. It will contain a rule-book for the just transition plans that local authorities across Europe will need to draw up to obtain funding. So establishing a rule-book that ensures plans are compatible with EU climate targets is crucial. In WWF's view they should also adhere to the principle to 'Do No Significant Harm', which EU Council President Charles Michel wants to see applied to the whole EU budget and recovery package – a position supported by WWF.

For WWF, the best way to implement the 'do no harm' principle is through the EU's forthcoming system for classifying which sectors are sustainable, the taxonomy.

While excluding fossil fuels from the Just Transition Fund may seem obvious, the gas lobby has been hard at work to get its hands on a piece of the pie, and some of its efforts have paid off. While the EU Council – made up of Member State governments – excluded

gas from the Fund, the Parliament – made up of directly elected MEPs – failed to do so.

Undermining their official declaration of a ‘climate emergency’ earlier this year, MEPs adopted a position which would allow the Just Transition Fund to support new fossil gas projects, despite the fact that these would both undermine a just transition and effective climate action.

A group of MEPs is actively supporting the gas industry’s claims that gas is a ‘bridge’ fuel to climate neutrality. A group of 51 MEPs recently wrote a letter calling for gas to be included as ‘sustainable’ in the EU Taxonomy itself.

Their arguments are fallacious. Gas is clearly a polluting fuel which makes **no contribution** to achieving climate neutrality but rather undermines it. **No new gas is needed** to meet EU energy demand. Not only do the EU Council, Commission and Committee of the Regions officially oppose fossil fuels in the Just Transition Fund, but also groups of **organisations representing civil society** and the **electrification sector** have all

expressed the need to exclude coal, oil and gas and increase renewables and energy efficiency instead in recent letters.

What’s more, if the point of the Just Transition Fund is to ensure a socially fair transition, why use it to finance a sector which does not really provide many jobs? **Compared to gas**, renewable energy investments are highly job intensive, and what’s more those jobs are in a sustainable sector with a bright future.

Currently, 50% of the money in the Just Transition Fund proposal will only be granted if that Member State commits to an EU target of climate neutrality by 2050 – all countries except Poland have already said they’ll implement it. This is good, but far from enough. Funding should be far more strongly conditional on higher ambition, so that countries planning to do more to 2030 are supported to make the transition. But so far the opposite is true: a recent report found that **nearly two-thirds of the Fund will go** to the five EU countries which do not plan to phase-out coal – the most heavily polluting fossil fuel – and to

two others who have set phase out dates long after 2030! This must be corrected.

Getting the Just Transition Fund right means excluding fossil fuels, and rewarding climate ambition. It also means ensuring that communities have a clear role – together with civil society, local governments and trade unions – in deciding how money is spent, as supported by a **statement signed by over 60 mayors from European coal regions**.

Getting the Just Transition Fund right will send a clear signal about the EU’s stated commitments to leave no-one behind in the transition and to address the climate emergency. It will set up clean, green investments at local and national levels for the years to come. It will set a precedent for other, bigger pots of EU money.

Getting it right will show former mining communities like that of Mr Zastawnik that they are not alone. That the skills honed over generations will be put to good use for future decent jobs in sustainable sectors. It will enable the EU to move as whole to climate-neutrality, leaving no-one behind. ●



The BAoBaB project: sustainable energy storage using salt and water

By Michele Tedesco, Wetsus, European Centre of Excellence for Sustainable Water Technology, The Netherlands

THE ENERGY STORAGE CHALLENGE

The need of energy storage for our society has drastically increased in the last years, due to a growing share of renewables (wind and solar) on electricity grids. Electrochemical energy storage has received increasing attention as an alternative storage system, and several battery technologies have been making rapid advances in the past years. However, despite all the R&D efforts, a new generation of innovative batteries is urgently needed, to provide safe and sustainable energy storage on large scale and ensure grid stability in the future.

CONCEPT

The aim of the BAoBaB project is to develop and demonstrate the first acid-base flow battery as a safe and environmentally friendly technology for centralized and decentralized energy storage. The technology is based on bipolar electro dialysis, i.e. a membrane process able to dissociate water and generate acid and base solutions. During the battery charge, electricity is used to generate acid and base from a salt solution. During discharge, the opposite process occurs, and electric energy can be harvested by the

controlled mixing of acid and base in the battery. As a result, the acid-base flow battery technology allows to store electric energy using only salt and water, thus providing a safe and sustainable energy storage system. The technology has already been demonstrated at laboratory scale, and the first demonstration at pilot scale is currently ongoing.

EXPECTED IMPACT

- Bring to the market a scalable and flexible energy storage system at kWh-MWh scale
- Enlarge the portfolio of available energy storage systems for centralized and decentralized applications (e.g. island grids)

THE BAoBaB PROJECT

The BAoBaB project is a H2020 collaborative project gathering 6 partners from 3 different EU countries. In the past four years, the BAoBaB partners have been focusing their R&D efforts on several aspects, including development of novel battery components (monopolar/bipolar membranes), process modeling, life cycle assessment, battery optimization at laboratory scale, stack design and scale up.



DEMONSTRATION SITES

The final goal of the BAoBaB project is to demonstrate the acid-base flow battery technology in relevant environment (TRL 5-6). Last months a first pilot-scale demonstration plant with a target capacity of 1 kW/7 kWh has been built by AquaBattery. The pilot has been recently installed in Pantelleria (a small Italian island in the Mediterranean Sea), and will be tested in the upcoming months as energy storage system at the local power plant, to provide seasonal storage during high energy demand in summer months. An important milestone in the scale-up of the technology, and in the path towards sustainable energy storage. ●

CONTACT INFORMATION

Project Coordinator: Dr. Michele Tedesco, Wetsus

Website: www.baobabproject.eu

Email: Baobab.Project@wetsus.nl

Project partners: Wetsus, AquaBattery BV, Fujifilm Manufacturing Europe BV, Università degli Studi di Palermo, Fundación CIRCE, SMEDE SpA.



The BAoBaB project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 731187.

Methane emissions reduction

By Andris Piebalgs, Part-time Professor, Florence School of Regulation and Maria Olczak, Research Associate, Florence School of Regulation

What role for the equivalency agreements in the methane emissions reduction?

Methane emissions are very much dependent on the fossil fuel value chain. That means that production, use and trade of fossil fuel - oil, natural gas and coal - can greatly impact CO₂ emissions and efforts to mitigate them.

Hence, in order to substantially diminish greenhouse gas (GHG) emissions from the fossil fuel value chain, a robust and transparent accountability system needs to be established. Here is a telling example of how such a system could be put in place.

Recently, Singapore's biggest buyer of liquefied natural gas (LNG), Pavilion Energy, has asked all sellers to quantify the GHG emissions associated with each cargo produced, transported and imported into Singapore. Although the move represents an effort to make the sector greener, the challenge remains, internationally and across the entire supply chain, to estimate the level of credibility of these declarations, as the regulatory approaches to methane emissions quantification and reporting differ greatly between countries and jurisdictions.

Let's take the European case. The EU is one of the biggest consumers

and - at the same time - importers of fossil fuels. In the past few years, 95% of oil and 83% of gas consumed in the EU was imported¹. As the European Commission rolls out its new Strategy to reduce methane emissions², it is likely that the European Union will become a major advocate for transparency in the emitted methane declarations.

This EU strategy has also an external dimension that could pave the way for the introduction of stricter climate targets.

By committing to stricter rules, the European Union could, in fact, very well stimulate more substantial



reductions of methane emissions internationally. One way to achieve this would be for the EU to leverage its role as the world's largest natural gas and oil importer and set a methane-intensity performance standard on natural gas imported to the Union. The idea received support from some of the major oil and gas companies. Yet, the performance standard in itself is not sufficient.

Firstly, such a system requires a credible transparency framework including monitoring, reporting and verification of emissions. Secondly, the performance standards imposed on the entire natural gas value chain will need to be harmonised across several states.

Therefore, to tackle the issue of methane emissions would require a new, pervasive policy toolbox that is flexible enough to take into consideration the fast evolving science and technology to detect and mitigate emissions. The EU in particular would need a specific regulatory mechanism to align the different reporting practices in energy supplier and buyer countries. Such a mechanism could be modelled after the so called "equivalency instruments".

In essence, an equivalency agreement is an instrument that allows the recognition of regulatory standards used in different jurisdictions. A similar logic applies to equivalency arrangements – special trade agreements, which determine if standards, regulations or procedures concerning the imported organic products, achieve consistent outcomes³.

A good example is the equivalency

agreements that have been introduced in the Canadian Environmental Protection Act (CEPA), which enables the exemption of subnational government (provincial, territorial or Indigenous) from federal regulations⁴. The exemption can be granted only if an equivalent provision is already in force in the jurisdiction in question. The equivalency does not mean that the provisions must be identical, they need to "...serve the same purpose and have the same effect"⁵. The most recent example of equivalency agreements are agreements negotiated between Canada's federal government and the governments of British Columbia, Saaskatchewan and Alberta concerning methane regulations⁶.

The equivalency agreements help to achieve a high-standard by keeping a flexible approach towards regulatory elements. This approach will provide for the necessary credibility in the declarations of the operators and will not interfere in the national sovereignty regarding regulatory models. To guarantee a regular review of these agreements there should be a clause of termination after a fixed time (5-10 years).

As of today, the EU has a rather stable fossil fuel supply chain. Russia, Norway, US, Algeria, Qatar are the EU's main suppliers of natural gas – the cleanest of fossil fuels. All of them have an interest in continuing to supply gas to the Union and all of them have some form of methane emissions regulation in place. In the course of possible negotiations of equivalency agreements, importer countries could agree on strengthening regulatory measures if necessary. The evolving standard Oil &

Gas Methane Partnership (OGMP) 2.0 Reporting Framework could serve as a benchmark.

All this considered, three elements are important moving forward. First, the definition of "equivalent" should be made clear and preferably quantifiable.

Second, in order to hold both parties (buyers and suppliers) accountable – the agreement should include an information-sharing mechanism and the reported data should be publicly available, ideally via an international methane emissions observatory - already suggested in the EU methane strategy.

Third, it is necessary to ensure that the data obtained thanks to the equivalency agreements guide the decision-making routines of both users (policy makers) and data providers (the companies).

All in all, with the new strategy, the EU clearly has the potential to be a pioneer in promoting equivalency agreements, and the responsibility to gather widespread consensus for the agreements.

This is because the use of performance standards and equivalency agreements could provide the transparency and accountability systems that states and institutions lack in their efforts to curb GHG emissions. The end result of these new agreements would be the strengthening of climate change measures globally and ultimately the substantial reduction of methane emissions which is single handedly responsible for at least 25% of today's global warming. ●

1 European Commission (2020) EU energy in figures.

2 COM (2020) 663 final.

3 For more information see: <<https://www.usda-eu.org>>.

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5 B. Plumtre, E. Flanagan, Using equivalency agreements to advance Canadian climate policy, Pembina institute, August 2017.

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Integrated Energy Solutions in the built environment

A NECESSITY FOR THE EU RENOVATION WAVE?

By Eise Spijker, Wytze van der Gaast, Ida Terluin (JIN Climate & Sustainability), Ludmiła Wach, Katarzyna Grecka, Andrzej Szajner (Baltic Energy Conservation Agency)

The European Commission launched the European Green Deal in 2019¹ to address the climate challenge, with an integrated policy package covering a range of sectors. For the built environment, the Renovation Wave² aims to accelerate improvement of the energy performance of 35 million buildings by 2030.

To achieve this, much emphasis is put on advancing technology integration by developing integrated and compatible technology packages for building renovations. However, a technology perspective alone is not enough. A good practice assessment³ performed by the EU funded RES4BUILD project on Integrated Energy Solutions (IES) reveals that accelerating the uptake of IES increasingly requires consideration of financial and social innovation to address non-technological barriers.

