SUMMER 2023

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Includes editorial contributions from:

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Vice-chair of the European Parliament's Committee on Industry, Research and Energy

Mechthild Wörsdörfer
Deputy Director General, DG ENER, European Commission

Sean Kelly
MEP

European Commission

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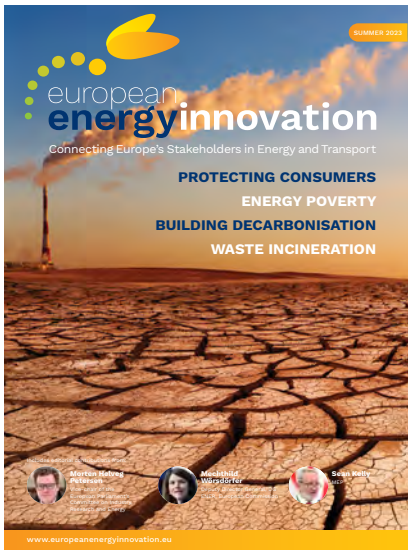

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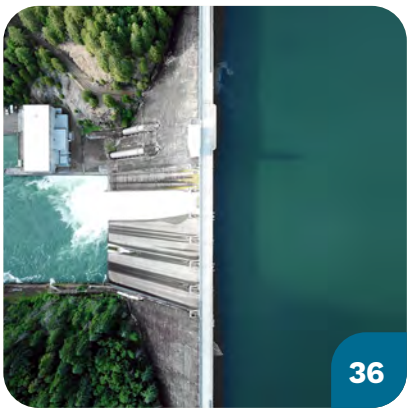

#BalanceOfPower
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power summit 2023 Balance of Power

20-21 June 2023
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CEO, ENGIE

powersummit2023.eurelectric.org

Foreword

We are proud once again to be a media partner of the "biggest renewables and energy efficiency event in Europe". This year, EUSEW will follow a hybrid format, in Brussels and online, under the theme of 'Accelerating the clean energy transition – towards lower bills and greater skills'. *More*: https://interactive.eusew.eu/.

In this issue:

An MEP on MEPS: Ciarán Cuffe MEP discusses decarbonisation of Europe's buildings, reminding us of the pressing need (energy-inefficient buildings consume 40% of Europe's energy and produce 36% of its emissions) and the potential benefits (50 billion cubic litres of gas saved per year, putting money back in the pockets of consumers). Within the context of the EPBD, he cautions against the consequences of oversimplifying the average performance of buildings at district level.

Echoing this theme, Seán Kelly MEP sets out a personal perspective on building resilience toward high energy prices. Noting how this "new normal" has exposed our collective vulnerability, and its disproportionate effects on those living in poorly-performing buildings, he argues persuasively that it is the neighbourhood ("more than the sum of its buildings, public and green spaces, amenities, mobility and public transport, social and commercial services") that offers greater opportunities to reach energy and climate objectives than a piecemeal approach to renovating individual buildings. He indicates further benefits: for social cohesiveness, air quality and energy, heat, mobility and waste management.

Crisis into opportunity: we are delighted that DG ENER's Mechthild Wörsdörfer explores the recent turbulence in energy prices. Unsurprisingly, low-income households have been hardest hit, which, coincidentally, are often the very people living in the worst-performing buildings – but she indicates that middle income households also face the prospect of not being able to pay energy bills. While measures to address the crisis include emergency provisions under the REPowerEU plan, she highlights the example of a Spanish initiative giving solar electricity produced on school roofs to vulnerable households. Wörsdörfer goes on to explore the potential for reforming the electricity market to improve consumer protection and accelerate the deployment of renewables and the phasing out of gas – which together further support the translation of climate-neutral objectives into concrete targets under Fit for 55.

Noting in her excellent article the "unparalleled" range of financial and legislative instruments being brought to bear in the fight against climate change, Nives Della Valle from the JRC explores a human perspective upon barriers to the adoption of solutions or services that use less energy. With a PhD in Economics, an interest in people's engagement with energy and a multi-disciplinary approach involving economics, engineering, geography and sociology, Della Valle is exceptionally well-placed to offer us an academic perspective on the energy efficiency gap. She acknowledges the role of neoclassical economics in providing a foundation for policy, while noting that it relies upon citizens' rational decisions. With its vocabulary of 'thinks' and 'nudges plus', and reference to the tendency to maintain the status quo and the inclination towards immediate rather than delayed benefits, it is unsurprising that the psychological nature of a behavioural economic perspective offers useful complementarity to policymakers.

On the subject of taking an alternative approach, Janek Vähk contends that incineration of municipal waste should be reclassified as disposal, rather than recovery. With climate policies tending to view incineration as low-carbon and a Directive that constrains landfill, it is no surprise that the quantity of waste being incinerated has more than doubled since 1995. Vähk presents data demonstrating that incineration is far from low-carbon – and that it is an inefficient means of generating electricity. Twice the carbon intensity and half the efficiency: we need to rethink rubbish!

Even as final preparations for EUSEW are being made in Brussels, so we can imagine finishing touches being made in Kiev to the counteroffensive that signals a new phase in the conflict there. Emerging revelations of fresh Russian war crimes should help stiffen our collective resolve to support Ukraine, while recent sombre predictions about breaching the Paris 1.5º target should spur us to greater effort on climate. Summer looks interesting, to say the least.

And there is much more for you to read inside...

Michael Edmund
Editor

Protecting and empowering consumers is key to the success of the energy transition

By Mechthild Wörsdörfer, Deputy Director General, DG ENER, European Commission

As the turbulence caused by the energy crisis now slowly begins to settle, we must draw on the lessons learned during this challenging period and continue to put consumers at the heart of energy policy.

Lessons learned from the crisis

Consumers across Europe have experienced severe pressures during the energy crisis, which was the worst of its kind in a generation. The last Consumer Conditions Scoreboard demonstrates the extent of the strain on consumers, showing that in 2022:

- almost half of consumers (48%) were worried about being able to pay their bills
- a large majority (71%) took measures to reduce their energy consumption at home
- and 37% reported that they have dipped into their savings.

Indeed, the pressures of the crisis were felt even more acutely by energy poor and low-income households who spend significantly higher shares of their incomes on energy. For the first time in recent memory, middle-income households in Europe also faced the prospect of not being able to pay their energy bills.

Our response

Throughout the energy crisis, our role as EU policy makers has been to protect struggling households, particularly the most vulnerable ones. Already in October 2021, before Russia's full-scale invasion of Ukraine, the European Commission had put in place a toolbox with different measures that Member States could implement to protect consumers from the impact of high energy prices, through direct payments of bills or support measures for energy efficiency renovations, for example.

This toolkit was further expanded following the Russian invasion of Ukraine with the adoption of a series of emergency measures under the REPowerEU plan. On 6 October 2022, the adoption of the Regulation (Joint Declaration on enhanced consumer protection) on an emergency intervention to address high energy prices allowed Member States to implement measures to reduce electricity demand to help lower the electricity costs for consumers and suggested a temporary revenue cap on electricity producers.

We have also engaged with representatives from suppliers, distribution system operators, regulators and consumer organisations, which resulted in the Joint Declaration on enhanced consumer protection, signed in December 2022, to protect consumers during the last winter, including through bill deferrals, payment plans, avoiding disconnection and the provision of clear information to all customers.

Looking ahead – the Revision of the Electricity Market Design

The Commission's recent proposal for the reform of the electricity market design addresses the issue of consumer exposure to price volatility. The main focus of the reform is in three areas:

- **Improving consumer protection** by ensuring the right to access energy through suppliers of last resort and protecting vulnerable customers from disconnection. It also aims to ensure consumers can choose from a variety of offers, including fixed price and fixed term contracts and receive clear information. At the same time, it further empowers consumers by enabling them to have direct access to renewable generation through energy sharing and self-consumption.

- **Making energy bills less dependent on short-term market price of electricity** while providing stable revenues for investors in renewable and low-carbon energy. It aims to boost the market of power purchase agreements and stabilize curb excessive revenues of energy producers by requiring the use of two-way contracts for difference for new investments in low carbon generation where public funding is needed.

- **Enabling an accelerated deployment of renewables and the phase out of gas** by facilitating further the integration of renewables in the electricity system and improving conditions for the use of flexibility solutions such as demand response, storage and other weather independent renewable and low carbon sources.

The way to 2030

Drawing on the lessons learnt from the crisis, we need to ensure that nobody is left behind. Going forward, national measures need to be well-targeted and must incentivise consumers to save energy, where feasible. Of course, we are not speaking here of the many vulnerable people living in cold homes because they cannot afford heating (situation known as "hidden energy poverty"), but for others where further energy savings are possible. After all, the cheapest energy is the energy we do not use.

In this sense, our objective to become climate neutral by 2050 was translated into concrete targets for 2030 in our Fit for 55 Package, our objective to reduce emissions by 55% before 2030, compared to 1990. Adopted by co-legislators on 10 March 2023, the revision of the Energy Efficiency Directive is set to reduce final energy consumption at EU level by 11.7% by 2030. Importantly, new provisions addressing energy poverty, basic contractual rights and information and awareness raising are set to increase the levels of consumer protection and empowerment across Member States.

As regards building renovation, the proposed Energy Performance of Buildings Directive upgrades the existing regulatory framework. It sets out how Europe can achieve a zero-emission and fully decarbonised building stock by 2050, relying on increased rates of renovation, particularly for worst-performing buildings and modernise the EU's building stock, making it more resilient and accessible.

As a further demonstration of the EU's commitment to deliver on a just and fair transition that is upheld by the benefits of structural measures, co-legislators formally adopted the Social Climate Fund to help tackle energy poverty and improve access to zero- and low-emission mobility and transport in the EU.

Empowering Consumers

Beyond providing protection, our measures must also transform consumers into active energy citizens by empowering them in energy decision-making at household and community level.

During the crisis, many households decided to invest in new technologies. Solar PV installations in 2022 grew by 47% and heat pumps saw a 38% increase relative to 2021. At community level, we saw a rise in interest in energy communities, which empower consumers to access renewables and see the benefit directly in their energy bills.

We have already seen successful examples of such energy communities in action. In Mechelen, Belgium, for example, an energy community was set up to make energy sharing possible between residents of social housing with solar panels on their roofs, and other residents of an apartment building in that district on which solar panels could not be installed for technical reasons.

I would also point to an initiative in Spain whereby electricity produced via solar panels on school roofs was given for free by the local authority to the vulnerable households selected by the municipality's social services to participate in the scheme. There are many more such encouraging examples across the EU. The crisis has shown us that consumers who are adequately protected and empowered to make energy decisions at household and community level, can truly be the protagonists of the energy transition.

The European Commission will continue to prioritise consumer protection and empowerment in our policy making, which will be key in our efforts to promote security, affordability and clean energy in our energy system, and become the world's first climate neutral continent by 2050.

Learn more and join the discussion at the upcoming European Sustainable Energy Week on 20-22 June. Register now.

The Green Deal: Paving the way to defossilise agriculture

In the face of accelerating climate change and its impacts on our planet, it is imperative to explore sustainable solutions across all sectors. Agriculture, as a significant contributor to greenhouse gas emissions, must undergo a transformative shift towards defossilisation. The Green Deal, a comprehensive and ambitious framework proposed by the European Union, offers a promising pathway to not only address climate change but also promote sustainable agricultural practices. This article delves into the essence of the Green Deal and explores strategies to defossilise agriculture for a greener future.

Understanding the Green Deal

The Green Deal, unveiled by the European Commission in December 2019, aims to make Europe the world's first climate-neutral continent by 2050. At its core, the Green Deal seeks to decouple economic growth from environmental degradation by transforming Europe into a sustainable, low-carbon society. As agriculture is responsible for approximately 10% of the EU's greenhouse gas emissions, the Green Deal recognizes the need for a comprehensive strategy to defossilise this sector.

Promoting sustainable farming practices

- **Enhancing soil health:** Healthy soils act as carbon sinks, sequestering atmospheric carbon dioxide. Promoting sustainable soil management practices, such as conservation agriculture, cover cropping, and reduced tillage, helps improve soil structure, increase organic matter content, and enhance carbon sequestration.