It was found that a robust IES solution needs solid technologies which become affordable thanks to accompanying financing and warranty plans (e.g. building-linked finance, lease/rent/subscription-based finance, energy performance contracting), and socially realistic with help of end-user engagement procedures and communication protocols before, during and after the renovation.

Barriers to implement and scale IES

D'oca, et al. (2018)⁴ conclude that *“Until now, deep renovation has often been approached as a technological challenge”* while *“social and financial barriers have been overlooked”*. They suggest that *“new approaches will probably need to integrate technical, financial, and social aspects from the beginning [...]”* Both literature and market experience offer insights on technical, financial, and social barriers to the upscaling of individual technologies (e.g. heat pump, solar PVT) and IES concepts in the built environment, as well as ways to overcome these barriers.

IES GOOD PRACTICE EXAMPLE (NL)

Homeowner association, “De Ellen” in Assen.

Technology: Dated (1965) four-floor, 28 single-family apartments building where high insulating, prefab façade panels, with electric HVAC system, result in residual energy demand of 25 kWh/m²/y.

Finance: A novel unique building-linked financing scheme (‘The Asser Servicekosten model’) was developed, resulting in a cost-of-ownership-neutral renovation. Homeowners now pay less for energy and maintenance and more to the association to pay off interest and loan (backed by guarantee fund of the Province of Drenthe).

Social: Learning-by-doing resulted in the development of robust protocols and procedures to communicate and engage with homeowners, before, during and after renovation (i.e. floor-specific communications and engagement manager).

IES GOOD PRACTICE LESSONS (PL)

Technology: A still too-high level of technology fragmentation is observed, often resulting in over dimensioning of energy systems. Technology integration is required.

Finance: Cost reduction potential and financial support are key drivers in IES decision making, highlighting a clear need for financial innovation (e.g. public-private co-funding, integrative subsidies).

Social: Early involvement of stakeholders (end-users) in plan development and financing is key for successful acceptance and implementation.

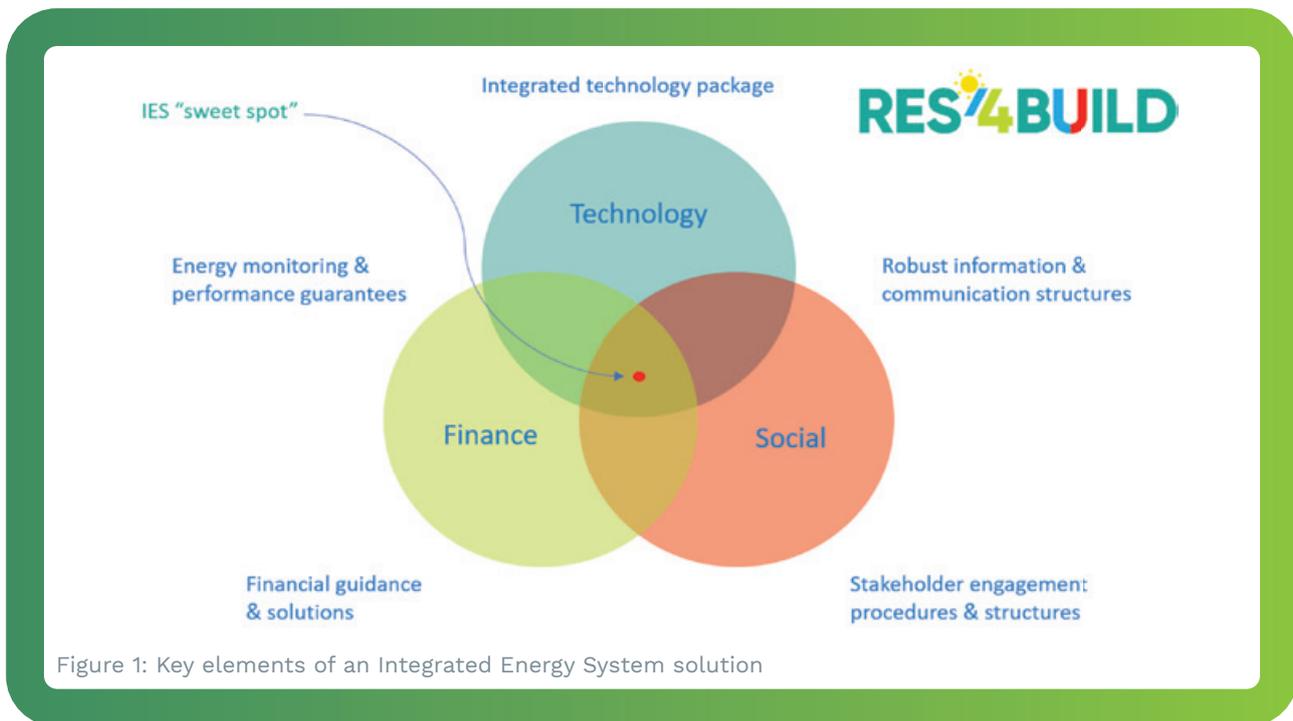


Figure 1: Key elements of an Integrated Energy System solution

Integrated Energy Solutions 2.0

An IES solution should thus be more than a turn-key technology package composed of a mixture of energy installation, insulation, and IT controller technologies. The RES4BUILD assessment highlights good practices in Poland and the Netherlands, and explores key elements of a robust, marketable, and scalable IES (Fig. 1).

Based on this assessment, a robust IES should:

- Be **an integrated turn-key technology package** that offers a guaranteed energy performance (performance contract); where a smart ICT system monitors i) the energy system and ii) end-user behavior, and where there are clear and simple lines for communication and engagement with stakeholders / end-users available before, during and after renovation.
- Provide **innovative finance solutions** to be developed

and offered jointly with an IES technology concept to allow for multi-stakeholder, collective or group finance that is sufficiently flexible to meet specific end-user needs and limitations (e.g. building-linked finance, rent/lease/subscription finance packages, hybrid finance).

- Ensure **early involvement of end-users** in the IES implementation process to improve acceptance and faster implementation of IES by establishing collaborations with new social structures, like local citizen initiatives, homeowner associations, and energy cooperatives.

The full report is available for download on the RES4BUILD project website (www.res4build.eu/results). As work progresses within the project, more results will be made available online – to stay up to date on the latest news follow RES4BUILD on social media (www.twitter.com/res4build). For more information on the report please contact Eise Spijker at eise@jin.ngo. ●



The RES4BUILD project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 814865. This output reflects only the author's view. The Innovation and Networks Executive Agency and the European Commission cannot be held responsible for any use that may be made of the information contained therein.

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Getting EU transport emissions back on track with energy efficient rail

By Libor Lochman, CER Executive Director and Ethem Pekin, CER Head of Economic Policy and Sustainability

According to the official EU statistics, more than half of the EU's energy needs relies on net imports. Transport, the single largest energy user, accounts for almost one third of the final energy consumption in the EU. Annual energy consumption of transport in the EU grew by 23% between 1990 and 2018 and generated 1.097 Mt tonne CO₂ equivalent greenhouse gas (GHG) emissions. This is more than the total GHG emissions in Germany, Europe's biggest emitter of CO₂.

To achieve the climate neutrality target set out in the EU Green Deal, energy supply decarbonisation should be complemented by demand-side measures. However the EU has failed to achieve its **2020 targets** due to the steadily growing transport GHG emissions.

This is hindering the EU's ability to lead the global fight against climate change. Reducing oil consumption for transport (oil-derived fuels account for 95 % of energy consumption in transport) remains a very challenging

but ultimately rewarding task for the European economy.

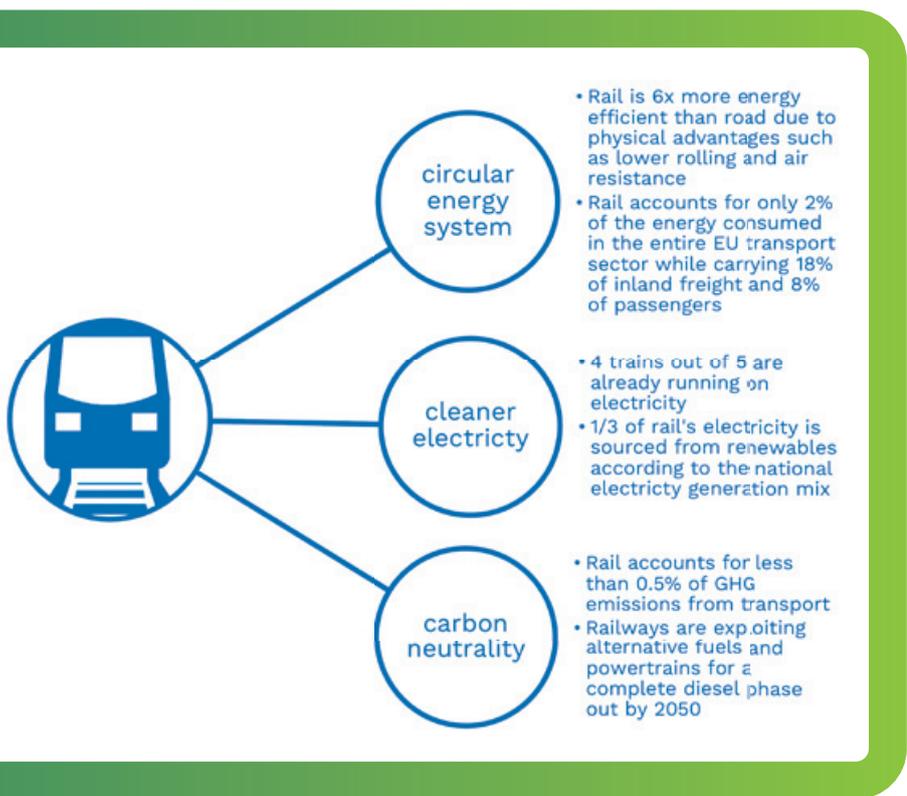
Under the current policies though, EU transport is likely to remain unsustainable. This is why the forthcoming Sustainable and Smart Mobility Strategy is essential to reverse the trend of transport GHG emissions and correct the EU's dependency on energy imports. Higher ambition is needed now, during the Coronavirus pandemic, and must be coupled with sustainable recovery measures.

Consequently all transport modes will have to contribute to EU Green Deal GHG reduction targets by increasing efforts to reduce energy use.

Energy-efficient rail is the workhorse of transport decarbonisation

There is no doubt that low-emission railways have a central role to play in mitigating the negative impact of climate change. Rail's well documented eco-friendliness is depicted in the figure below.

60% of the European rail network is already electrified and 80% of traffic is running on those lines. There are no technical obstacles to further electrification. Where economically justified, railway infrastructure managers upgrade, electrify and digitalise existing railway lines¹. Railway infrastructure is key to decarbonising transport and it is important to ensure that there are



sufficient investments in the EU and national budgets. In addition to the GHG emission savings, modern rail infrastructure also contributes to mitigating air and noise pollution in the cities.

When coupled with renewable energy, currently powering over 30% of electric trains, railway well-to-wheel GHG zero emission is achieved². Thus railways are already able to offer carbon-free train operations. To this end railways sign power purchase agreements and also invest in own generation by installing wind power and photovoltaics on the roofs of buildings and stations.

Railway undertakings are also continuously investing in modern energy-efficient rolling stock. New trains are procured and the existing fleets are modernised through reconditioning of technical components. With the aim of zero direct emissions in operations, alternative drives such as hydrogen and battery powered trains are also being deployed for the areas where electrification is not economically feasible.

Rail – the cleanest mode – is also resource-efficient and contributes to the circular economy. The durability and longer lifetime of rolling stock (up to 60 years) and railway infrastructure strengthens rail's sustainability.

The optimal way forward

The railway sector is ready to lead the way on climate action. However to accelerate the shift to sustainable and smart mobility, railways will require important investments in the coming decade as regards the infrastructure, the fleet and overall system capacity. In return railways

will improve their energy efficiency thanks to high levels of automation and energy efficiency programmes serving all actors of the railway market.

It is a fact that all transport modes are electrifying and improving their specific energy consumption. Nevertheless, despite the implementation of the CO₂ standards for road vehicles, only a 12.5% GHG reduction in transport by 2030 is achievable according to the Commission Impact Assessment on the EU Climate Target Plan. Furthermore, from a life cycle perspective, even the most efficient road vehicles will continue to cause problems of congestion and emit fine particles from tyres and brakes, a health concern for people living cities. This proves that rail will remain the most efficient solution for sustainable mobility.

The forthcoming transport strategy and the revision of EU legislation on climate and energy should therefore lead to the environmental impacts of transport modes being fully accounted for through smart pricing and taxation. This will enable railways to demonstrate their full potential in delivering the EU Green Deal within a long-term outlook based on climate

neutrality, resource efficiency and circularity. Such a green transition in transport will also be beneficial for sustainable economic growth. According to the E-mobility Platform, around 550 000 rail jobs might be created in Europe by 2030 with further development of railways. ●

Railways set example with commitment to the EU Green Deal

European railways have committed to reduce their CO₂ footprint according to the CER/UIC sustainable mobility targets. In order to achieve an absolute GHG emission reduction target of 30% by 2030 compared to 1990 levels and at the same time realise expected modal shift to rail, the sector carefully assesses its relative climate and energy performance (expressed in passenger-km and tonne-km) as the relevant indicator. According to the most recent data, in 2018 rail's specific energy consumption was reduced by 18% in the passenger sector and by 24% in the freight sector from a more ambitious baseline of 2005.

1 Switzerland's railway lines are 100% electrified, while Luxembourg (95%), Belgium (86%), the Netherlands, Sweden, Italy, Austria, Bulgaria, Spain, Poland and Portugal are all above 60%

2 For example since 2018 electric traction is from renewable energies in Austria, in the Netherlands electric trains are already running 100% on wind energy, Sweden 100% and in Switzerland 90% on hydropower.

Toolbox for energy efficiency in buildings

EFFECT4buildings project has published a toolbox with financial tools and instruments

Building manager is the key person in launching and completion of the entire energy efficiency project including maintenance. That person knows the building, communicates with the client, and schedules the repair works for the building. Manager is a specialist in multiple areas but needs good tools and accessories to simplify his or her work and enhance performance. Often, they have initial knowledge of various instruments, but lack operational experience and special knowledge in energy performance. That was the bottleneck solved in EFFECT4Buildings project.

The activities of EFFECT4Buildings project resulted in putting together a “toolbox” to help the manager in solving various bottlenecks encountered during the execution of energy efficiency project. Toolbox has its own guides that explains how and when to use different tools and how to combine them. The summary provides initial brief overview of the first things to consider and methods to use to achieve energy efficiency of a building without taking excessive financial risks.

In general, there are three groups of tools:

- Supportive tools, which are useful and help to produce desired results. This includes e.g. instructions of how to convince the decision-maker and obtain positive renovation decision, tool for financial calculations that shows how to calculate and present financial impact of the project, how to bundle different measures and to make it financially attractive, overview of funding instruments and schemes

(containing both domestic and cross-European financial sources). The tools in the package can be successfully used in various projects separately.

- Financial instruments include an improved implementation model for Energy performance contracting (EPC) with tender criterias, contract templates and step-by-step guidelines. With Multi service contracting, additional benefits to energy savings can be reached such as improved indoor climate. Other instruments are Guides for Green lease contracting and a thorough overview how to become prosumer i.e. how to produce and consume electricity in the same time.
- Technology solutions tool helps to navigate among various technological solutions available on the market. During project activities, various solutions and common practices were mapped. As an example, we carried out a pilot for energy monitoring by using control of technical building systems in and 24/7 diagnostics of a smart building. The results were excellent - AI (artificial intelligence) was significantly quicker and more accurate in detecting problems than an ordinary operator.

During the project, partners shared their experience, which made it possible to develop the existing financial instruments and improve their usability as well as find bottlenecks in different markets. Instruments were all practically usable and validated by several cases in participating countries.



All tools are very practical and ready for immediate use. The tools provide a practical guide as an overview and are supplemented with concrete tool elements such as guidelines, templates, contracts, training material, recommendations etc. ●

About EFFECT4buildings

Financed by EU Program Interreg Baltic Sea Region (European Regional Development Fund) and Norwegian Funding. The goal is to implement more energy efficiency measures in public buildings in the Baltic Sea Region. Partners are from Sweden, Finland, Norway, Latvia, Estonia, Denmark and Poland.

www.effect4buildings.se

Long Term mission of the AI SMART Project: setting tourist routes towards a greener horizon



Eng. Barbara Valenzano

The maritime tourism sector is a driving force for regional development, especially in the Adriatic–Ionian regions. Tourist ports represent important attractive gates to the regions, and they are often characterized by high aesthetic, natural and historical value. Their economic benefits are based on the scenery of the surrounding coastal area, on their environmental quality and on the capacity of the ports to create green routes to satisfy a “sustainable” and “inclusive” tourism demand.

In the small port network the AI SMART Project is a strategic proposal financed by the [Interreg V-A Greece-Italy Programme 2014-2020](#). AI SMART aims to implement a common port network in the Adriatic Ionian area that connects, through an ICT Platform, all touristic ports of the Apulia Region in Italy and those operating alongside three Greek regions: the Ionian Island region, the Region of Western Greece and the Epirus region. The ports will share in common their facilities and their services in a transnational network based on the concept of smart, green and sustainable ports, exploiting the short-sea routes as an alternative to the cruise routes, to promote sustainable tourism. The AI SMART ports, through efficient connections with rail and inland transport networks, will act as key-hubs from which, access to inland territories, can be facilitated to discover their natural and cultural heritage

The Project is led by the Department of Mobility, Urban Quality, Public Works, Ecology and Landscape of the Apulia Region. The idea behind this project – said the Head of Department, **Eng. Barbara Valenzano** – is that our territories deserve the development and setting up of short-sea routes towards a greener horizon: the Apulia Region has more than 400 km of coastline and more than 100 ports operate along the Adriatic coast. From the Gargano to the Salento, many ports and resorts have been awarded the Blue Flag certification in recognition of the beauty of their coastline, their clean water, and the large assortment of services they offer to tourists. Our idea is to develop the AI SMART network as part of an integrated and sustainable transport system that can boost some of the TEN-T Corridors getting through southern European territories, such as Apulia Region in southern Italy, Albania, Montenegro and Greece, as is the case in the Corridor VIII.

The project will create an ICT platform that can become the “virtual common environment” for increasing the capacity of local authorities and decision-makers

to identify, manage and provide prompt solutions to day-to-day problems faced by small ports, starting from the identification of resources (human and financial) for infrastructural and non-infrastructural interventions, to the continuous monitoring of the impact of environmental stressors as required by Environmental Management System – declared the Project Manager, **Dr. Matilda Mali**.

The collection of this data will be the first step for defining a transnational governing tool and to promote a continuous and quite automatic updating of the Port Environmental Policy – said **prof. Umberto Fratino** of Polytechnic University of Bari, one of the research body involved in AI SMART Monitoring Activities.

In a similar context – **Eng. Valenzano** added – we also focus on other projects, which the Apulia Region is leading together with an international partnership financed by different Cross-border Cooperation Programs, i.e the ALMONIT project within Italy-Montenegro-Albania Program, the MARLESS Project and the CASCADE Project within the Italy-Croatia Program. ●



EU Green Week 2020

Wide-scale mobilization for nature in the midst of a pandemic and ahead of the crucial COP 15 Biodiversity Summit

IN BRIEF

Under the theme “A New Beginning for Nature and People”, this year’s edition of Europe’s biggest annual environmental event, EU Green Week, engaged thousands of actors from all over Europe in both real-life and virtual events, and on social media.

Taking place in the midst of a global pandemic that is shaking the foundations of our society and our economy, and amid reports of devastating impacts of climate change and the unprecedented loss of nature, it tapped into this moment of great uncertainty, but also of great opportunity: **to build the future we want.**

During an illuminating week of more than 30 virtual sessions, and more than 200 partner events all around Europe, discussions have consistently highlighted the need to reverse nature and biodiversity loss and put nature first in COVID-19 recovery plans. Experts across the board underlined that **protecting and restoring nature can stimulate recovery in a post-pandemic world, create jobs and sustainable growth, and help us to build a healthier and more resilient society.**

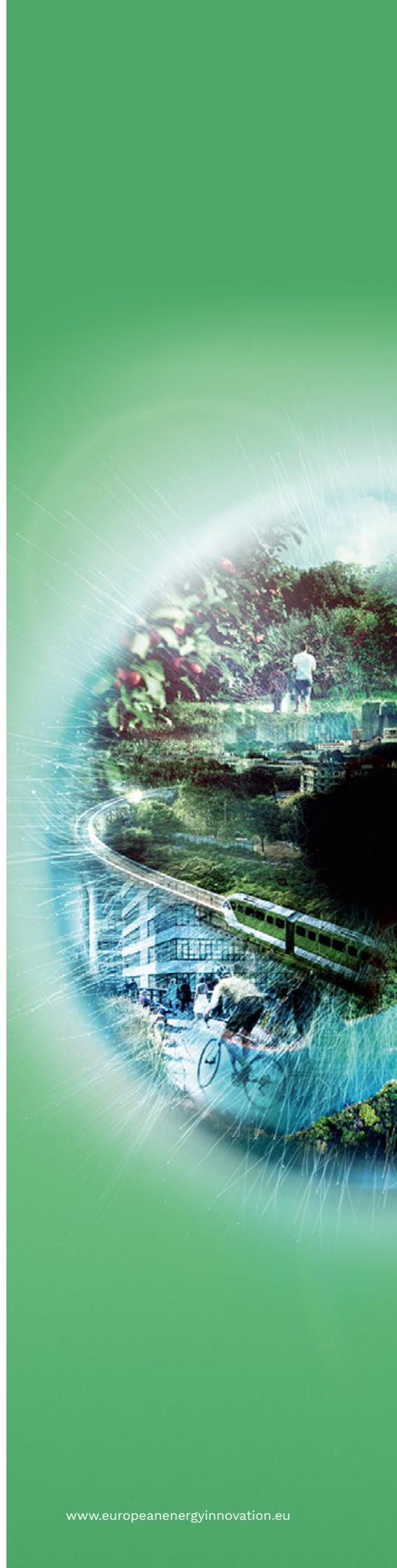
The event looked at ways of building a sustainable economy that does not destroy our life support systems, but protects, restores and heals them instead. It also acted as a milestone on the path to the COP 15 Biodiversity Summit now planned for 2021, where world leaders will adopt a 10-year action plan for biodiversity – a new global deal for nature, people and the economy. The EU wants to lead by example, setting the pace with the [EU Biodiversity Strategy for 2030](#) and the [European Green Deal](#).

A CLOSER LOOK AT DISCUSSIONS...

Human activities have significantly altered three quarters of the Earth’s lands and two thirds of oceans in recent decades, destabilising our climate and our natural life support systems. The [EU State of Nature report](#) launched at EU Green Week provided a sobering reminder that Europe’s nature is in alarming decline too, with more than 80% of habitats in poor condition, mostly due to unsustainable farming, forestry and fishing, urban sprawl and pollution. This means we are still losing nature and all the vital life support system that it provides for people and the economy, and that we have failed to reach the 2020 target of halting and reversing the loss of biodiversity in the EU. To halt biodiversity loss by 2030, lead by example and steer a systemic change of our societies, the new EU Biodiversity Strategy proposes a far-reaching EU nature restoration plan with commitments and clear targets to be achieved by 2030. Some of them include establishing protected areas for at least 30% of land and sea in Europe, restoring at least 25,000 km of EU rivers, planting 3 billion trees and reducing the use and harmfulness of pesticides by 50% by 2030.

Experts agreed – these targets could really bring Europe’s nature back, and help mitigate the climate crisis, but they first have to be agreed and implemented. In addition, **nature restoration** alone is not sufficient. It is crucial that restoration goes on top of cutting fossil fuel emissions and is not used as an excuse for doing less.