- **Precision agriculture:** Leveraging technological advancements like remote sensing, GPS, and machine learning, precision agriculture minimizes the use of fertilizers, pesticides, and water by optimizing resource allocation. This reduces the carbon footprint of agriculture while maximizing yields and minimizing environmental impacts.

- **Organic farming:** Encouraging the transition to organic farming practices reduces dependence on fossil fuel-intensive inputs like synthetic fertilizers and pesticides. Organic farming promotes biodiversity, improves soil fertility, and reduces greenhouse gas emissions associated with chemical inputs.

- **Agroforestry and perennial crops:** Integrating trees and perennial crops into agricultural landscapes not only provides sustainable sources of food and fuel but also sequesters substantial amounts of carbon. Agroforestry systems, such as alley cropping and silvopasture, combine trees with annual crops or livestock, resulting in enhanced carbon storage and diversified income streams for farmers.

- **Renewable energy adoption:** Agriculture can contribute to defossilization by transitioning to renewable energy sources. Solar panels, wind turbines, and biogas digesters can provide clean energy for on-farm operations, reducing reliance on fossil fuels and decreasing emissions.

- **Sustainable livestock management:** Livestock farming is a significant contributor to agricultural emissions. Encouraging the adoption of sustainable livestock management practices, such as improved feed efficiency, methane capture, and alternative protein sources, can substantially reduce the carbon footprint of animal agriculture.

- **Circular economy principles:** Adopting circular economy principles in agriculture promotes resource efficiency and waste reduction. Implementing practices like nutrient recycling, anaerobic digestion of organic waste, and the use of bio-based materials fosters a closed-loop system that minimizes the need for fossil fuel-based inputs.

Investing in research and innovation

To successfully defossilise agriculture, significant investments in research and innovation are essential. Research institutions, policymakers, and farmers should collaborate to develop and deploy innovative solutions, such as climate-resilient crop varieties, sustainable livestock feed alternatives, and efficient agricultural machinery. Public-private partnerships and funding initiatives can support research and accelerate the adoption of sustainable agricultural practices.

Governments and policymakers play a vital role in defossilising agriculture. Setting clear targets, implementing effective policies, and providing financial incentives can encourage farmers to adopt sustainable practices. Supportive measures like subsidies, tax breaks, and access to green financing can help alleviate the financial burden associated with transitioning to sustainable farming systems.

The Green Deal encompasses a wide range of European projects aimed at addressing climate change, promoting sustainability, and transitioning to a low-carbon economy.

AREA ZERO: Alliance for Renewable Energy in Agriculture and Zero Fossil Energy

The Alliance is a collaboration of six EU-funded projects working together on solutions to overcome current challenges still facing agricultural and livestock farming sectors.

Our main objectives are to enhance the collaboration toward improvement of energy efficiency in the European agriculture; maximize the impact and improve the quality and the relevance of the outputs generated by each of the projects conforming the alliance; and contribute to the 2050 climate goals of the European Union.

AREA ZERO is an alliance bringing together four projects funded by the European Union under Horizon 2020 Research and Innovation Programme, which aim to work together for implementing technologies, techniques or strategies toward lower harmful emission, cleaner energy and improved energy efficiency in the agricultural sector.

Website: www.area-zero.eu

AgroFossilFree: Strategies and technologies to achieve a European Fossil-energy-free agriculture

To feed a growing world population, the global food system needs to reduce its dependence on fossil fuels. A shift to an 'energy smart' model will safeguard the agri-food system, which is currently impacted by the high and fluctuating prices of fossil fuels and the risk that fossil fuels may not be available in the future. The project evaluates the current status in EU agriculture regarding energy use and assess existing needs, allowing farmers to optimize agricultural production through more efficient energy use and reduced GHG emissions, resulting in economic, agronomic and environmental benefits. AgroFossilFree brings together key stakeholders to evaluate and promote currently available fossil energy-free technologies and strategies (FEFTS) in EU agriculture. The goal is to close the gap between the available FEFTS, either commercial or from applicable research results, and everyday EU agricultural practices. The results assist in the creation of policy recommendations and the promotion of viable strategies and technologies.

The project has also created a Decision Support Tool, based on Artificial Intelligence, to provide an initial ranking of the technology categories best suited for each user that visits the tool. The tool mimics the consultation process of a series of experts as if they were evaluating and ranking the input data provided by the end user in order to propose the most interesting interventions for each farm. The Decision Support Tool allows to improve the visitor's experience by guiding them to the most suitable FEFTS for their day-to-day farming use.

Website: www.agrofossilfree.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000496.

RES4LIVE: Energy Smart Livestock Farming towards Zero Fossil Fuel Consumption

The farming industry inherently relies too heavily on unsustainable fossil fuels. The EU livestock sector is a significant contributor to climatic change, a driver of land-use change, is dependent on fossil energy sources, and a significant emitter of greenhouse gas (GHG) emissions. However, there is no need to maintain this harmful and non-sustainable strategy. It is currently feasible to achieve sustainable farming that is efficient, cost effective and low maintenance. In recent years, EU policy has focused on improving environmental sustainability and animal welfare of livestock production to achieve the goals set out in the European Green Deal. This signifies a transformation of the industrial sector in the near future.

In the RES4LIVE project, farmers in Belgium, Italy, Germany, and Greece are teaming up to illustrate the potential for livestock farms to reduce their fossil fuel dependence and implement renewable energy solutions. At the same time, it should be ensured that the applied sustainable energy practices do not come at the expense of animal welfare and comfort.

Sustainable farming in action: RES4LIVE incorporates a variety of renewable energy installations into four different pilot farm projects: a poultry farm in Greece, pig farms in Belgium and Italy, and a dairy farm in Germany. The selected technologies include PVT systems, PV panels, modular heat pumps, biogas upgrading to biomethane, biomethane-fuelled tractors, smart energy control systems and electrically powered on-farm machinery.

Website: https://res4live.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000785.

HyPErFarm: Hydrogen and photovoltaic electrification on farm

Reinventing agriculture is essential to aim for a climate-resilient future. While traditionally known for food production, the agricultural sector can concurrently function as an energy source, without causing any harm to its primary role. With photovoltaic (PV) technology now as competitive as wind power, the sector is poised to dramatically revolutionize renewable energy generation. Yet, the current model of sprawling PV-parks demands vast land areas, inadvertently displacing land once used for farming. The solution? Enter agrivoltaic systems, a dual land-use innovation that seamlessly integrates crop production with power generation.

HyPErFarm brings together diverse stakeholders with a singular mission: to optimize and validate agrivoltaic business models in 3 different pilot sites (Belgium, Denmark and Germany). This innovative approach incorporates cutting-edge PV technologies, such as PV H2-production and bifacial PV-panels, into radically new crop production systems. Through stakeholder innovation workshops, public perception analysis, and farmer adoption studies, HyPErFarm aims to test the marketability of its products and gauge citizen-consumer acceptance. Moreover, the consortium is exploring new methods of harnessing and distributing the on-farm energy produced through heat pumps, e-robots, hydrogen production, storage and use, and e-driven pyrolysis of biomass side-streams. The latter not only captures carbon but also enhances soil quality.

HyPErFarm's potential impact is profound. By elevating agrivoltaic systems to TRL7-8 and crafting appealing business models, the project enables farmers to participate in this transformative innovation. The overall vision? A low fossil-carbon, climate-resilient future for EU farming that can also power local communities with clean energy and hydrogen.

Website: https://hyperfarm.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000828.

TheGreefa: Thermochemical fluids in Greenhouse Farming

TheGreefa focuses on improving energy and resource efficiency in the greenhouse sector. The main challenge for the sector currently is high energy consumption for heating in Central Europe and water quality improvement in the South Mediterranean and storage of goods. The project aims to recover heat and water from the air and to create optimal climate conditions in the greenhouse. To minimise heat losses through ventilation, a technology for humidity control, heating and cooling in one system is being developed. This system utilises the absorption process using thermochemical fluid (TCF) to recover heat from the air and provide storage for the greenhouse's needs for heating, cooling, humidity control and water recovery. In another application, the absorption process produces dry air, that can be used for low temperature dying of herbs and fruits without losing their qualities, such as smell or taste.

Another TheGreefa solution is the regeneration of TCF, allowing it to absorb humidity again. This can be achieved by using low temperature renewable energy or residual heat. The regenerated TCF can then be transported and stored for extended periods without energy losses. The developed technologies are tested in two demonstrators – in Switzerland for heating and in Tunisia for cooling, water recovery and desalination. The implementation of the technologies in the greenhouse sector will result in reduced energy and water consumption, cost savings for the greenhouse owners and enhance the use of renewable energies.

Website: https://thegreefa.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000801.

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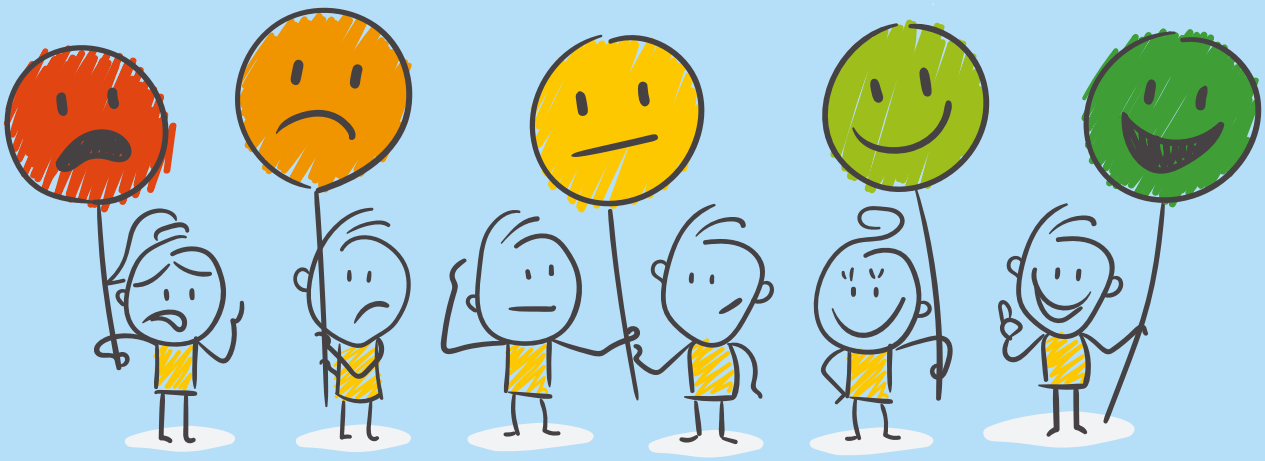

The "Energy Efficiency Watch" collects opinions from experts like you in all EU Member States on how they see the progress of energy efficiency and the energy transition in their own country in the last 3 years.

Like the three previous surveys, results will be presented to the European Commission, the EU Parliament and national policy makers. The survey is carried out in the framework of the LIFE Energy Efficiency Watch project.

By taking part, with just 10 minutes of your time, you will be making an important contribution to energy efficiency and energy transition efforts in Europe!