We have to protect what is left of nature, dramatically reduce emissions, and tackle the underlying drivers of biodiversity





loss, such as sea and land-use change, deforestation and our consumption footprint. And we have to acknowledge that **biodiversity and climate crises** are inextricably linked, as are the solutions. When you restore nature, you mitigate and adapt to climate change at the same time, and you reduce the risks of future zoonotic disease outbreaks.

Getting there will take a **“transformational change”** of the way we live, produce and consume. There will be winners and there will be losers, which is why this also needs to be a just transition. Finally, we cannot rely only on environment ministers and the youth to step up – we need the overall political will, the whole society engaged, much more capacity, and business leaders to speak up.

When it comes to making this transformational change happen, the conference looked into several specific pathways. One of them was **transforming our food systems**, so that they deliver for people, environment and climate. Another was **finances and investment**. Financing for nature restoration will be key and the financial sector can and must play a crucial role both through financing green initiatives and through greening the finance sector itself by directing financial flows away from activities that harm the environment.

And finally, as over half of global GDP depends on nature and the services it provides, business is key to make this transformation happen. At the last UN Biodiversity Summit Business for Nature, more than 600 companies, representing 4.1 trillion US dollars of annual revenue called for collective action for nature, urging governments to adopt policies to reverse nature loss in this decade. A growing number

of businesses are also reducing their impact on nature and managing the risks relating to nature loss. Business frontrunners confirmed – all this leads to innovative business transformation and clear benefits.

EU Green Week provided evidence that when we invest in nature, those solutions are fair, long-lasting and they generate real economic value. If we look back at the 2008 economic crisis, those projects that invested in nature protection, restoration and green infrastructure, were those that had the greatest economic return, the fairest distribution among communities, and had the most long-lasting effect.

Closing the event, Commission President Ursula von der Leyen shared a powerful [video message](#), highlighting the increasing momentum for the protection of biodiversity, and emphasizing that the benefits of nature protection and restoration are threefold: for climate, biodiversity and jobs. Europe is determined to show leadership – in delivering the European Green Deal, in the global biodiversity negotiations, but also in showing others the benefits that can be drawn from making the preservation of our natural world a genuine priority.

Although #EUGreenWeek 2020 has ended, all the sessions are available [online](#). At the same time, the preparations for the 2021 edition are already underway. Next year’s conference will take place from 31 May – 4 June, on the theme of Zero Pollution. ●

Contact at DG ENV:

Daniela Stoycheva, Press officer,
daniela.stoycheva@ec.europa.eu



By Vaishally Bhardwaj, Wei Liu, Luis Orellana & Emily Maggioli

The European power system is witnessing massive transformation in order to meet greenhouse gas emission and renewable energy targets in the coming years. Accomplishing these targets requires new technologies and the concerted efforts from everyone involved in the power sector.

The InnoDC project is developing innovative tools and methods to manage future power grids and help integrate renewable energy. The project aspires to contribute to European innovation and has shared its results with the scientific community, as well as other audiences for far-reaching impact. The following statistics highlight the project's achievements to October 2020, with much more planned before the end of 2021.



InnoDC researchers have presented their work at **27 international conferences** spanning over **14 countries**, as well as published **15 academic journal articles**.



The researchers have had the opportunity to be involved in **9 policy-level events** where they discussed their results and policy implications.



3 awards have been presented to the researchers for their outstanding research and presentation skills.



Their work has led to **3 collaborations**, enabling the researchers to expand their technical knowledge and network with other specialists.



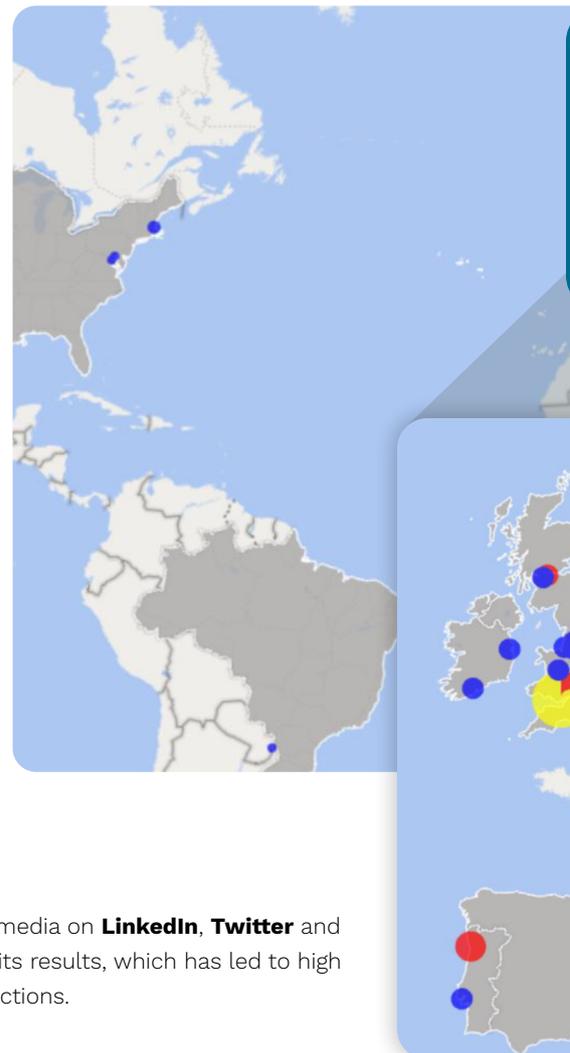
They have been involved in **18 public activities (outreach)** by delivering interesting tutorials, hands-on workshops - and online webinars during COVID-19 restrictions - for school and university students. They also teach and help with educational planning, alongside their research.



InnoDC's academic and industrial experts have organised more than **16 training sessions** for the researchers on diverse topics ranging from technical know-how, IPR (Intellectual Property Rights), open access (the free sharing of research), entrepreneurship, innovation and other **transferrable skills**.



The project has promoted its work through its website and social media on **LinkedIn, Twitter** and **YouTube**. It has created and published **37 videos** to demonstrate its results, which has led to high viewing figures and been specially pertinent during COVID-19 restrictions.



“ The project aspires to contribute to European innovation and has shared its results with the scientific community, as well as other audiences for far-reaching impact. **Vaishally Bhardwaj** ”

InnoDC’s research focuses on developing solutions to help the use of new technology in the power system and address challenges of offshore wind power integration. In 2019, 15% of Europe’s energy demand came from wind (12.2% onshore and 2.3% offshore)*.

The project is conducting research at system, equipment and device levels.

At system level, the researchers are studying the interaction between hybrid AC/DC grid, AC/DC protections, as well as how to make the system more reliable and cost-effective. At equipment level, they are analysing modular multilevel converters (MMCs), DC/DC converters and DC circuit breakers. They have proposed new control and modelling methods to better operate offshore wind

power systems. At device level, they are looking into new material-based power electronic devices (e.g. silicon carbide) and insulators to increase reliability and reduce cost.

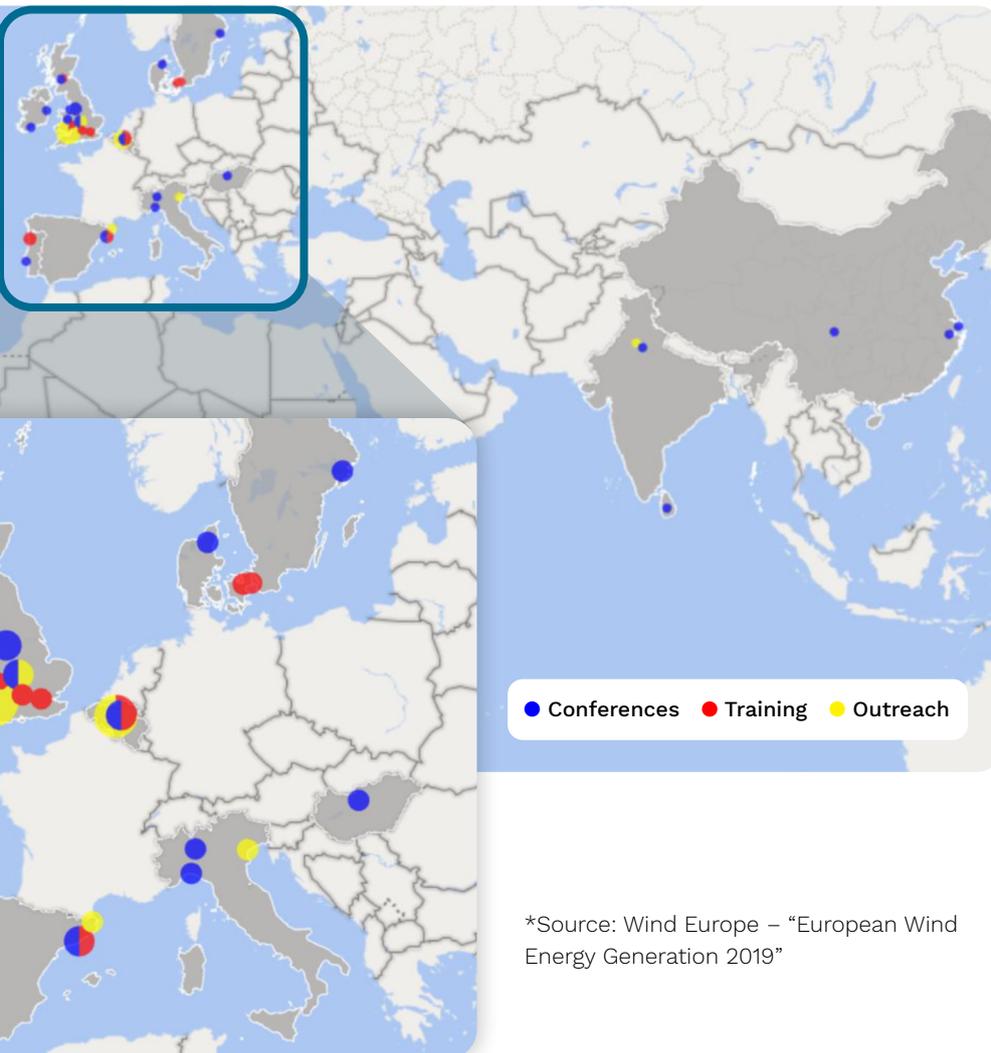
15%
EU electricity demand came from wind*

 InnoDC has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement no. 765585

Details at: InnoDC.org



Contact information:
 Project Manager: Manon Davies
 Email: DaviesM75@cardiff.ac.uk
 Tel: +44 (0)29 2087 0890



*Source: Wind Europe – “European Wind Energy Generation 2019”

Can procurement make the energy market more sustainable?

By Jon Jonoski, ICLEI – Local Governments for Sustainability

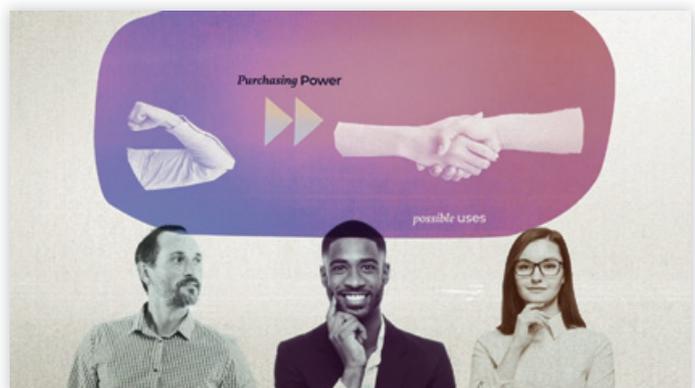
In Europe's urban areas, 58% of all greenhouse gas (GHG) emissions can be traced to the use of energy sources used for the functioning of cities' infrastructure, heating, cooling, security and light. As local and regional authorities have full or partial control over many of these public utilities, they can use the tools at their disposal to reduce their environmental impact. One such tool is public procurement. Public buyers are among the biggest investors in the European single market, spending 2 trillion euro per year on goods, works and services. That gives them a lot of potential to have a positive influence on the broader (energy) market – both on the demand and the supply side – by demanding that

suppliers operate in more sustainable or socially responsible ways.