PARTICIPATE HERE:

bit.ly/eew-survey
www.energy-efficiency-watch.org

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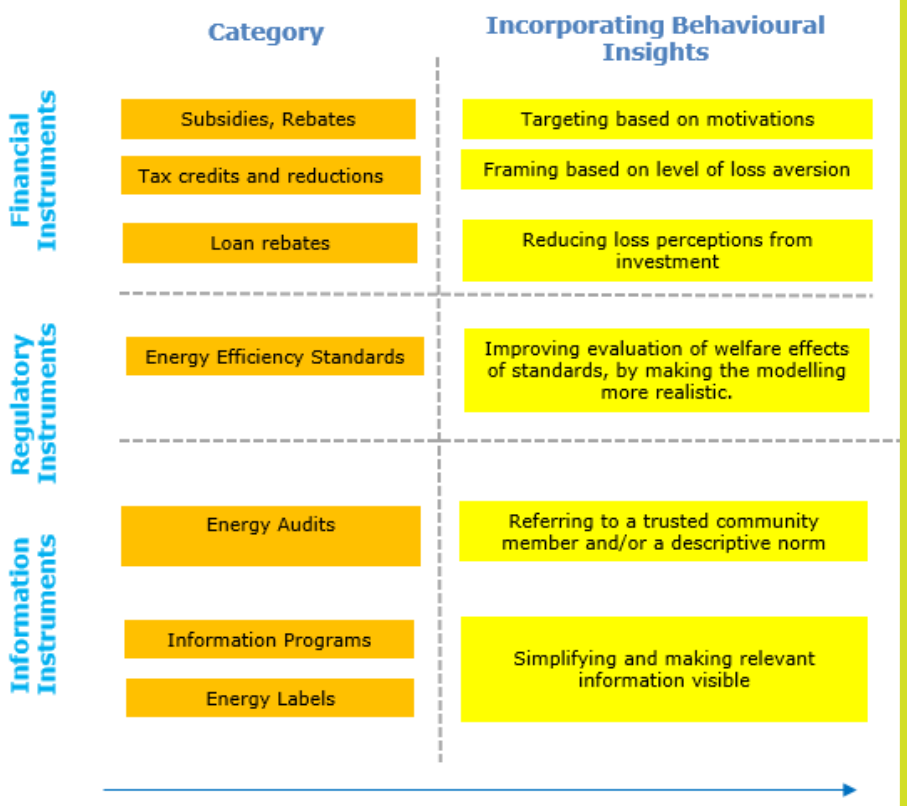
A more behavioural approach to energy efficiency policy

By Nives Della Valle

In its endeavours to reach climate neutrality by 2050, the European Union identified energy efficiency as a major contributor to achieve decarbonisation. Boosting energy efficiency is a key pillar of the European Green Deal and is, in the building sector, the goal of the Renovation Wave, which also addresses energy poverty. Improving energy efficiency is one of the main objectives of the post-pandemic economic recovery plan as well as of the REPowerEU plan, launched to tackle the energy crisis and to accelerate the transition to more sustainable energy systems, as outlined in the Fit for 55 package. Finally, energy efficiency measures are being extensively supported through the European Structural and Investment Funds.

The European Union's enabling policy framework and supporting measures for energy efficiency are unparalleled.

Fig. 1. How traditional instruments promoting energy efficiency can be complemented by behavioural insights



Source: adapted from Della Valle and Bertoldi (2021).

However, many barriers still prevent citizens from adopting solutions or services that use less energy, leading to the so-called energy efficiency gap.

The energy efficiency gap is a long-debated phenomenon that refers to the difference between the socially desirable rate of energy efficiency investments and that actually observed.

As highlighted in the proposals for recasting the EU Directives on Energy Efficiency and on the Energy Performance of Buildings, many barriers impede energy efficiency investments, including behavioural ones. Thus, to promote energy efficiency uptake, a range of instruments is required, which should also include measures that empower citizens.

Traditionally, the energy efficiency gap was analysed through the lens of neoclassical economics. By associating the energy efficiency gap with market characteristics and failures, such as imperfect information, split incentives, and credit constraints, neoclassical economics provided a rationale for implementing interventions aimed at correcting the market. The underlying assumption was that citizens are rational decision-makers who would always seek the best solution: given that investing in energy efficiency is cost-effective, they would always prefer to do so, once the market failures are remedied, for example by ensuring access to the relevant information.

However, the uptake of energy efficiency is intertwined with many

more factors than expected monetary returns and available information.

Behavioural economics can better account for such complexity. As an example, because we actually seek a solution that is good enough, rather than the best one, we systematically fail to assess all the information we have, which can result in ill-informed decisions. Such limited attention is one of the contributors to the energy efficiency gap: we might direct more attention to salient features, such as high prices or subjective negative opinions of peers, and disregard other less salient but crucial attributes, such as low running costs.

The behavioural economic perspective takes into account many other behavioural mechanisms that help explain the energy efficiency gap, such as the tendency to maintain the status quo and the preference for options that provide immediate rather than delayed benefits.

The behavioural economic perspective therefore very usefully complements the economic rationale for interventions with the behavioural one.

This has led to an increased use of behavioural insights in the European policy cycle within a broad range of policy areas, including energy efficiency. Behavioural insights can improve the overall policy impact by enabling adjustments to traditional interventions, such as financial, regulatory and information instruments (Figure 1). As an example, the new generation of energy labels was informed by the experimental evidence that citizens process energy efficiency information more easily if it is framed on the A-to-G scale rather than on the numerical/ alphabetical one.

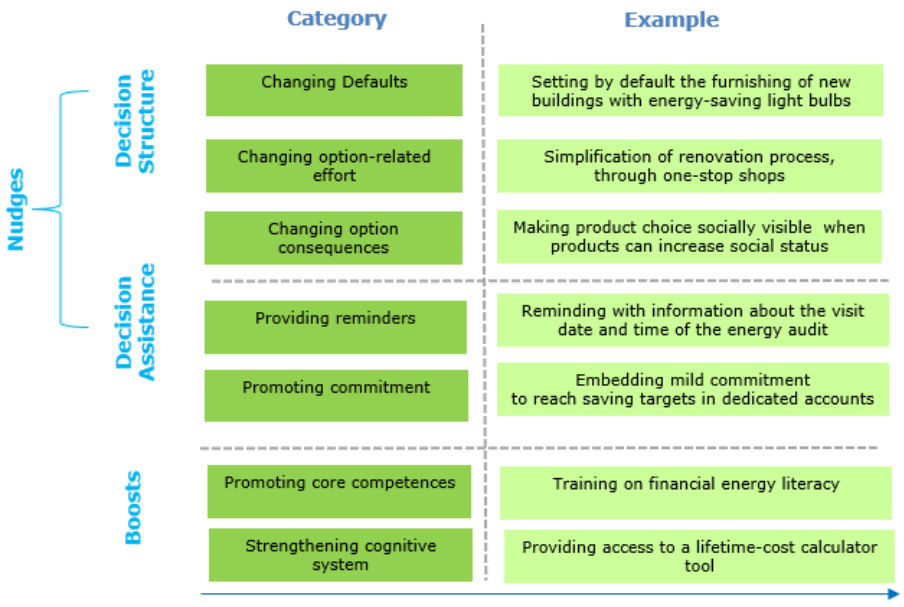
Behavioural insights can also enrich the policy toolbox with additional instruments, like nudges and boosts (Figure 2).

Nudges enable policymakers to address specific behavioural aspects that prevent citizens from investing in energy efficiency by altering the way the decision is presented or by assisting their decision. As an example, one-stop-shops play a central role in the proposals for recasting the EU Directive on the Energy Performance of Buildings, as they can reduce the cognitive effort needed for investing in renovation, thus facilitating the renovation decision. Boosts promote core competencies, empowering citizens to make complex decisions autonomously. As an example, in the proposal for recasting the EU Directive on Energy Efficiency, training activities are considered key to promoting behaviour change: boosting financial literacy in the field of energy can help citizens appreciate the benefits of energy efficiency and make better-informed decisions.

Overall, behavioural insights can better integrate the human factor into energy efficiency policy-making.

However, this integration is only in its infancy. Notably, the potential of instruments like thinks and nudges plus, which could enable citizens to shift from being passive policy recipients to becoming policy co-developers, remains largely untapped. Thinks are deliberative interventions, where citizens can reflect on a problem and have their say on potential solutions. Nudges plus add the deliberative element of thinks to a nudge, which can result from a co-design process involving different forms of expertise, including citizens and local policymakers. Initiatives such as the Covenant of Mayors, the Energy Communities Repository and the Rural Energy Community Advisory Hub already showcase good practices on how to foster this bottom-up approach. More particularly, the Clean Energy Package represented a turning point for the development and diffusion of energy communities in Europe as places where pro-environmental consumption practices and deliberation take place.

Fig. 2. Exemplary behavioural instruments for promoting energy efficiency investment decisions



Source: adapted from Della Valle and Bertoldi (2021).

FOREST

Funded by the European Union

Advanced lightweight materials for energy-efficient structures

forest-project.eu

Insight
The FOREST project will develop innovative bio-based polymers & additives and recycled carbon fibres that will facilitate the decarbonisation of the transport sector for the next three and half years. The project will contribute to the decarbonisation of the transport sector by developing and implementing innovative bio-based polymers & additives and recycled carbon fibres.

Concept
FOREST will develop novel lightweight multifunctional biocomposites as a competitive alternative to conventional composites.

New chemistries will be developed based on bio-based materials (reactive and nonreactive polymeric system and fire-retardant additive) in combination with fully recycled carbon fibre and EMI particles.

These biocomposite candidates will be obtained using one-shot manufacturing techniques, involving Out-of-Autoclave (OoA) processes to build and test prototypes (TRL5) with improved multifunctional properties (mechanical resistance, fire-retardant, EMI-shielding) for transport application.

FOREST will increase the focus area on the sustainability in Circular Economy (CE) by effective circularity solutions applied to multifunctional biocomposites constituents with >50% sustainable materials contain in the lightweight products.

Goals
FOREST project will contribute to the decarbonisation of the transport sector by developing and implementing innovative bio-based polymers & additives and recycled carbon fibres. The goal will be achieved by combining three key drivers: **Reduce, Recovery, and Reshape.**

About FOREST Project
FOREST is a 42-month research project funded by the European Union's Horizon Europe research and innovation programme under Grant Agreement No. 101091790 with €4.3 million in funding. The research consortium is made of 14 partners from 8 different countries. The project is coordinated by AIMPLAS - Plastics Technology Centre set in Valencia, Spain.

Start date: December 2022

Duration: 42 Months

Project coordinator: AIMPLAS – ASOCIACION DE INVESTIGACION DE MATERIALES PLASTICOS Y CONEXAS

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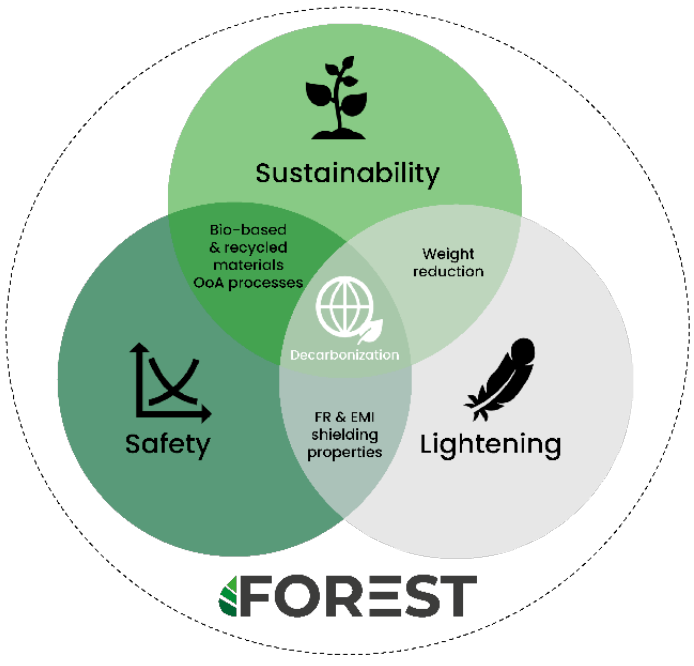


CARBON4MINERALS

Funded by the European Union

Transforming CO_2 into added-value construction products

Insight

The European Green Deal has set ambitious targets for GHG emission reductions for the process industry, including steel and cement production. While transitioning to renewable energy can alleviate a significant part of GHG emissions, it offers no solution for process-inherent emissions. Residual, hard-to-abate CO_2 emissions from industrial processes will need to be captured, processed, and recycled into new products to meet these targets. The Carbon4Minerals project aims to address this challenge.

Concept

The core concept of Carbon4Minerals is to address the simultaneous use of CO_2 from industrial flue gases with current and future waste streams to unlock a vast stock of resources for innovative low-carbon binders and construction materials. This cross-sectorial innovation has the potential to reduce European CO_2 emissions by 46 Mt/y, equal to 10% of the EU process industry emissions, while safeguarding the competitiveness of the European industry.

Solution

The cement industry generates 6-8% of global GHG emissions and seeks alternatives to Portland clinker to reduce CO_2 emitted during limestone calcination. Carbon4Minerals develops innovative technologies for CO_2 capture and use in the production of carbon-negative minerals for high-value construction products, with the potential to reduce CO_2 emissions by 80%-135% compared to cement-based reference materials. The project addresses challenges arising from dwindling supplies of low-carbon resources for cement production, while reducing emissions by 10% and safeguarding competitiveness.

About the CARBON4MINERALS Project

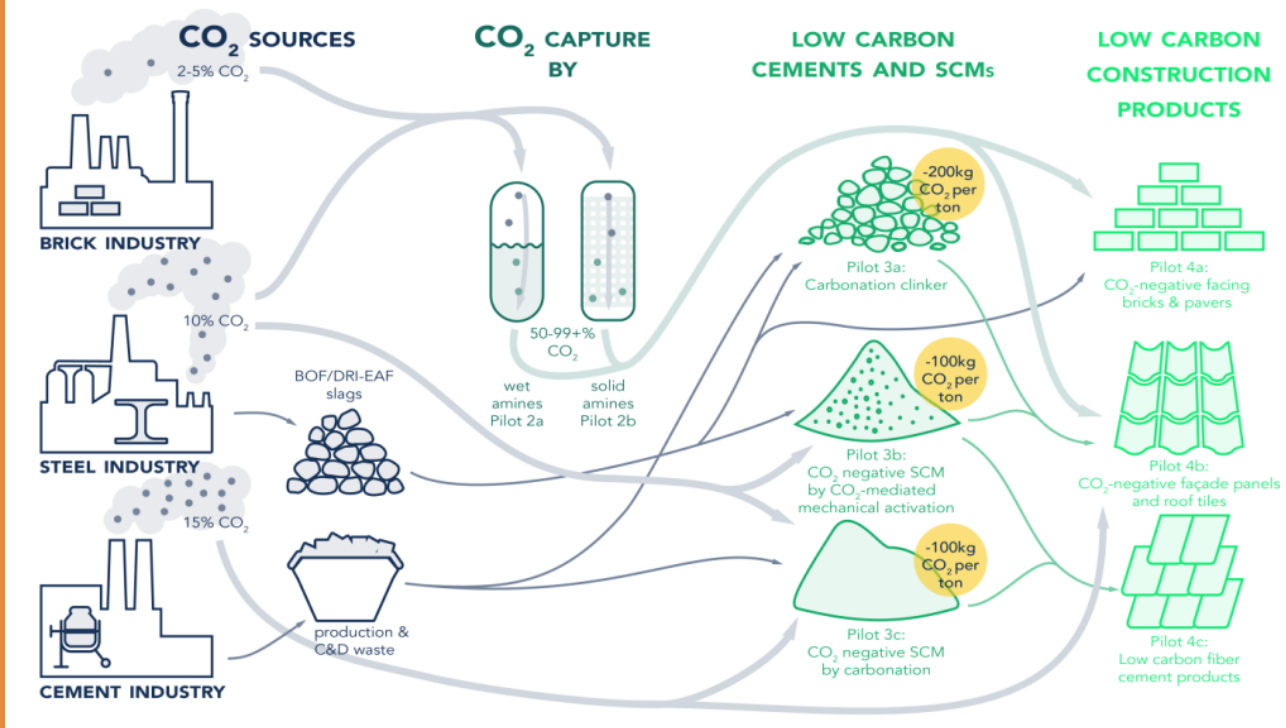
The Carbon4Minerals project, funded by the European Union's Horizon Europe research and innovation program under Grant Agreement No. 101091870, with an EU contribution of €14,846,811 in funding and a total cost of €20,322,450.

Start date: January 2023

Duration: 48 Months

Project coordinator: VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V.

carbon4minerals.eu



Unlock the green subsurface potential

By Morten Helveg Petersen (pictured), Vice-chair of the European Parliament's Committee on Industry, Research and Energy

By 2030, Aarhus, Denmark's second largest city, will be the home of EU's largest geothermal district heating plant. It will meet 20 percent of Aarhus' district heating needs, equivalent to heating some 36,000 households.

Now similar projects are underway in other Danish cities including capital Copenhagen. My objective however, would be to elevate the significance of these projects beyond Denmark and onto the European stage, harnessing the green potential of geothermal energy in the crucial battles against climate change and ensuring energy security within the EU.

Geothermal energy serves as a complementary power source to wind and solar energy, as it can operate as a reliable baseload supply regardless of weather conditions. Consequently, incorporating geothermal energy into the European energy mix is pivotal to achieving the EU's energy goals.

Raising awareness and promoting geothermal energy at the political level within the EU is essential. Despite its enormous potential, geothermal energy often goes unnoticed in Brussels and its surrounding institutions.

Establishing a strong political position within the European Parliament will drive the development of a comprehensive EU strategy for geothermal energy, incentivizing private investments, facilitating access to subsurface data, and expanding the use of geothermal energy within the European district heating network.

Just as wind turbines harness energy from the wind, and solar cells harness energy from the sun, geothermal energy utilizes heat from the Earth's interior. The Earth's core is over 5,000 degrees Celsius, constituting an inexhaustible source of thermal energy that we currently only exploit in a few places on the planet.

The most well-known example is arguably Iceland, where heat bubbles just below the Earth's surface and forms the core of Iceland's energy system.

The heat is not readily accessible in many places, but large parts of Europe lie above geothermal heat sources, and the hot geothermal water is typically found 2-3 km below the surface. At the same time, 3 out of 4 Europeans live in urban areas, and if you have a local heat source combined with high population density, the conditions are nearly optimal for district heating.

Under the right conditions, district heating is the most efficient provider of affordable green heat to consumers. At the same time, Europe finds itself in a situation where we are constantly dependent on enormous amounts of imported fossil energy, especially from the Russia. In the coming years, Europe will need all the green energy we can get our hands on, and geothermal energy is an excellent complement to the expansion of wind and solar energy because energy production is not dependent on whether the wind blows or the sun shines.

Geothermal energy can readily replace some of the coal in the major district heating networks in

Germany, Poland, Hungary, Slovakia, and Bulgaria – all countries that are particularly dependent on imported fossil fuels. These countries struggle to make their district heating green while keeping the heating prices low.

In light of this, it is easy to see why geothermal energy is a natural ingredient in the European energy mix. When the technology is not widely spread, it is primarily because district heating companies have been concerned about the financial risks associated with geothermal projects, the prospect of drilling projects ending up without finding hot water.

The extraction of geothermal heat is technically complex, and expertise in subsurface operations is not district heating companies' strongest suit. Typically, drilling engineers, geologists, and reservoir engineers have been employed in the oil and gas industry, not in the district heating sector.

The reason geothermal projects are currently gaining momentum in Denmark is that the technical challenges have been solved with the help of specialists from gas extraction in the North Sea. The economic challenge has been addressed through legislation that allows for private investments in geothermal energy for district heating, while also protecting consumers from the financial risks associated with geothermal projects.

This is the kind of political attention, I want to raise in the EU. Geothermal energy has tremendous green potential, but it simply is not sufficiently visible on the EU radar. In practical terms, it is initially about creating awareness about the possibilities within geothermal energy, and then my ambition is for the European Parliament to establish its own political position in this field. Ultimately, the European Commission holds the key to getting geothermal energy at work for a greener Europe. Ultimately, we need European legislation promoting energy transition through geothermal-based district heating. This can include incentives for private investments, access to subsurface data, and the general expansion of the European district heating network for all renewable energy sources.

We generate lots of renewable energy by water, wind and sun. The circle of renewables is on complete when we include earth-based renewables as well.

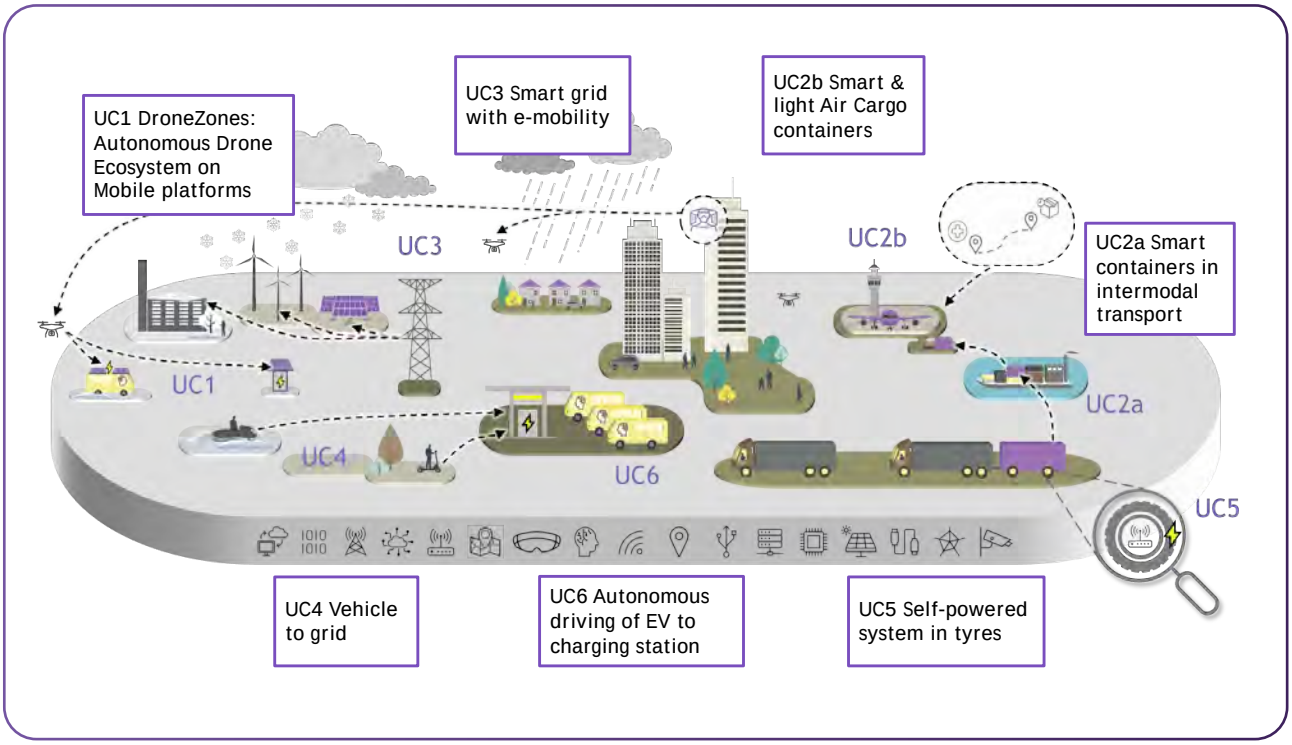
Energy ECS initiative to develop smart and secure energy solutions for future mobility and green-energy transition

An ECSEL JU funded project with 28 partner organizations from eight European countries is paving the way for an emerging new European business and technology ecosystem, aimed at tackling various energy related challenges for the future of mobility. The project accelerates Europe's decarbonization goals for 2050.

Energy ECS (Electronics, Components and Systems) is an extensive 3-year project with an overall budget of 33 M euros. It is co-financed via the ECSEL Joint Undertaking of the EU Horizon 2020, national funding agencies of the participating countries, and the consortium partners. The project consortium consists of 14 small and mid-sized enterprises, 8 large enterprises and 6 research and technology organisations from Finland, Austria, Germany, Ireland, Iceland, Italy, Sweden and Switzerland. The consortium brings together all the players needed to develop integrate technology platforms and bring about the field-testable solutions.

The advancement of e-mobility is a key part of the green energy transition. Together with its direct role in reducing emissions, the adoption of e-mobility also has a crucial indirect role as a grid stability element. E-mobility accelerates the transition to wind and solar energy production, as well as enabling the efficient utilization of resources and physical assets, and thus reduces the use of fossil fuels in the energy mix.

The Energy ECS project, launched in June 2021, responds to these needs by developing a set of technologies to improve the digitalisation and energy footprint of e-mobility systems. The aim is to provide European business the know-how based on manufacturing capabilities combining



hardware, software services and data. This combination enables interaction with other vehicles and smart mobility infrastructure: connection to the grid, intermodal transport, autonomous driving, data generation, and vehicles as service providers.

This project is also working to mitigate the challenges that electric vehicles pose on the energy system. The Energy ECS project will build on six use cases that represent different angles on future mobility and energy: enablers of new logistics modes, energy optimized and trackable intermodal transport, charging technologies and opportunities, safe and efficient operation of drones in urban environments, grid stability responding to bi-directional charging, and enablers of safe autonomous driving.