Public authorities use public funds when procuring goods, works and services. The European Union (EU) has created a well-regulated public procurement market founded on the core principles of transparency, equality and open competition to ensure that these funds are not misspent and that tenders are fair. Socially Responsible Public Procurement (SRPP) aims to go one step further and to address the impact on society of the purchases made by the public sector. SRPP is about implementing social or 'green' considerations (when talking about green procurement or sustainable

procurement, the latter including both social and green aspects) in public contracts to achieve positive social outcomes.

The European Commission (EC) has recently published the report "[Making socially responsible public procurement work: 71 good practice cases](#)". The 71 cases included in the document make the potential of SRPP visible, showing how procurement can affect the broader market. By promoting employment opportunities, decent work, social inclusion, accessibility, design for all, ethical trade, and compliance with social and environmental standards, public buyers can increase demand for "socially responsible" goods, works



and services. Public procurers can be especially impactful in sectors where they command a large share of the market, such as construction, healthcare and transport. As public procurers spend around 14% of the EU's gross domestic product (GDP), their power does not stop there. The EC report also contains cases relating to cleaning and facility management, food/catering services, furniture, gardening services, social services, ICT and textiles. The report shows that in many of these sectors public procurers can make interventions that make the energy market more sustainable and drive down GHG emissions.

Traditionally, public procurers have made purchasing decisions by comparing price and quality. The EC report highlights the impact procurers can have when they look beyond these two categories and consider how a product or service is produced or sourced. For example, in France, the Department of Vendée, needing a supplier that would

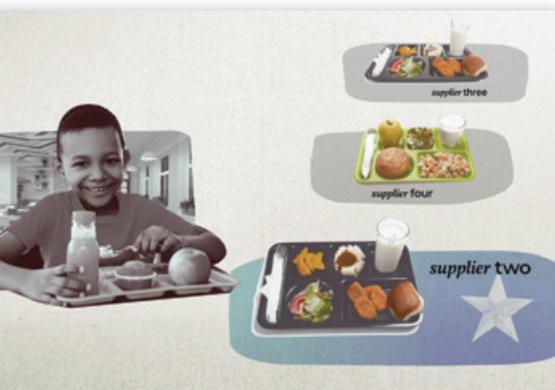
provide food services to schools in the Department's territory, issued a tender in which the award criteria were based on price, technical quality and environmental services. Consequently, interested tenderers had to show in their offer that the energy sources used to realise these services would be environmentally friendly. To create an additional social impact, the tender was reserved for social enterprises working in agri-food that employed a minimum amount of people with disabilities.

Though there were no geographical requirements in the published tender, the eventual winner was an organisation from Vendée, which proved it could make an environmental impact by providing locally-sourced organic food and reducing transportation distances. The Department of Vendée has estimated that this catering project has led to an annual reduction of 281.59 tonnes of CO₂ emissions. Furthermore, the schools do not need to receive the food products on their own: they are delivered through the service of the winning social enterprise. This has reduced the volume of deliveries by two thirds. Vendée estimates that this reduction in transportation will lead to expected primary savings of 1.03 GWh per year. The Department is now considering broadening the programme to include other buyers, such as retirement homes and municipalities. Moreover, it has taken a similar approach to meat and fish procurement.

The Vendée case is a good example of how the future of how SRPP could look like, by showing that it can be a valuable tool to protect both vulnerable people and the environment, through energy savings and emissions reduction. The European Commission has until recently seen Socially Responsible Public Procurement and Green Public Procurement (GPP) as two separate strands of sustainable procurement. In the future, it aims to encourage

public authorities to integrate social and green aspects equally in their procurement.

Such developments could make procurement have an even more direct impact on the energy market, for example, when cities are procuring building maintenance services. While most buildings receive scheduled maintenance, different energy needs based on activity levels and actual usage are not always considered. Higher CO₂ emissions and higher economic costs are among the major consequences of such inefficient maintenance. By effectively employing SRPP when acquiring building maintenance services, procuring authorities can have a major social and environmental impact on their cities and regions, while also decreasing costs. To have an even bigger impact, authorities could also introduce social or environmental considerations when acquiring construction services, to ensure that the constructing company they contract makes the buildings more energy-efficient and uses more sustainable materials. The EC reports highlights that introducing such social and environmental considerations does not lead to extra costs. In fact, SRPP can often even lead to savings. ●



What is socially responsible public procurement about?

- Watch these videos to learn more.
- #WeBuySocialEU – Video about a case in Vendée, France
<https://www.youtube.com/watch?v=Sri4Hdd6-cQ>
- #WeBuySocialEU – Video about a case in the Czech Republic
https://www.youtube.com/watch?v=vGRvf_J3fJ4&t
- #WeBuySocialEU – Video about a case in the city of Toledo, Spain
<https://youtu.be/Nx6XVjkaBZg>

POWERSKIN+

“Highly advanced modular integration of insulation, energizing and storage systems for non-residential buildings”

INSIGHT

Buildings consume around 40% of the total energy in the EU. A minimum of energy wastage will thus be crucial contributing towards the EC targets regarding saving potential, decreasing the final energy consumption and the Greenhouse gases (GHG) emissions reduction. EU is dedicated to reaching an 80-95% GHG cut by 2050, from 1990, in the framework to the low-carbon economy.

The EC objective is to realize a large deployment of Plus Energy Buildings (PEB) in the EU by 2050. Considering the age profile of buildings in the EU (35% of the EU's buildings are over 50 years old) and the slow pace of the current retrofit, the renovation potential of buildings in the EU is considerable – up to 110 million buildings potentially need renovation.

The annual rate of home and commercial building renovation is well under the 3% required to achieve EU climate and energy goals. So how can we achieve the required renovation rate? By ensuring that the retrofitting process is advanced, cost-effective and energy-efficient.

Given the facts mentioned above, there is no doubt that the EU building market is craving for the most innovative building renovation solutions. This is where POWERSKIN+ comes into the picture.

ABOUT POWERSKIN+

POWERSKIN+ is a collaborative project supported by the European Commission under the Horizon 2020 Programme for Research and Innovation (Call LC-EEB-01-2019), with a duration of 48 months.

The project consortium comprises of a value chain formed by renowned key partners across Europe,

industrially focused and highly capable of generating knowledge and innovation. It is a diverse consortium consisting of 14 partners from 8 European countries. The partner's list includes material suppliers, prestigious manufacturers, installers and end-users along with acclaimed disruptive spin-offs.

“POWERSKIN+ aims to develop a truly innovative façade solution based on a smart integration of highly energy efficient components, including super-insulative elements, solar energy harvesting and active energy storage features, all in one single combined active/passive management system especially addressed for modern non-residential Curtain Wall retrofitting solutions.” says Jorge Corker, the Project Coordinator from Portuguese Innovation and Technology Institute – Instituto Pedro Nunes.

POWERSKIN+ intends to be at the forefront of the first generation of off-site prefabricated, modular “ready-to-

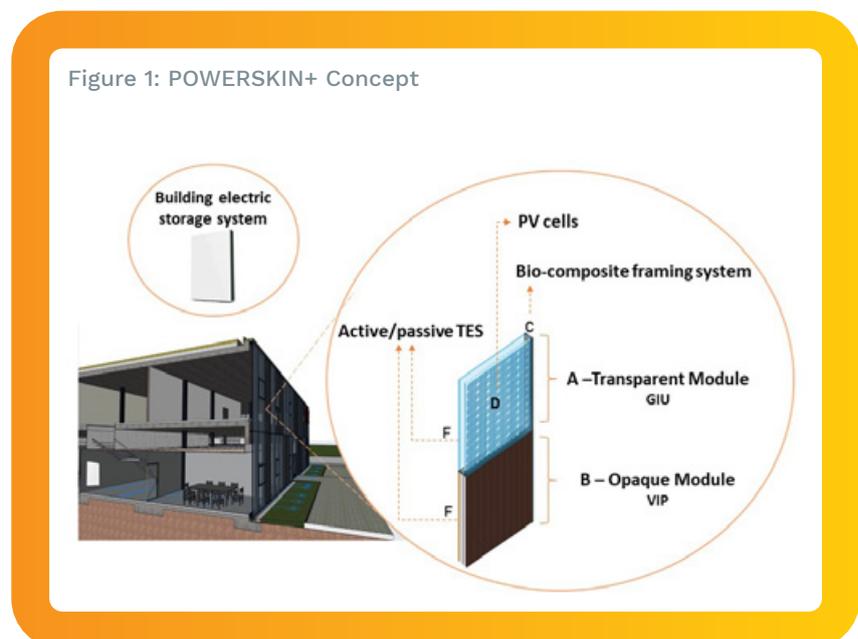
buy” and easy-to-install glazing and opaque elements, with sustainable eco-designed connecting framings, improved functional coatings, active and passive thermal energy storage (TES) solutions and integrated semi-transparent PV cells. The solar electric harvesting features will be matched and completed with a dedicated large capacity building electric storage system, in a true energy management turnkey package.

OBJECTIVES

- Insulation & climate control
- Easy module installation
- Energy harvesting
- Energy storage

CONCEPT

The concept proposed by POWERSKIN+ releases the untapped potential in the energy insulation/valorisation and energy generation of building façades by developing an integrated approach consisting of a number of innovations whose technologies, efficiencies and added



value exceed the currently available alternatives on the market.

POWERSKIN+ presents a radically new vision for the energy insulation and renewable generation, combining several breakthrough developments in highly energy-efficient materials and superinsulation elements, solar energy harvesting components and active energy storage features. Among them, it includes state-of-the-art Glass Insulation Units (GUI) combined with an active heat storage fluidic capillary system, advanced Vacuum Insulation Panels (VIP), Phase Change Materials (PCM), cutting-edge flexible perovskite solar cells and multi-functional nano-enabled coatings.

At the same time, each of these sub-technologies is designed for highest compatibility with standard manufacturing lines so that rapid implementation, adaption to various use-cases (e.g., dependent on building location) and market penetration can be ensured.

The vision is materialized in the development of modern lightweight Curtain Wall and DSF retrofitting systems for non-residential buildings, comprising of the first generation of off-site prefabricated glazing and opaque elements with eco-designed framings, multi-functional coatings with self-cleaning, light-reflective or absorbing, self-healing properties, active and passive thermal energy storage and integrated semi-transparent PV cells and in the implementation of three demonstration constructions.

POWERSKIN+ will create and demonstrate pilot nearly-Zero and Plus Energy Buildings (nZEB and PEB) that can also be affordable, provide a comfortable and healthy indoor environment and be stimulative to dynamic climatic conditions, occupant comfort and energy-efficiency requirements.

Taking advantage of its modular



nature, different combinations of POWERSKIN+ modules and addons can be set to match any specific need and refurbishment budget. In its full package, branded as POWERSKIN+ Upgrade, the system targets the deep renovation market and accelerates the transition to plus energy ranks, while providing a unique all-in-one envelope retrofit solution.

DEMONSTRATION SITES

POWERSKIN+ will prototype and demonstrate both premium and affordable solutions, for lightweight and non-load-bearing curtain wall

and DSF systems, based on highly durable system components. POWERSKIN+ façade renovation system will be demonstrated and validated in an operational environment in 3 real-size non-residential buildings located in 3 different European countries (Portugal, Slovenia and the Czech Republic). The demo cases represent 2 different climates (Hot-summer Mediterranean and Oceanic), as well as different building practices (commercial, office, etc.), characterizing and demonstrating how the overall system will work in real conditions in the future. ●

Project ID: 869898

Website: <https://www.powerskinplus.eu/>

Start date: October 2019

Duration: 48 months

Project coordinator: Jorge Corker

Contact email: info@powerskinplus.eu

Project partners: IPN, Fraunhofer ICT, Friedrich-Schiller-Universität Jena, Brunel University London, FENIX TNT, Flachglas Sachsen, Politecnico di Torino, Oxford Brookes University, Czech Technical University, Navodnik, Saule Technologies, Warsaw University of Technology, AMSolutions, Saule Research Institute



How can Positive Energy Districts shape urban futures in Europe?