By 2030, the new technologies developed in Energy ECS are expected to generate turnover for the participating companies. In addition, the project is aimed at enabling increased market share and market leadership for the commercial partners. The partners represent a wide array of technologies including, for example, battery-charging electronics, grid and sensor power management, energy harvesting, real-time location controls and sensors. The R&D within the project will also apply trustworthy artificial intelligence, immersive technologies, IoT, ultra-low power technologies, advanced algorithms, battery life simulation models and software. All the technologies will be designed with cyber-security and reliability in mind.

Project coordinator: Tietoevry Finland

Learn more: www.energyecs.eu

Get in touch: info@energyecs.eu

Follow the progress: #energyecseu

ECSEL JU

EUROPEAN PARTNERSHIP

ENERGY ECS

This project has received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 101007247. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Finland, Austria, Germany, Iceland, Ireland, Italy, Sweden, and Switzerland.

Building resilience neighbourhood by neighbourhood

By Sean Kelly, MEP (pictured)

The path to achieving climate neutrality by 2050 requires addressing the energy efficiency of Europe's diverse building stock. It is evident that without significant improvements in this sector, our overarching goal will not be reached. The recent energy crisis has exposed Europe's vulnerability to sudden price hikes, and it is clear that gas prices will remain high even after the crisis subsides.

This "new normal" will disproportionately affect those living in poorly performing buildings, placing a heavier burden on them compared to those in energy-efficient structures. As other sectors modernize, households will bear the brunt of soaring energy prices.

The solution is clear: we must renovate our buildings to consume less energy and rely on cheaper and greener renewable sources. Simply scaling up renewable energy resources alone will not be sufficient to meet our climate goals by 2030 and 2050. We must prioritize increased renovations and structural measures in the building sector. Neglecting the benefits of renovations would only shift the burden of reform to other sectors.

At the core of our efforts lies the Energy Performance of Buildings Directive (EPBD), the EU's primary legal instrument to address energy use in the built environment. While this is EU legislation, its implementation ultimately rests with local authorities and municipalities in most respects. However, it is crucial to recognize the role of the EPBD in setting minimum performance standards for buildings.

In my view, a neighbourhood

approach is essential in our pursuit of energy efficiency. By considering entire neighbourhoods and taking into account local mobility, social infrastructures, and water and wastewater management, we can enhance the effectiveness of renovations.

From the historical perspective, most institutional housing providers own residential units that are geographically clustered, i.e. neighbourhoods. Yet, a neighbourhood is more than the sum of its buildings, public and green spaces, amenities, mobility and public transport, social and commercial services are all included.

Looking at scale rather than just individual building level offers additional ways to reach ecological, climate, energy usage and social goals in the building sector. These ways are not available with a perspective that is limited to single buildings or apartments.

The Energy Performance of Buildings Directive should embrace this neighbourhood approach to strike a balance between individual building approaches, as detailed in the European Parliament's Report, and national trajectories for progressive renovations in the Council's General Approach.

Although some versions of the Parliament's position at one point included a neighbourhood approach to minimum standards, derogations of certain portions of the building stock were ultimately chosen. However, the practical benefits of a neighbourhood approach are clear. Through integrated planning and subsidy schemes for technologies such as solar installations, heat pumps, and energy storage, we can increase energy savings and demand-side flexibility while actively involving people in the energy transition.

A neighbourhood approach to renovations offers numerous advantages, including cost-effectiveness, improved air quality, and the potential for sector coupling, encompassing energy, heat, mobility, and waste management.

If done at scale, there will be reduced costs for maintenance, tenant participation is less fragmented and therefore easier to organise, the renovations themselves become more cost efficient. In essence, most advantages would result from reduced proximity and homogeneity of buildings.

Given the variations in clean heating alternatives across the EU and even within the same municipality, area-specific solutions through a neighbourhood approach prove more efficient, both technically and economically.

Although neighbourhood pilot projects are currently limited, there is significant potential to scale them up across cities, nations, and the entire EU. To expedite the heat transition process, we must address barriers such as labour shortages and citizens' willingness to invest in alternative technologies. Close collaboration between the national government, industry, and educational institutions is crucial to developing mechanisms for monitoring the installation times of sustainable alternatives.

Municipalities play a pivotal role in driving the heat transition forward. With their valuable local knowledge of building stock, heating sources, stakeholders, and residents, they can better anticipate local skill needs, facilitate job-skill matching, and support small- and medium-sized enterprises in streamlining their workforce.

Moreover, municipalities are well positioned to consider the social aspect of the transition in their energy strategies. By developing locally tailored solutions and outlining alternatives to fossil fuels on a neighbourhood-by-neighbourhood basis, they can actively engage residents and promote behavioural change.

Neighbourhood-level communication has proven effective in leveraging social influence and sharing success stories related to district heating, heat pumps, and insulation, thereby maximizing the impact of these measures.

In my view, Member States should be required to set up a minimum amount of pilot neighbourhood projects. Ideally, this would be in every city, but municipality administrative capacity should be factored in. This will help create a positive narrative that could spread through the population, raising awareness and knowledge of environmental problems as well as the benefits of increased energy performance. If implemented probably, this would increase demand for renovations and complement supply sided instruments.

Embracing a neighbourhood approach to building renovations is not only a practical and economic means for achieving climate goals but also for creating a sustainable future.

By prioritizing energy efficiency and integrating renewable technologies, we can reduce carbon emissions.

Seán Kelly MEP has been an MEP for Ireland South since 2009 and is the leader of the Fine Gael delegation in the European Parliament. A member of the European Parliament's Industry, Research and Energy Committee, Kelly has worked extensively on renewable energy and energy efficiency policy.

Digital tools

Optimising energy renovations and drive the EU building stock towards decarbonisation

Retrofitting existing buildings for decarbonisation comes with many bottlenecks, including financial issues, difficulties in efficiently managing the different actors and tasks involved, and the need of closing gaps between design assumptions and the performance of the building after the renovation.

To build capacity amongst the actors of the deep renovation value chain and make decarbonisation of existing buildings a reliable, attractive, and sustainable investment, the StepUP EU-funded project has developed a set of innovative digital tools for the efficient management of energy renovation projects and helping renovation managers, building owners and occupants to make informed decisions.

The solutions developed include data-driven models and tools for the implementation of the LEAN methodology in renovation projects, and a range of tools to assess the buildings more in need of renovation and which measures and solutions will have a greater impact. Other results include a management platform to connect the different stakeholders and financing models for the optimisation of energy consumption, comfort, and cost performance over the life of the building.

Data intelligent tools for optimising energy retrofitting

The StepUP project has developed a life-cycle platform to "reduce uncertainties, facilitate the renovation steps and provide a unified place for planning, designing and easing decisions on renovation projects," says the coordinator of the project from Integrated Environmental Solutions Ltd, Amisha Panchal.

The data intelligence tools include a project management portal where stakeholders can communicate and exchange information amongst themselves, and constitutes a suite of digital tools which can be used to identify the best candidates for deep renovation and assess the best combination of energy conservation measures for a specific building and innovative solutions. The platform allows the selection of the optimal set of energy efficiency measures to optimise both energy savings and investments, considering comfort and indoor conditions.

Assessing the financial viability of deep energy renovations

To tackle financial factors backing the start of renovation projects, the StepUP project is also offering a tool helping users determine whether a proposed investment in an energy renovation scenario makes sense from a financial performance point of view.

The tool, targeted to building owners, either landlords or owner-occupiers, aims to ease the decision-making process and offer guidance and support based on financial data.

"We integrate benefits and cost reductions, such as energy cost savings or increased rent income, as well as cash flows from relevant expenses, to provide users with a relevant output to evaluate the feasibility of the renovation and their return on investment," says Miguel Casas, Senior Financial Consultant at Energinvest.

IT tools to ease the implementation of LEAN construction principles

The concept of LEAN Construction is beginning to spread in the sector, although in renovation projects its introduction has been much more limited. Under the project, a digital tool based on LEAN principles has been designed to identify deviations in real-time, as well as to evaluate the actual impact of the energy renovation solutions.

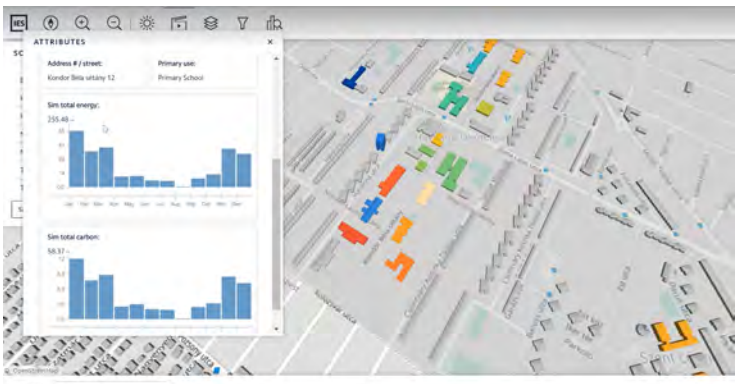
"We aim to help renovation managers to execute effectively the installation and deployment of industrialised solutions in deep renovation projects," explains María Ibáñez, Head of R&D projects at ACR Grupo. "The tool is accessible through a dashboard and a mobile app that can be used to report and validate the progress of the different works on-site," adds Ibáñez.

The StepUP project addresses the European challenge of achieving the decarbonisation of existing buildings by 2050 in line with the European Union's Renovation Wave initiative. The project is demonstrating the potential of the platform and digital tools in three different pilots across Europe with different renovation needs and characteristics.

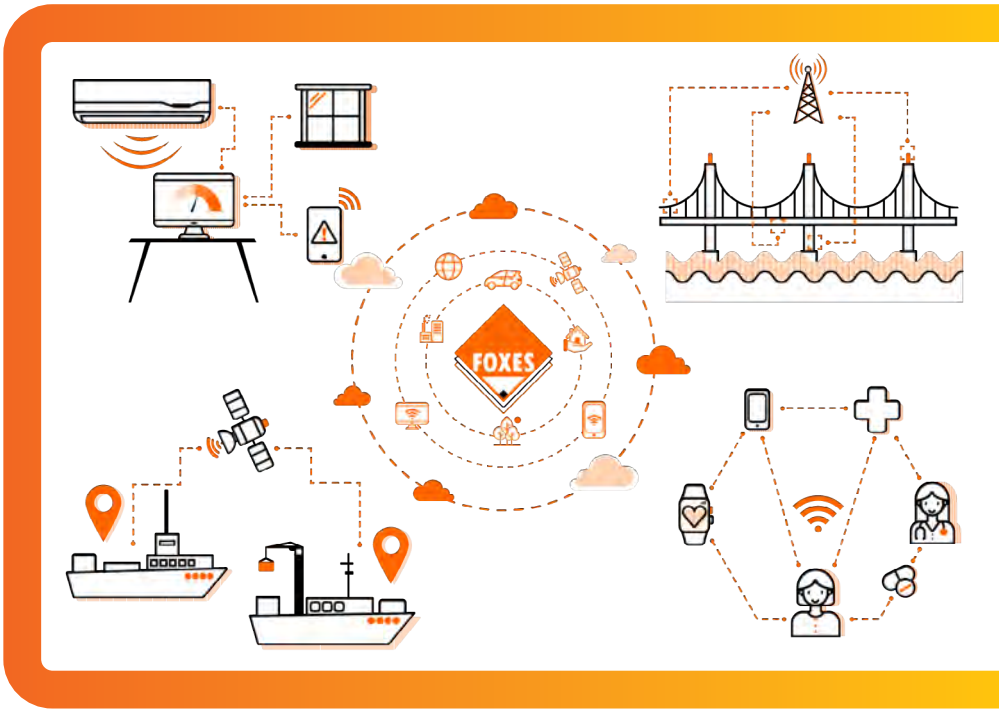
StepUP is made up of a consortium of nine partners from seven European countries, including two technology transfer institutions (Eurecat, Unismart), five industrial companies (IES Ltd and IES R&D, Manni Group, ABUD, Energinvest and HeatVentors) and two owners and contractors (ACR and Municipality of 18th District of Budapest).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 847053.

Overview of a Budapest 18th district building's simulation results on IES' Portfolio Overview or iCIM tool, part of the suite of tools in the Life-cycle Platform



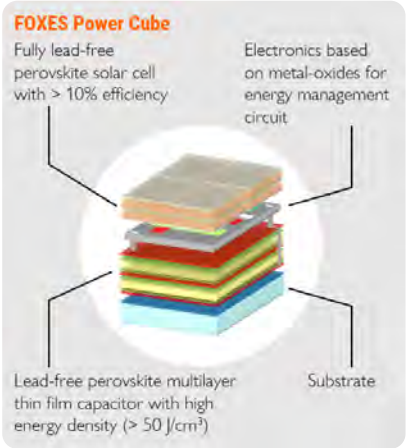
FOXES: A clean and sustainable way to power wireless IoT devices



The Internet of Things (IoT) is a network of physical objects, or 'things', embedded with sensors, software and connectivity that enable them to collect and exchange data. It is the backbone of many forward-looking concepts such as Smart Homes and Industry 4.0. The range of IoT devices is extremely broad – from smartphones to GPS tracking systems, from environmental sensors to medical devices, to structural-health monitors on large infrastructure.

For many applications, IoT devices need to be completely wireless and self-powered. The current solution is to rely on batteries, with or without energy harvesting sources such as photovoltaic cells. But batteries have a limited lifetime – often shorter than the device itself – and a significant environmental footprint. The project FOXES addresses the challenge of developing a clean and sustainable way to power wireless IoT devices.

The goal is to realize what has been dubbed the Power Cube: a self-contained and portable energy-harvesting and storage system, consisting of an array of photovoltaic cells, a capacitor with high energy-density and an energy management circuit. The system is designed to power an IoT device with solar energy during the day, and to store the surplus energy in the capacitor for retrieving it during nights. All three components of the Power Cube are based on low-cost processes that minimize the use of harmful chemicals, toxic elements and critical raw materials.



The second innovation developed within the project is a low-power sensor node for air-quality monitoring, which represents also the first test bed for the Power Cube. At the end of the project, the combined system Power Cube plus sensor node will be tested in the lab against gas mixtures under variable irradiation conditions, as well as in a real urban environment for monitoring pollution levels.

The long-term vision is to produce the Power Cube as a modular system that can be customized according to the needs of the application. Stand-alone power systems could be made up of multiple Cubes connected in parallel. This opens up endless application possibilities, especially in areas where lightweight IoT devices and low-cost power generation are critical, such as autonomous driving sensors, aeronautics, industrial process automation, GPS and wearables.

FOXES is a project of Materials Center Leoben Forschung GmbH (AT), Bergische Universität Wuppertal (DE), AMO GmbH (DE), UNINOVA – Instituto de Desenvolvimento de Novas Tecnologias (PT), and of the Universitat de Barcelona (ES). The project is funded by the European Union's Horizon 2020 Research and Innovation Programme, under grant agreement Nr. 951774.

More information on www.foxes-project.eu

MEPS: A fair and innovative framework to decarbonise Europe's buildings

Prioritising upgrades for buildings will accelerate the rollout of green technologies, while improving the lives of people living in energy poverty and reducing energy consumption, writes EPBD lead negotiator Greens/EFA MEP Ciarán Cuffe (pictured).

Energy innovation is driving the decarbonisation of Europe's buildings, for the betterment of our pockets, our health, and the planet.

This innovation is not limited to technology, however. We are also delivering innovative policy approaches to accelerate this process and channel the necessary support to the people who need it most.

One example of such an approach is the Minimum Energy Performance Standards or 'MEPS' in the Energy Performance of Buildings Directive (EPBD). MEPS require buildings to meet predefined energy ratings by a specific date or at a certain moment in the lifecycle of the building, like during a sale or a change in tenure. The standards are then progressively tightened over time, in line with the EU's objective of a carbon neutral building stock by 2050.

By setting these standards, I believe we can improve the energy efficiency of Europe's building stock significantly, while lifting millions out of energy poverty and lowering bills for all. We can also slash Europe's energy consumption, and deliver better health outcomes for everyone living in Europe.

Seven out of every 10 buildings in Europe are energy inefficient. That means that energy is leaking out of badly insulated windows, doors, walls, and roofs across the EU. People and organisations are spending millions every month on energy that goes to waste.

MEPS can turn this situation on its head, by establishing a baseline requirement of energy performance that buildings must reach, ensuring that new and existing buildings meet minimum efficiency standards.

Why tackle buildings? They represent approximately 40% of Europe's energy consumption and 36% of carbon emissions. More energy efficient buildings consume less energy, and therefore contribute less emissions. MEPS will provide the necessary clear benchmarks to drive improvements in the energy performance of our buildings.

Not all buildings are equal under MEPS: different standards and timelines are set for different building types, including residential, non-residential (commercial), and public buildings. Residential buildings are given more time to reach these standards than for public buildings under the European Parliament proposal, for example.

Energy inefficient buildings are also costly, and most acutely for the millions of people in Europe who live in energy poverty. It is estimated that the EPBD will save around 47 billion cubic litres of gas per year, putting more money in the pockets of those vulnerable households struggling to pay their bills. MEPS prioritise these households by starting renovations with the buildings that waste the most energy ('worst-performing buildings') first. It is often the poorest

people who live in these buildings, who are most impacted by high energy bills. Social safeguards will protect those who cannot afford renovations or rent increases, while renters will specifically benefit from the EPBD because they often pay the energy bills but have no influence over the energy performance of their homes.

To further protect people living in energy poverty, we should be careful not to apply a district level approach to MEPS. This would be disastrous for vulnerable households. Under this approach, a local authority operating in a district with a mix of well and poorly-performing buildings could take the average performance of a district as the standard and prevent targeted action against the worst-performing buildings. We must strictly avoid condemning vulnerable households to energy poverty by forcing them to live in highly inefficient buildings with sky high heating bills. Our priority must be to realise the potential of MEPS to live millions out of energy poverty.

MEPS will bring lower bills to all, because more efficient buildings require less energy to operate, leading to lower bills and long-term cost savings for building owners and occupants. They will also support households and building owners to get there, by encouraging them to adopt energy-efficient technologies and practices like heat-pumps and building automation and control systems (BACS). They should also benefit from supports to upgrade their buildings with these systems, and we can expect the price of these technologies to come down over time.

Implementing MEPS doesn't necessarily mean that a building has to be renovated. A MEPS can be achieved for certain buildings if there is an increase of the share of renewables in the grid or via locally sourced renewables or if the building is connected to an efficient district heating network. Something as simple as improving the building's insolation or installing solar rooftop PVs could increase the energy performance of the building and bring it to the relevant standard.

As MEPS often incorporate better insulation, efficient heating, cooling, and ventilation systems, they can ensure better health outcomes for people living in Europe. These improvements enhance indoor comfort and well-being by maintaining a more consistent temperature and improving air quality. Poor air quality was the cause of 238,000 deaths in 2020 and improved air quality through cleaner buildings would be a significant step in curbing this figure.

MEPS will also contribute to mitigating climate change and reducing greenhouse gas emissions. Better performing buildings will result in lower carbon emissions and reduce our reliance on fossil fuels from authoritarian regimes like Russia and Saudi Arabia. By promoting sustainable building practices, MEPS support the EU's environmental goals and helps the transition to a renewable-based economy.

It is very important not to mix up cost and investment. At the end of the day, this directive is about protecting households from increased fuel prices and saving money for families in the long term. If we don't tackle buildings now, we only create a larger and more expensive problem for future generations. To be serious about our climate goals and make the European Green Deal a reality, we need a strong EPBD that realises the full potential of MEPS for people and the planet.

GA N° 101096923

Navigating the Future: SEAMLESS and the Next Autonomous and Smart Shipping Frontier

By Marco Molica Colella, CiaoTech – PNO Group, Managing Consultant R&D Advisory Services. Email LinkedIn and Anastasiya Azarko, CiaoTech – PNO Group, Junior Innovation Consultant. Email LinkedIn

Achieving sustainable transport in supply chains is often hindered by the balance between performance expectations and available resources, including delays due to congested land infrastructures and the inability of supporting infrastructure to serve increasing freight flows. SEAMLESS is a Horizon Europe R&I project which unites 26 partners from 12 countries to address this challenge by leveraging the state of the art of autonomous and smart shipping and port operations, advancing technologies and redesigning the logistics system.

The development of autonomous shipping is still in its initial stages, but there have been some notable advancements in recent years and the industry is taking momentum. Several companies, including Wartsila, DNV GL, Kongsberg Maritime AS (which has merged with Rolls-Royce Commercial Marine as of 2018) are investing in the development of autonomous ships.

As the industry thrives and the first demonstrations at relevant scale take place (as most recently happened in the AUTOSHIP project) it becomes clear that the lack of infrastructure for highly automated and autonomous ships poses a significant challenge for the realization of autonomous shipping.

One crucial aspect is the absence of adequate communication and navigation systems that can support autonomous ship operations. Highly automated ships and ports are expected to address efficiency, environmental performance, and safety challenges while promoting supply chain integration and modal shift to waterborne transport. Besides, to make autonomy and automation a reality, the business side must be included, requiring a comprehensive solution along the value-chain.

It is here that the SEAMLESS project comes into the game, to complement and exploit the advancements made in three EU-funded autonomous shipping-related projects, namely MOSES and AEGIS, related to smart ports and automated cargo handling onboard and ashore, and AUTOSHIP, bringing to TRL 7 autonomous vessels and their Remote Control Centers.

The project aims to develop a fully automated, cost-effective, and economically viable **waterborne freight service for Short Sea Shipping and Inland Waterways Transport. With 24/7 operations and human oversight from RCCs**, the project prioritizes safety, efficiency, resilience, and environmental sustainability in autonomous operations.

By facilitating seamless freight flows, SEAMLESS **overcomes congestion and supports resilient logistics**. **A digital "bird's eye" view** of the supply chain enables **real-time planning optimization and reconfiguration**. The project will conduct full-scale demonstrations **in real-world scenarios**, combining **physical and digital assets** developed in the project. It will also demonstrate the transferability of its solutions in selected use cases across different regions in Europe.

Finally, SEAMLESS is dedicated to **developing novel business models** and overcoming regulatory challenges in autonomous vessel operations. The aim is to **identify gaps and challenges in the current regulatory framework** related to autonomous vessel operation and provide **recommendations for policymakers** to ensure the smooth and safe deployment of fully automated services in the waterborne freight industry.

CiaoTech – part of the PNO Group - has a broad knowledge of the trends and innovation related to autonomy and smart logistics. In SEAMLESS we will further expand on previous results to assess the business replication potential, and lead the Cost Benefit Analysis, also using our own advanced IT tools and methodologies.

GA N° 101056940

The Shipping Industry's Race to Achieve Zero-Emission Navigation with Hydrogen Technology

By Marco Molica Colella, CiaoTech – PNO Group, Managing Consultant R&D Advisory Services. Email LinkedIn and Manuela Guiducci, CiaoTech – PNO Group, Communication Consultant. Email LinkedIn

The shipping sector is facing an enormous challenge: achieving zero-emission navigation. The urgency stems from the latest directive by the International Maritime Organization (IMO), which seeks to lower the overall annual GHG emissions from international shipping by at least 50% by 2050.

Achieving this target necessitates the adoption of novel sustainable and efficient technologies by the industry, and hydrogen is one of the most promising zero-emission fuels available today. However, the technology and logistics necessary to use hydrogen as a fuel are neither yet fully developed, nor regulated. That's where sHYpS comes into the picture.

The project plans to create a new 40' ISO c-type container for hydrogen storage and assist the maritime industry in transitioning to a more environmentally friendly approach by establishing a logistics scheme based on exchanging pre-filled containers, while also outlining a potential expansion of the storage capacity and supply, focusing on the Port of Bergen use case. This strategy **will enable the supply chain to begin without the need to wait for the full infrastructure to be completed.**

sHYpS has been funded in the frame of the Horizon Europe research and innovation programme and it is **coordinated by the Italian naval architect** Navalprogetti. To reach its objectives, the project **brings together** 13 partners from 6 European countries. The concept involves upgrading the state-of-the-art containers' technology and realizing the connection space to convert the stored liquid hydrogen into gas.