By Siddharth Sareen, Science Communication Manager of the Positive Energy Districts European Network (PED-EU-NET) and Associate Professor at the University of Stavanger

The new COST Action PED-EU-NET brings together engineers, scientists, spatial planners, architects, economists, and social and political researchers. This interdisciplinary network of diverse practitioners aims to co-create positive energy districts for sustainable smart cities and communities across Europe.

The late 2010s saw a significant change in the basis for rapid energy transitions. Renewable energy solutions are now the most cost competitive sources. These solutions are modular and can be installed at small scales in distributed ways, close to where energy is consumed.

European cities are leading transitions to low-carbon energy. Our global region has made advances in energy innovation at the level of buildings. Europe is now ramping up efforts for city-wide transformation with the pioneering concept of Positive Energy Districts (PEDs). Established in September 2020 through COST Association funds, PED-EU-NET boasts a growing expert member base spanning 33 countries.

PED-EU-NET Chair Vicky Albert-Seifried, Senior Researcher at the Fraunhofer Institute for Solar Energy Systems in Germany, is focused on the EU's Strategic Energy Technology Plan, which sets out a vision to create 100 PEDs by 2025. "The knowledge and skills needed to plan, design, implement and monitor PEDs", she explains, "need to be advanced, and then replicated and mainstreamed."

Action Vice-Chair Laura Aelenei,

Senior Researcher at the National Laboratory of Energy and Geology in Portugal, emphasises that "the challenge cuts across sectors and domains, and thus requires collective innovation." They steer a large team with diverse, complementary competencies that aims to catalyse, accelerate, and harmonise the deployment of PEDs.

The network is organised into four work streams to strengthen coordination of research and build capacity on PEDs. Working groups focus on (i) mapping, characterising and learning from PEDs, (ii) developing PED guides and tools, (iii) running real-world PED laboratories to advance monitoring and replication strategies, and (iv)

ensuring dissemination and outreach and maximising exploitation across sectors.

"We aim to combine theoretical research with practical insights to identify key parameters of PEDs and understand how to assess their performance," says Michal Kuzmic, Industrial Liaison Officer at the University Centre for Energy Efficient Buildings in the Czech Republic, emphasising the need to collect solid evidence through the network.

Nienke Maas, Senior Energy Transition Consultant at the Netherlands Organisation for Applied Scientific Research, adds: "To create PEDs, we need advanced technical tools, but equally important are new

Solar photovoltaic modules integrated into the built environment in Lisbon's urban landscape



“ We aim to combine theoretical research with practical insights to identify key parameters of PEDs and understand how to assess their performance. ”

Michal Kuzmic, Industrial Liaison Officer at the University Centre for Energy Efficient Buildings in the Czech Republic

governance and business models to deal with aspects such as energy flexibility.”

Operating Agent of International Energy Agency EBC Annex 83 on Positive Energy Districts and Senior Scientist at VTT-Technical Research Centre of Finland, Francesco Reda highlights that PEDs are a means to support cities to foster the energy transition from a fossil-based to a zero-carbon economy and to establish a new economic paradigm in which citizens are the primary stakeholders and beneficiaries of new energy technologies. PED-EU-NET’s emergence is timely for sharing knowledge and breakthroughs on PEDs across a variety of stakeholders, including multi-level governments,

private enterprises, citizen interest groups, knowledge institutions and PED-related European projects.

At a time of rapid and exciting developments, such cross-fertilisation is essential to establish a PED innovation eco-system and pool European resources for experimentation and co-creation. These processes are at the heart of innovating, implementing, and replicating PEDs according to Savis Gohari Krangsås, postdoctoral fellow at the Norwegian University of Science and Technology, who coordinates the network’s short-term scientific missions and conference grants.

PED-EU-NET plans many networking

and capacity-building activities to train a new generation of PED professionals and researchers, and channel expertise from experienced practitioners. In addition to networking events, training schools and workshops, planned outputs include policy briefs, reports, a multimedia website and journal articles. Wide and focused participation will mobilise relevant European actors for collective progress to our long-term climate neutral goal. Interested readers within the broad ecosystem of PEDs, especially practitioners in cities, are welcome to contact the Action for membership and to engage with specific working group activities. PEDs are key to our climate neutral urban future. To succeed, the endeavour clearly has to be a shared one that harmonises activities across diverse actors and competencies. ●

The positive energy solar settlement in Freiburg, Germany



Electricity meets data: enabling the twin green and digital transition

By Bruce Douglas, Director Business & Communications at Eurelectric

From the beginning of time, the human ability to innovate and adapt has challenged the limits of possible and impossible. Each discovery from fire to electricity, from steam-powered to electric vehicles, from ice-cooled rooms to refrigerators, has shown us that with the right mind set we could make disruptors work in our best interest. It has happened in the past, and it can happen again.

The need to cut the alarmingly high and still mounting greenhouse gas emissions has triggered a radical transformation of business operations around the world. In the aftermath of the Paris Agreement, the European electricity utilities committed to clean up the generation

mix, gradually replacing the fossil-fuelled capacities with carbon-free sources, such as wind and solar.

Industry-wide assessments have shown us that it is both technically and financially possible to have renewables cover over 80% of electricity demand by 2045. In this scenario, a deep decarbonisation of the power sector, coupled with increased electrification rates of heating and cooling, transport and industry, would enable Europe to become carbon neutral well before mid-century.

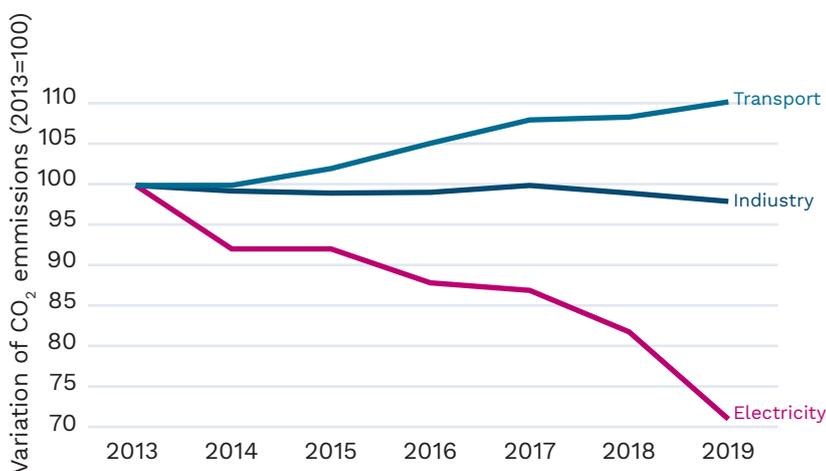
The potential of clean sources of energy has exponentially increased in light of the promising technological evolutions that facilitate their

penetration, increase efficiency or simplify operations and maintenance. Together with that, the growing interplay between digitalisation, decarbonisation and decentralisation, brings new services and ways to engage consumers in the energy transition.

In the first half of 2020, renewables covered 34% of the EU electricity mix, dethroning the fossil fuels for the first time, and leading to a 23% year-to-date drop of the CO₂ emissions from the power sector. While some will attribute these results, in part, to the COVID-19 black swan event, for us this is a reflection of an inexorable trend: the accelerating decarbonisation process.

Data presented in Eurelectric's *Power Barometer*, shows that the accelerating decarbonisation of electricity generation, turned the power sector into the front runner in the race to cut the CO₂ emissions. At the same time, the transport and other industrial sectors continued to emit steadily. But, by ramping up the uptake of clean electricity, through direct and indirect electrification, these energy and carbon intensive activities, could drastically cut their emissions.

A recent assessment of the World Meteorological Organisation has shown that this year the global CO₂ emissions fell between 4.2% and 7.5%, in spite of the high-magnitude standstill imposed by the COVID-19 pandemic. If economic activities



*Evolution of EU emissions by sector since 2013

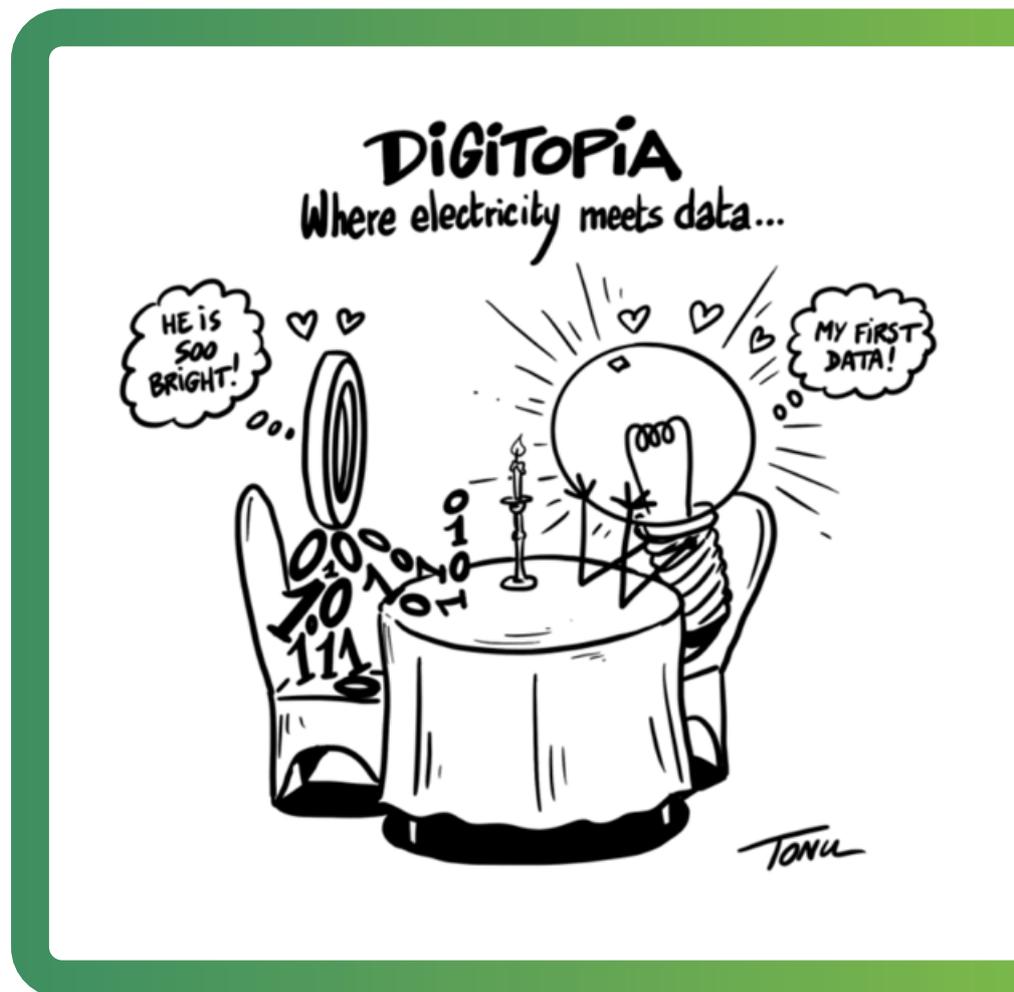
go back to the pre-crisis “normal”, the limit of what can possibly be absorbed without raising the global temperatures even more, will be reached soon. From that point onward, each calorie produced to heat our homes and workplaces, each trip by car or plane, as well as each meal we cook, would further intensify the global warming.

The good news is that individuals and business around the world are growing more aware of the negative impacts that keeping the status quo would have. Their calls to #BuildBackBetter and #BuildBackGreener were heard, and at EU level we have seen a massive mobilisation of recovery funds, of which 33% are dedicated to climate projects while 20% should be directed to digitalisation.