On top of that, the system will be ready to burn, including the full electric powertrain design as well as realizing the loading and unloading system. Finally, the project will demonstrate the LH2 storage technology onboard of a true newbuild cruise ship developed by Viking Cruise, operating in the Norwegian Fjords.

To overcome the absence of established regulations for approval for the utilization of hydrogen as a marine fuel, **sHYpS will adopt a risk-based assessment and create a full-scale storage demo case.**

By designing, developing, and testing the use of 40ft ISO-sized cryogenic container tanks, **sHYpS will realize a shorter-term hybrid solution within Viking's next new building program** to be delivered by 2025, which is scalable to comply with IMO 2030 and eventually IMO 2050 (50% emissions cut), with a fast-track market potential, but **it will also extend the preliminary design to both passengers and freight transport vessels, in view of a next demonstrator by 2027**.

CiaoTech – part of the PNO Group – supports EU industries achieving Zero-Emission. We are at the core of the maritime innovation and during sHYpS, we will complete market studies, supporting the business replication potential of the project, also leveraging on our data-driven methodologies and IT tools.

Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Climate, Infrastructure and Environment Executive Agency. Neither the European Union nor the granting authority can be held responsible for them. UK participants are supported by UKRI Grants.

Rethinking waste incineration: Reclassifying it as disposal, not recovery

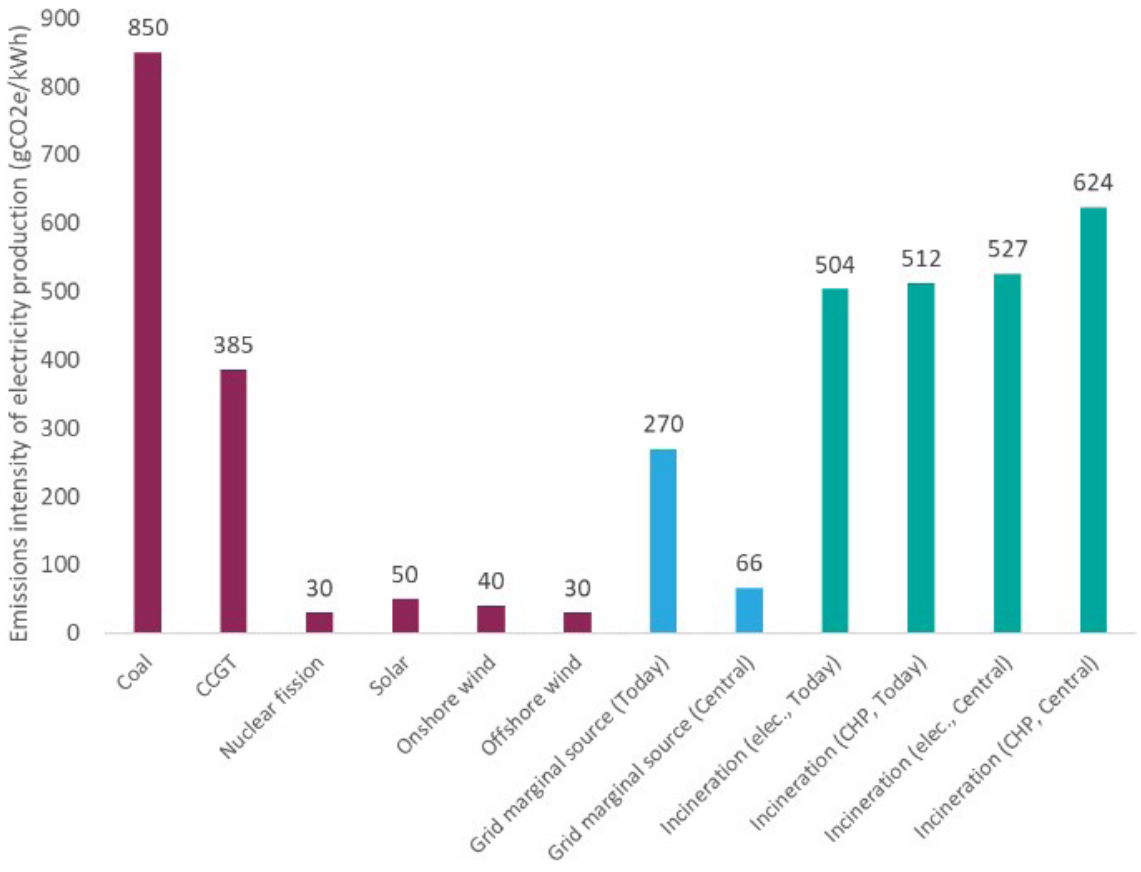
By Janek Vähk (pictured), Climate, Energy and Air Pollution Programme Coordinator, Zero Waste Europe

Waste-to-energy incineration (WTE) has long been hailed as a solution to address the growing quantities of waste while providing a low-carbon source of energy. Advocates argue that it effectively manages waste while generating clean energy. However, recent studies and data have emerged, casting doubt on the prevailing perception and calling for a reclassification of waste incineration from a recovery operation to a disposal method. Let's explore the reasons behind this paradigm shift.

The Rise of Waste Incineration

Recent data from Eurostat reveals a significant surge in the incineration of municipal waste in the EU since

The GHG emissions of electricity generation methods (excl. biogenic carbon emissions) Client Earth 2020



1995, with a staggering increase of 32 million tonnes or 107%. In 2021 alone, approximately 62 million tonnes of waste were sent to incinerators.

Several factors contribute to this upward trend. The Landfill Directive, which aims to reduce landfilling to 10% by 2035, has undoubtedly played a role. Additionally, climate policies still regard incineration as a potential low-carbon, and in some cases, even renewable energy source. However, it is essential to critically examine the true carbon footprint of waste incineration and reassess its classification as a low-carbon solution.

Is Incineration Truly Low-Carbon?

While proponents argue that waste incineration is a low-carbon energy source, recent findings cast doubt on this claim. Greenhouse gas (GHG) emissions from incinerators are influenced by various factors, including waste composition, incineration efficiency, and energy recovery methods. Nevertheless, comprehensive studies consistently indicate that incineration tends to result in higher GHG emissions compared to alternative energy production methods.

For example, a recent study by Eunomia examined the carbon intensity of burning municipal mixed waste in WTE plants. The findings revealed an average carbon intensity of 512gCO_2eq/kWh, surpassing the EU's average GHG intensity for electricity production, which stands at approximately 300g CO2eq/kWh. In fact, the carbon intensity of incineration-generated electricity is nearly double that of natural gas generation, with emissions per unit of electricity for CCGT reaching 385gCO_2eq/kWh.

The Inefficiency Challenge

One significant drawback of incineration is its inherent inefficiency. Research conducted by Equanimator demonstrated that

the typical generation efficiencies, especially when producing electricity alone, hover around the mid-20s percentage range. These figures pale in comparison to the approximately 35% efficiency of coal-fired electricity generation and the 55% efficiency of combined cycle gas turbine (CCGT) plants.

Although the performance in heat generation shows some improvement, it still falls short of domestic gas-fired boilers. Moreover, when factoring in the emissions of non-fossil CO2 from waste incineration, the carbon footprint effectively doubles for both electricity and gas production.

Looking ahead, particularly in new-build housing and commercial properties, the shift towards lower carbon sources for space heating and hot water, such as heat pumps, reduces the viability of incineration as a counterfactual heat source.

Rethinking Recovery Classification

The distinction between D10 and R1 incineration merits reevaluation. The R1 formula, originally designed to measure energy efficiency, no longer fulfills its intended purpose. It encompasses facilities with power generation efficiencies around half of the EU's average for gas-fired power generation.

Additionally, these facilities generate electricity with twice the carbon intensity of gas-fired power stations. Furthermore, when focused on heat generation, incineration performs comparably to gas-fired boilers in terms of carbon emissions.

Is it Superior to Landfilling?

Another crucial aspect to consider is the comparison between incineration and landfilling. Numerous studies, including one funded by DG Environment, have questioned the prevailing notion that incinerators are significantly superior to landfills when evaluating external costs and benefits.

While it may not always be clear-cut which method fares better environmentally, no study has conclusively justified the economic disparity between landfilling and incineration based on their respective benefits. In simpler terms, the additional costs of incineration outweigh the magnitude of its benefits.

Conclusion

The evidence strongly suggests that waste incineration cannot be considered a genuinely low-carbon source of energy. Strategies that promote waste incineration risk undermining the EU's ambitious goal of achieving net-zero climate change emissions by 2050.

Moreover, the efficiency analysis of EU incinerators reinforces the need to reassess the arbitrary distinction between D10 and R1 incineration. The current R1 formula no longer serves its intended purpose of promoting energy efficiency, as incinerators exhibit subpar power generation efficiency and higher carbon intensity. Instead of promoting incineration as a recovery operation, it is imperative to prioritize sustainable, renewable energy alternatives that boast lower greenhouse gas emissions and align with the transition toward a circular economy focused on waste reduction and resource efficiency.

About the author

Janek has been ZWE's Climate, Energy, and Air Pollution Programme Coordinator since 2018. He coordinates our climate and energy policy advocacy work towards EU institutions in issues related to end-of-life waste treatment.

Before joining ZWE he worked for Friends of the Earth Europe (FoEE) and Justice and Environment (J&E), where he was responsible for the development of strategic partnerships.

About Zero Waste Europe

Zero Waste Europe is the European network of communities, local leaders, experts, and change agents working towards the elimination of waste in our society. We advocate for sustainable systems and the redesign of our relationship with resources, to accelerate a just transition towards zero waste for the benefit of people and the planet.

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Big Data for OPen innovation Energy Marketplace (BD4OPEM)

The goal of the H2020 project BD4OPEM is to create a seamless link between energy stakeholders and services developed, by extracting value from operational and non-operational data related to power systems. These various services are offered from a Marketplace which ensures secure data flows between data providers and solution providers, driving new data-driven business models and increasing the penetration of renewables into the energy grid. The developed services permit, enhanced assets management and planning as well as consumer participation in energy balancing.

On 20 March, the Intergovernmental Panel on Climate Change (IPCC) released the final part of its sixth assessment report (AR6) and identifies that the energy grid plays a vital role in addressing climate change.

To take this role, Big Data from smart metering equipment can provide multiple benefits. It can help to identify inefficiencies in the grid, optimize energy distribution and future grid reinforcements. Energy data can also be used to predict demand, generation and identify trends to better manage energy supply and consumption and also to help consumers to become more responsible in how they consume energy.

However, energy grid stakeholders face multiple challenges in unlocking the potential of big data. The data generated by smart sensing and metering devices might not have the suitable quality, latency and/or volume required for developing the desired applications. There are multiple data formats, sources that further complicate the analysis process for making relevant and informed decisions, cyber security concerns, GDPR compliance, interoperability issues and user friendliness. Finally, finding the value in the data requires advanced analytics and machine learning techniques that require advanced technical know-how.

BD4OPEM addresses these challenges so that, like distribution system operators, energy stakeholders can profit from data-driven services for boosting the operation, planning and maintenance of their electrical grids and prioritize investments to further integrate renewable energy systems and tackle climate change. The services offered by the BD4OPEM marketplace include: topology retrieval of LV grids, observability, predictive maintenance, fraud detection, flexibility forecasting and aggregated services for BRP and DSOs, EV to grid integration, demand estimation, demand-generation and energy storage management at individual household or at community level, peer-to-peer trading, asset and investment planning.

To conclude, BD4OPEM wants to contribute to the transition from traditional energy distribution and consumption into smart energy distribution that can integrate with ease the latest innovations and help to contribute to a cleaner, brighter, and more sustainable tomorrow.

For more information check the BD4OPEM webpage: https://bd4opem.eu/using-bd4opem/
Daniel Brandt, project manager Sustainable Innovation and work package lead for dissemination and communication in BD4OPEM.

About BD4OPEM
The H2020 project consists of a complementary and multidisciplinary consortium of 12 partners, from nine different European Countries. The large-scale pilots from Spain, Belgium, Denmark, Slovenia, and Turkey have been carefully chosen to provide wide and diverse scenarios for tool development and the testing of services developed.