Digitalisation is a key enabler of a climate neutral power sector. Eurelectric’s *AI Insights: The Power Sector in a Post-Digital Age*, a joint assessment conducted by major electricity utilities and tech players, shows us the huge opportunities for the energy transition, that stem from the interplay between our sector and the interconnected exponential technologies, such as artificial intelligence and machine learning.

First, as AI is breaking through the limits of human capabilities at just the right time as radical transformation of the electricity sector is essential for a cost-effective clean energy transition. When looking at electricity generation, AI has the potential to drive operating efficiencies, automation and cost savings. This transformation is not about replacing the human component, but more about augmenting their abilities.

An additional benefit of AI applications in the power sector is enhanced forecasting, which can enable a predictive maintenance of assets, as well as an optimal match



between supply and demand. While not so long ago, a 24/7 carbon-free electricity supply was unimaginable, technological evolutions – including energy storage, digitalisation and decentralisation – are bringing it closer to the realms of possibility.

Second, the growing synergies between the AI and the power sector are enabling consumers to play a key role in the energy transition. Smart devices, like Alexa or Google home, allow individuals to manage their energy consumption based on desired comfort levels, or to switch appliances on and off, when power is expensive.

The increased interaction between consumers and the power system serves also as an effective flexibility solution to ensure the adequate

functioning of a green grid. A better coordination between the growing numbers of coordinated devices, such as smart homes and EVs, would be essential to enable a stable and reliable electricity supply, while phasing out the fossil-fuelled generation.

A successful coordination depends on data exchanges between consumers, suppliers or grid operators. But privacy concerns and risks related to data collection, storage and management still need to be tackled. Going forward, a careful balancing act will be required to manage the potential risks, avoid bias and safeguard consumer privacy, while allowing sufficient access to data and designing regulations that are robust and effective without strangling innovation. ●

How cities and suppliers are working together to tackle heavy-duty vehicle emissions

By Anja De Cunto of Eurocities

Cities are pulling out all the stops to achieve their climate ambitions, but the challenge they face is huge.

Urban transport alone accounts for up to 25% of all CO₂ emissions and for some 70% of all emissions in urban areas that are responsible for climate change. It's also estimated that by 2050 up to 82% of EU citizens will live in urban areas. The impacts on the environment, public health

and quality of life are clear to see if cities don't take drastic action.

Luckily, then, that some are – and in areas you wouldn't first think of. For example, the Netherlands' second city, Rotterdam, is purchasing electric heavy-duty vehicles to drive down emissions. And in the fight against climate catastrophe, procurement is proving to be a secret weapon.

Along with two fully-electric garbage

trucks, the city has a fleet of 527 electric scooters and bicycles, 213 electric and 204 hybrid passenger cars, 37 electric vans, 2 hybrid garbage trucks and 3 smaller electric street sweepers.

Procuring large electric vehicles such as the EMOSS ZE in use in Rotterdam is not common in Europe, and the market remains somewhat underdeveloped – not only in terms of manufacturing of new electric





vehicles, but also the available options for the retrofitting of existing vehicles.

According to Richard Brabers, Category Buyer Mobility at the City of Rotterdam, only a few markets have the option to purchase heavy-duty electric vehicles at the moment. “Volvo produced an e-truck and held a webinar a few weeks ago with all the buyers of the cities in Europe,” he says. “The e-truck is not available in every country. Volvo said the e-truck is only available at dealers who have the knowledge and the support.”

He adds that cities helping cities when it comes to procurement is vital: “Rotterdam may have some more experience than other cities. We must help each other.”

The city has taken part in the EU-funded Big Buyers Initiative working group on heavy-duty EVs. Other group members are from the cities of Amsterdam, Budapest, Helsinki, Lisbon, Malmo, Oslo, Porto, Rotterdam, Stavanger, public entity Belgian Post and the Swedish central purchasing body SKL Kommentus.

The group has looked at different types of heavy-duty electric vehicles, including waste trucks and street cleaning equipment, but also heavier city distribution and potentially snow cleaning. All the participating cities have a goal of having emissions-free fleets by 2030.

The working group jointly held five dialogues with suppliers this year: a meeting and factory visit was held with street cleaning vehicle producer Aebi Schmidt in Germany, and online market dialogues took place with Volvo, Renault, Daimler and Eneco e-mobility.

The Big Buyers is based on an understanding of the need to align and combine the purchasing power of individual public entities, bringing them together in strategic partnerships to maximise their

market impact, lower costs, help introduce innovations into the market, and help scale up good solutions, while at the same time improving skills and capacities in professional procurement practice. Another working group focuses on procurement of zero-emission construction sites, through use of innovative electric construction machinery. In both working groups, the buyers have jointly published their climate ambitions and upcoming procurement plans.

The initiative shows the power of joint European procurement to achieve climate-related goals. “As a buyer from a government, we must give the right signal. We must stimulate the market. With the Big Buyers group, we give attention, we motivate each other,” says Brabers.

But this is not to say that the procurement of heavy-duty vehicles doesn't have its challenges. Aside from the availability issues, charging and maintenance are difficult issues to solve - in cities where public transport fleets and private vehicles may be increasingly electrifying, the addition of large, energy-intensive vehicles is another layer of strain. “And,” says Brabers, “the charging infrastructure is also expensive.”

These issues then become linked elements in the development of tender criteria. The group therefore set out to work together on a new tender criteria definition, evaluation of

the technological and environmental component of tenders, and life-cycle evaluation of the products – for example, in relation to battery life and components.

The biggest success of the group, however, will be seen in the future. Already, participants in the market dialogues have agreed that future market development for them will be on heavy-duty and long-haul electric solutions. Suppliers, on their side, have expressed interest in meeting to discuss the needs of public entities and their upcoming procurement plans, particularly for the timeframe 2021-2026.

By coordinating procurement efforts, the cities are sending strong signals to the market that a clear demand for heavy-duty electric vehicles exists. And the effect is growing beyond public bodies. In the Netherlands, supermarket chain Albert Heijn has a growing fleet of electric trucks that distribute produce to its thousands of stores nationwide.

As the Big Buyers project enters a new phase – the Big Buyers for Climate & Environment - and shifts its focus to other domains where procurement can make an impact, the heavy-duty vehicles group of buyers is optimistic for the future of the market, even despite the remaining technical issues and the pandemic looming overhead. “We have to make big steps,” says Brabers. “But if we do it together, it's easier.” ●

Upper Austria leading the industrial energy transition

The Industrial Energy Leaders Initiative

By Christiane Egger & Christine Öhlinger, OÖ Energiesparverband, Upper Austria

Upper Austria is the industrial heart of Austria and generates 25% of the country's industrial exports. Since manufacturing is responsible for 44% of the region's total energy consumption, its decarbonisation is critical for the energy transition. Upper Austria is a living lab for innovative policy approaches for the industrial energy transition and much has been achieved so far. Already 2.3 billion Euro per year are invested in the energy transition, of which 30% are spent on energy efficiency measures in industry. In the past 15 years, greenhouse gas emissions were reduced despite 55% economic growth!

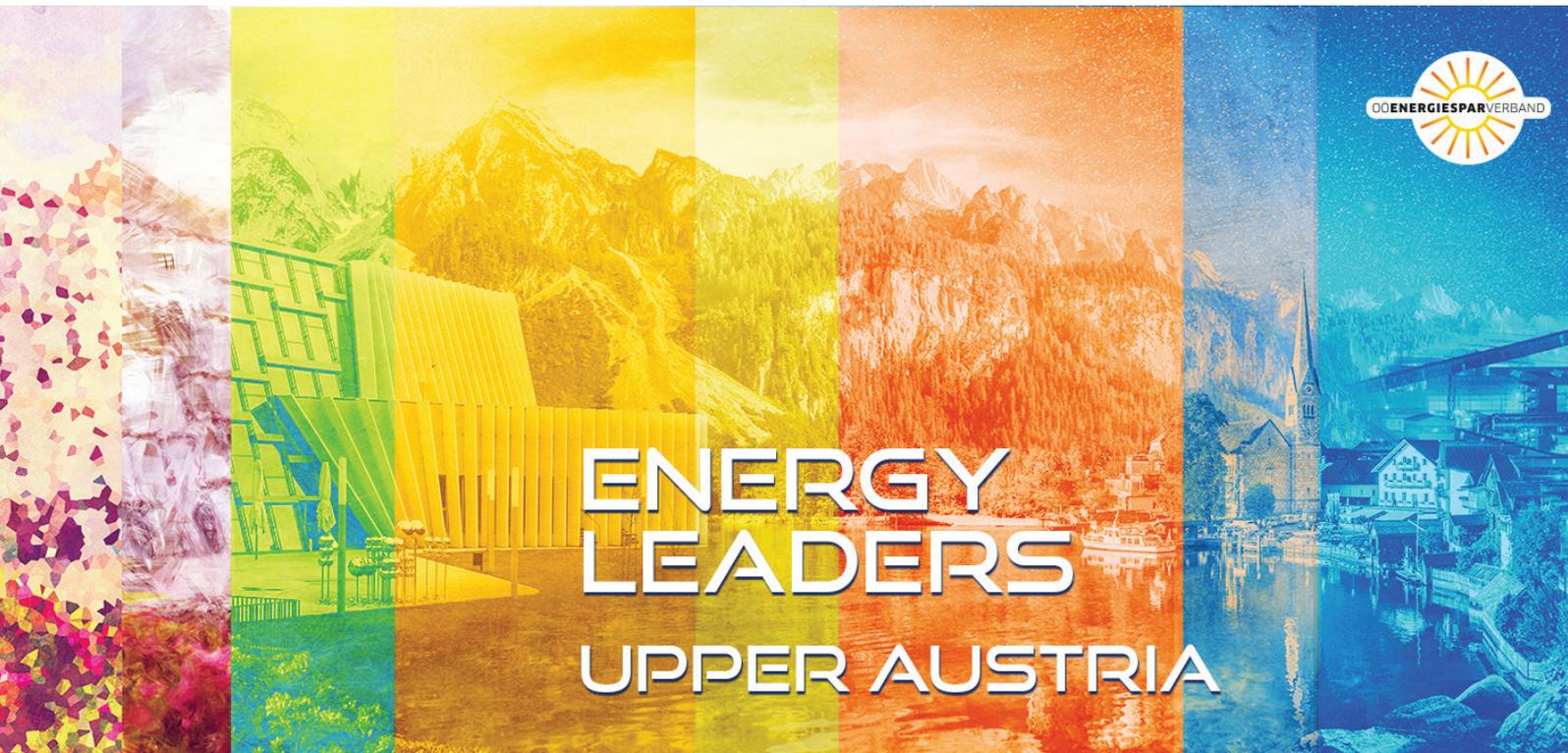
It is now time to move forward with fresh impetus. With Europe's political decision to strive for climate neutrality by 2050 – and Austria's ambition to reach this by 2040 – a clear goal has been set, also for industry. The EU sees decarbonisation as a major challenge, but also as its main strategy for economic growth.

INDUSTRY 5.0: DECARBONISATION – A DECISIVE COMPETITIVE ADVANTAGE

With these decisions, we seem to be at the turning point of another “industrial revolution”. Following automation and digitisation, “Industry 5.0 decarbonisation” will

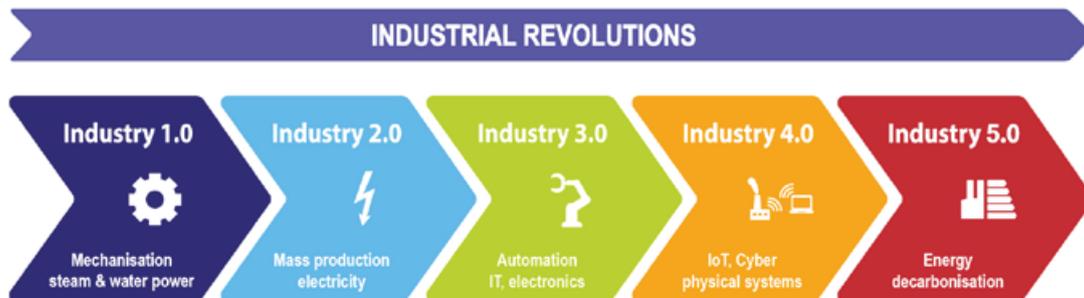
characterise the next big step in the industrial transformation. Decreasing dependence on fossil fuels is an ever more critical factor for international competitiveness. For companies, this transformation process requires designing a solid strategy and its step-by-step implementation.

However, understanding how to achieve climate neutrality in practice and concretely plan the process for a specific company is a path not yet travelled by many. How can companies strategically approach climate neutrality and make it an integral part of their normal business practices? Which investments are



**ENERGY
 LEADERS
 UPPER AUSTRIA**

INDUSTRY 5.0: COMPETITIVENESS THROUGH CLIMATE NEUTRALITY



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necessary? What additional benefits can it create for them? In Upper Austria, the novel initiative “Industrial Energy Transition Leaders” is providing answers to these questions.

THE INDUSTRIAL ENERGY TRANSITION LEADERS INITIATIVE

Developed and launched in 2019 by the regional energy agency of Upper Austria (OÖ Energiesparverband), the Industrial Energy Transition Leaders Initiative is yet a further innovative

contribution to making the energy transition reality in Upper Austria. It is based on the cooperation between 15 pioneering companies to develop practical, real-life approaches for achieving carbon neutrality. These 15 Energy Leaders employ over 25,000 staff and generate more than 7 billion Euro in annual turnover at 400 locations. As forerunners, they have already implemented many energy efficiency and renewable energy projects within their own companies, and thereby reduced their costs and increased their competitiveness. The aim is now to achieve climate neutrality and phase out fossil fuels!

The initiative showcases the diversity and importance of the benefits created by the energy transition. Increased productivity through improved working conditions (e.g. better lighting or indoor air quality), reduced failures and extended maintenance intervals are just a few examples. Companies that show commitment to sustainability are also more attractive employers and benefit from a better image with customers and partners. Companies that operate internationally – of which there are particularly many in Upper Austria – are frequently confronted with sustainability requirements from their customers (e.g. in the automotive sector) and the risk of being excluded from supply chains.

ENERGY AND CLIMATE BALANCE, ROADMAPS AND SHARING KNOWLEDGE

In the context of the initiative, a novel tool was developed: the “Energy and Climate Balance”. It helps assess how far a company is on its way to climate neutrality. It enables quantifying a company’s CO₂ emissions in a simple manner – using only limited input data – and helps prioritise measures.

Following a testing phase, it is now offered by the OÖ Energiesparverband as part of the regional energy advice service that is available to all companies.

Company-specific “Energy Transition Roadmaps” are at the very core of the initiative. They are developed in an interactive process and contain goals, measures and technology options. The essence of the Energy Leaders initiative is sharing knowledge and mutual inspiration, e.g. in the context of regular workshops, meetings and company tours.

AN INNOVATION ECOSYSTEM FOR THE INDUSTRIAL ENERGY TRANSITION

The partner companies are pioneers in the energy transition and have already implemented many investments and organisational measures. These include e.g. LED lighting, renewable heat from biomass and heat pumps, heat



recovery solutions, large PV systems, purchasing green electricity, energy management systems, electric vehicles and ambitious efficiency requirements for new buildings and renovations.

Over the next few years, the focus will be on using innovations to tackle fields that are still economically or technologically challenging today. Some examples are the decarbonisation of logistics and transport and of high-temperature processes as well as including company suppliers in the process.

The growing flexibility of the energy system offers new possibilities, such as storage solutions that increase the self-consumption of renewable energy generated on site. It is also crucial that energy and CO₂ indicators be adopted as key performance indicators (KPIs). This ensures – as with other important company figures – that progress is regularly checked and becomes part of the strategic decision-making process.

TOGETHER FOR COMPETITIVENESS AND QUALITY OF LIFE

All initiative partners consider it essential to involve their own employees in the transformation process and see their active participation as key for the long-term success of the energy transition. This takes the form of regular information about energy-efficiency measures in the company, tips for saving energy at home, ideas competitions, cross-department energy teams or incentives for sustainable mobility for employees' commute to work.

The exchange between the initiative's partners as well as the technical inputs from specialists provide inspiration, motivation and support for the concrete implementation of innovative solutions. As a result, climate neutrality can be achieved – together with higher competitiveness and quality of life!

To learn more about how to accelerate the decarbonisation of industry in practice, the

OÖ Energiesparverband invites you to join the **Industrial Energy Efficiency Conference** on **25 February 2021**, part of the World Sustainable Energy Days (22–26 February 2021). More information online at www.wsed.at. ●

ENERGY TRANSITION LEADERS

Mission statement:

We show how companies are phasing out fossil fuels and thereby increase their competitiveness and profits.

We accompany and showcase pioneer companies that work successfully on this vision.

We support Upper Austrian companies in the development of products and services for the industrial energy transition.

Companies, public organisations and researchers work together on a vision of a “climate neutral economy”, thus creating an innovation ecosystem for the industrial energy transition.

Partner companies:

Bellaflora, BMW, Fronius, KEBA, Miba, Obermayr, ÖkoFEN, Peneder, Resch & Frisch, Rexel, Rübiger, Sparkasse, Starlim/Sterner, TIGER, Weber Hydraulik

Developed and led by:

The Regional Energy Agency of Upper Austria, OÖ Energiesparverband

Contact information



Christiane Egger
OÖ Energiesparverband
Landstrasse 45
A-4020 Linz
+43 732 7720 14380
office@esv.or.at



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A bright future for the EU energy label

By Dr. Hans-Paul Siderius

Few people know that the first EU energy label for appliances was already introduced in 1979. It was an energy label for electric ovens, which however was not mandatory and was used only by a few Member States. It took till 1992 for the publication of the framework directive that became the source of the energy labels with the colored A-G classes. Since then the layout of the label has evolved in two reviews of the framework legislation, the latest published in 2017. The figure shows the energy label lay-out since 1979. The new label on the right hand side will be shown in shops and online for various product groups as of 1 March 2021.

Lessons learned from over 40 years of energy labelling

Today, the label is recognized by almost 80% of the population. The labels shown clearly highlight some of the features of the EU energy label that made it a success. First and foremost the colored, dark green to red bars of the scale are those that attract attention. It thereby provides a clear signal to consumers with a normative message: green is efficient is good, red is not efficient is bad. This stimulates retailers to show for sale green products and avoid the orange or red products.

Second, the success of the A-G label from the 90s had as down side, 15 years ago when most products were in the A class, manufacturers resisted the rescaling of the label. Rescaling would mean that appliances with an A-label would be downgraded to C or D which has large commercial consequences because consumers are not prepared to pay a premium for products in these classes. So, the A+, A++ and A+++ classes on the current label were a compromise. The A suggests that the product is efficient and the plusses provide further differentiation: A+++ is more efficient than A++. However, these subtleties diffused the clear signal of the label and eroded the willingness to pay a premium for A+++ products. Therefore the current rescaling – back to the A-G scale – was supported by all stakeholders. Rescaling is a complex operation for manufacturers, retailers and consumers, that should happen not too often. Therefore, the current framework regulation requires at least an empty A class at the start of rescaled labels. In the same time, the aim of the energy label is to move the market into the A class as soon as possible. Manufacturers have a strong commercial interest in being among the first with a model in the A class after rescaling. So, one should not be surprised when the first A class models would already appear

on the market shortly after 1 March 2021.

A third development in the labelling scheme is not visible on the labels itself. It is the requirement to show the label in advertisements and on-line shops. As more and more consumers search for and buy products on the internet, this requirement became an important complement to the label displayed on products in physical shops. In the new energy label framework regulation this requirement has been extended to showing the range of energy efficiency classes available. Furthermore, the QR code on the new label and the introduction of the energy label product database (EPREL) enhance the online presence of the label.

A bright future for the energy label

The QR code and the product database open opportunities for a more personalized advice through an app or a website. The database provides the basic product information that can be used to calculate the running costs in € per year for a specific situation, e.g. a user that runs a washing machine 300 times a year and pays €0,20 per kilowatt-hour for electricity and €1,50 per cubic meter water. This can stimulate consumers to buy products

“ Today, the label is recognized by almost 80% of the population. The labels shown clearly highlight some of the features of the EU energy label that made it a success. ”

with the lowest running costs. Since these apps involve more specific, local information, development is best done on national or regional level. Several of these apps are already being developed.

The energy label framework regulation also provides options for electronic feedback of energy consumption on the product itself.

Energy labels already exist for ventilation units and commercial refrigeration products, and they can be developed for other commercial and professional products. Although

buyers of these products may need more detailed specifications than consumers, the energy label and the product information sheet will help them regarding energy related aspects. Moreover the energy label is an easy way of communicating the efficiency of these products to those in (higher) management that do not want to get involved in detailed technical specifications.

To conclude, the energy label is an excellent tool to stimulate energy efficiency improvements of difficult to regulate products groups. An example is small network

equipment, e.g. routers, switches, modems, that is placed on the market in a large variation and quick pace. Setting minimum efficiency requirements is cumbersome and requires great care to avoid unintentional banning products from the market. An energy label does not ban products from the market, so a product that is for whatever reason less efficient can still be sold, albeit with an energy class F or G. One could even imagine that the energy label is used for a system like a data centre. All in all, after more than 40 years there is a bright future ahead for the EU energy label. ●

Ovens 1979

€	
Electric oven Abcdefgh	XYZ00
Usable volume	00 l
Preheat consumption to 200 °C	0,0 kWh
Steady state consumption (one hour at 200 °C)	0,0 kWh
TOTAL	0,0 kWh
Cleaning cycle consumption	n.a.
Standard: CENELEC	HD 376

Refridgerators 1992

Energy Manufacturer Model	Fridge-Freezer
More efficient	A
Less efficient	
Energy consumption kWh/year (Based on standard test results for 24h)	325
Actual consumption will depend on how the appliance is used and where it is located	
Fresh food volume l Frozen food volume l	190 126 ***
Noise (dB(A) re 1 pW)	
Further information is contained in product brochures	
Norm EN 153 May 1990 Refrigerator Label Directive 94/EC	

Refridgerator 2010

Refridgerators 2021

HIGH PERFORMANCE GREEN PORT GIURGIU

A NEW LOGISTICS HOTSPOT IS EMERGING

The global main objective of “High Performance Green Port Giurgiu” is to transform the port of Giurgiu into the first efficient green port on the Danube. This project is funded with 85 % by the European Union.

The construction of the first tri-modal logistics center on the Lower Danube with a fully covered ship berth built by ILR Logistica Romania is in progress. In this building it will be possible to load and unload trucks, wagons and ships independent of any weather conditions.

The connection of the tri-modal logistics center to the public railway (about 740 meters newly built railway track) and the rehabilitation of the access roads inside the port area (about 1.3 km) are nearly completed.

For the foundation of this new logistics center thousand tons of filling material were necessary and more than 920 concrete piles had to be drilled to protect the logistics center from high water of the Danube. The highlight of this logistics center will be a ship berth inside the hall.

The logistics center will be equipped with 2 bridge cranes and a modern computer-based supply chain management system. An increase of the annual capacity of the port from current 140,000 tons to 300,000



tons in the next years is the objective. Furthermore it will create new jobs in the Giurgiu region.

At the beginning of 2021 operation in this most modern logistics center in Southeastern Europe will start. It ensures a quality-assured transshipment of high-class industrial goods like steel or automotive components and offers companies a perfect logistical infrastructure.

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



FACTS & FIGURES

Size of the logistics center: 230 m length, 40 m width

Size of ship berth inside the hall: 100 m length, 15 m width

Equipment: 2 bridge cranes with a lifting capacity of 42 tons



Co-financed by the European Union
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www.ilr.com.ro/projects/high-performance-green-port-giurgiu.html

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