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 872525

EUSEW 2023: Focusing on EU policy priorities

More deployment of renewables and "innovative renewables" in the spotlight

By Greg Arrowsmith, EUREC Secretary General

This year's EUSEW is taking place as the revised Renewable Energy Directive (RED) is on the cusp (or is it?) of becoming law. It contains a binding EU target to increase the share of renewables in the EU's final energy consumption to 42.5% (and a non-binding target to reach 45%) by 2030.

Vitally, the RED also set a non-binding target for 5% of all new renewable energy capacity to be installed by 2030 to be of innovative renewable energy technology – a hard-won concession that we had long campaigned for (see our contribution to the European Energy Innovation Autumn 2021 issue) and that will reward those taking up the challenge of bringing new high-performance technology to market.

EU policy attention to the manufacture of renewable energy technology

The European Commission's recently proposed Net Zero Industry Act (NZIA) puts forward measures by which Europe may reclaim a part of the manufacturing market and decarbonise industry. Some of its most substantive measures relate to "Access to markets". The Commission wants public procurement procedures and tenders for renewable energy capacity to be awarded (in part) on "non-price criteria" related to the technology's environmental profile, its contribution to supply chain resilience or to energy system integration. But a technology's "innovative" character can reside in other areas, too, like higher efficiency or higher productivity.

The selection criteria should give points for technology having such characteristics, too. If they did, NZIA would better support the RED III 5% target for innovative technology.

Training a workforce

For the EU's plans for industrial decarbonisation and increased renewable energy capacity to succeed, it is imperative to have a workforce of the right size and with the proper skills. The REPOWER EU strategy to install hundreds of GW of wind turbines, PV modules, heat pumps and other generation technologies will demand an army of installers. Opportunities will also be created in manufacturing. The European Solar PV Industry Alliance hopes to deliver 30 GW of EU PV manufacturing capacity by 2025. With roughly 1000 trained staff needed to operate every GW in a manufacturing plant[1], that capacity implies around 30 000 new posts. We look forward to linking our Master programmes (European Master in Renewable Energy, Sustainable Energy Systems Management) to the 'Net-Zero Academies' proposed in NZIA in order to meet the need for highly skilled workers in PV and other sectors.

Reflecting that 2023 is the European Union's "European Year of Skills", EUSEW will open with a keynote speech on skills by Ditte Juul Jørgensen (Director-General for Energy) and Bertrand Piccard (Solar Impulse Foundation). The programme also includes a session that on the

EUREC Masters students: training a highly skilled workforce for a growing and innovative renewable energy sector

"RES-skilling": How to address the renewable energy skills challenge?

When: Monday, 20th June, 14:30 – 16:00 CEST

Where: Online and in-person (Charlemagne Building)

Box 1: EUREC's event co-organised with the European Commision and other partners of the Renewable Energy Skills Partnership

"Renewable Energy Skills Partnership" formed in March 2023 by relevant trade associations including EUREC and representatives of installers of clean technologies (see Box 1).

Next frontier: data access and data use

The Data Act is in the final stages of becoming law. It aims "to make more data available for re-use". Covering a wide range of economic sectors, the European Commission considers access to the data in the scope of the Act would "create €270 bn of additional GDP by 2028".

EUREC wants access to energy data for researchers in the public and private sectors to better understand the performance of technology, optimise plant design and minimise costs for the operation & maintenance of renewable energy plants. There are two areas the policymakers should focus on now:

Energy Performance in Buildings Directive

The Council and European Parliament both agree with the Commission that "Member States shall ensure that the building owners, tenants and managers can have direct access to their building systems' data [and that] at their request, the access or data shall be made available to a third party." But the European Parliament goes further, saying that that data should be publicly available providing it is "anonymised" and "aggregated". This is an excellent idea, which the Council should support (although "anonymisation" without the "aggregation" would be better).

Innovation Fund

Innovation Fund can award grants in the hundreds of millions of euros. A decimal place in the score of similar projects can make the difference between winning big or winning nothing. The winning project will get a head start. But it should not leave its competitors miles behind.

They must have the opportunity to learn from the winner's project by getting access to high-quality data from the project once it enters operation. EUREC, by virtue of its seat in the Innovation Fund Expert Group, has suggested pushing for such access in the secondary legislation that governs the Fund.

1. See page 6 of report "5% of new capacity from 'Innovative' Renewable Energy – A necessary and doable enhancement to the Renewable Energy Directive" (Oct 2022, downloadable here)

INTERNATIONAL **CLEAN ENERGY** CHALLENGE

An event for young professionals

Bright young innovators (born after 1987) will develop concrete solutions for the local energy transition in an event of collaborative thinking across disciplines. Join us in the Austrian alps in summer for this once in a lifetime experience! Apply now and have an impact on the success of the energy transition!

Deadline for application: 14 April 2023.

Apply now at: www.clean-energy-challenge.at

INTERNATIONAL
CLEAN ENERGY
CHALLENGE

24 – 28 July 2023, Upper Austria

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Vienna accelerates on its "moon-landing" challenge: phasing out gas in buildings!

Prioritising upgrades for buildings will accelerate the rollout of green technologies, while improving the lives of people living in energy poverty and reducing energy consumption, writes EPBD lead negotiator Greens/EFA MEP Ciarán Cuffe

Vienna, the fifth largest city in the European Union, is working to be climate-neutral from 2040 onwards, despite a growing population. In December 2022, the city published its "Phasing Out Gas – Heating and Cooling Vienna 2040" strategy. This sets the course for the energy transition for space heating, and for the progressive phase-out of 600,000 gas-fired units (approximately 474,000 gas-fired boilers and 260,000 gas stoves). This will not only reduce greenhouse gas emissions but ensure security of supply.

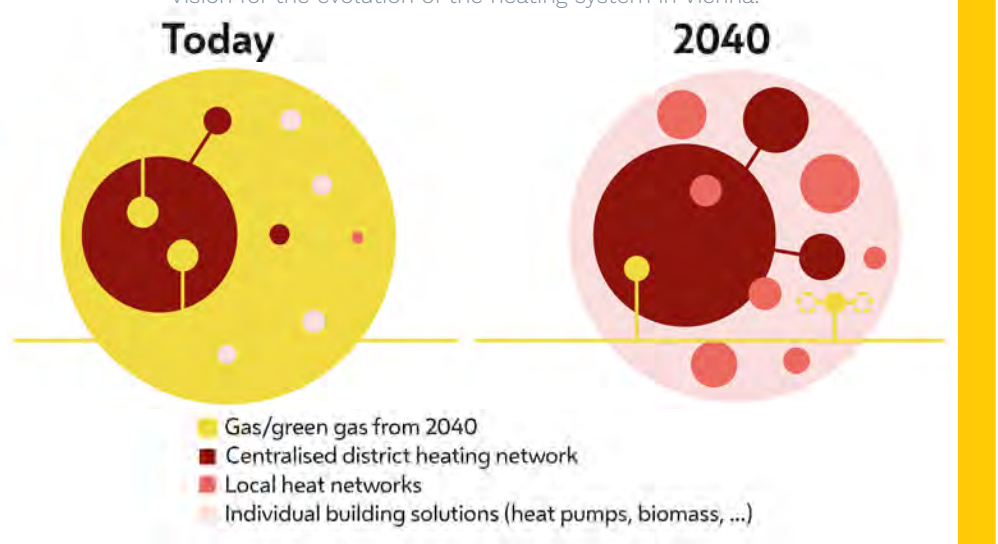
The political will to find socially equitable solution

The buildings sector accounts for nearly a third of Vienna's GHG emissions, 90% of which stem from the use of gas for heating. As stated by Jürgen Czernohorszky, Executive City Councillor for Climate, Environment, Democracy and Personnel of Vienna, phasing-out natural gas is a complex challenge: "Both at the federal and the provincial levels, clearcut legal provisions must be formulated, and durably earmarked subsidy schemes must be created. The switch to renewable energy sources can only come about as a socially equitable process – the people of Vienna must know precisely what to expect.". The "Heating and Cooling Vienna 2040" strategy provides this vision, as well as the technical requirements and the next actions to implement it.

"Green" gases are not the way for buildings' decarbonisation.

The city does not consider "green" gases such as green hydrogen, biogas and synthetic gas as alternatives to natural gas for heating houses. Two main reasons underpin this decision: a limited amount of green gases is expected to be available in the future, and these high-value energy carriers and sources are preferable for sectors in which no alternatives exist (grid flexibility, for industries requiring high temperatures or in some areas of public transport).

Vision for the evolution of the heating system in Vienna!



Replacement of individual gas boilers by a central heating system in multi-apartment buildings is both necessary and possible.

In addition to insulation for buildings, Vienna's strategy relies on the expansion, densification and decarbonisation of district heating as well as the deployment of individual heat pumps. District heating will be the preferred option in densely built areas of the city – especially in the inner city – preferably with a connection rate close to 100%. Individual heat pumps, especially geothermal-grounded heat pumps, are the most cost-effective solution in less populated areas. The Heating and Cooling 2040 strategy explores ways to replace individual gas boilers in multi-apartment buildings by a central heating system, which is the cost-effective decarbonisation option at the energy-system level and a must to connect these buildings to district heating.

Learn more about energy planning in European cities on the Decarb City Pipes 2050 website

Exchanges with the cities of Bilbao, Dublin, Munich, Rotterdam, and Winterthur have been a great help for Vienna to design its strategy within the framework of the EU-funded project Decarb City Pipes 2050. Since 2020, each of these cities have developed heat strategies including heating and cooling outlooks, spatially-disaggregated heating and cooling plans at district level and implementation roadmaps. Lessons learnt are gathered into a comprehensive set of resources for cities looking to strengthen their energy planning, such as this guide on heating and cooling mapping.

Bringing back a clean energy giant: Securing our net-zero energy future through Hydropower

By Steven Frigerio, Science Communication Coordinator of PEN@Hydropower COST Action

Hydropower is a well-established form of renewable energy that has been used for many years. It involves harnessing the energy from moving water, such as rivers or tides, to generate electricity. Hydropower (HP) has played an essential role in Europe over decades, providing a unique combination of safe, low-cost, and clean electricity production. It is still one of the largest renewable energy sources, adding up to about 35% of the electricity generated.

According to the International Energy Agency (IEA), renewable capacity will meet 35% of global power generation by 2025. Predictions show that by 2024-2025 all renewable energy sources will contribute almost 34% to the worldwide electricity production, and Hydropower will provide approximatively 50%.

Historically, hydropower projects have involved constructing large dams to create reservoirs for water storage. These projects, known as conventional hydropower, have contributed significantly to global electricity generation. However, the construction of large dams can have environmental and social impact, including the displacement of local communities and ecological disruptions.

Although Hydropower is largely perceived as a mature technology, both the current and foreseeable challenges require intensive scientific research and technological development efforts. The development of innovative and cross-sectoral solutions for these complex HP challenges requires a completely new research approach based on the expertise of all fields linked with sustainable HP (technology, society, economics and environment) and from a diversity of geographical and stakeholder contexts.

Introducing PEN@Hydropower COST Action

To address these complex challenges, a new network on sustainable

Photo by Dan Meyers

hydropower – Pan-European Network for Sustainable Hydropower (PEN@Hydropower) – was launched in September 2022 with the aim of bringing together researchers, engineers, scholars, and other stakeholders from industry, policy and civil society. The objective is to facilitate close collaboration among European research groups through projects supporting sustainable Hydropower.

"Hydropower is an essential part of the future energy mix as a clean and reliable source of energy. Yet there are clear research gaps and lack of funding in the hydropower field, alongside the need to train young professionals and researchers in order to successfully shift towards a carbon-neutral society. We established this network to build the capacity of young professionals, create networking opportunities, and discuss pertinent topics that will help us build the foundations for the future of hydropower in the years to come", says Dr Eduard DOUJAK, the Action Chair.

This collaborative network gathers experts and scientists from 33 countries and over 180 participants who will be working for the next 4 years on the needs and opportunities for sustainable hydropower production contributing to the Clean Energy Transition (CET). Hence, the PEN@Hydropower COST Action aims at creating a networking ecosystem for the definition of this new research approach.

Multidisciplinary approaches

This is the first COST Action on Hydropower that focuses on Technology and Sustainability to support Europe's energy transition at the coming future decades.

"The PEN@Hydropower network addresses the Hydropower sector with a strong emphasis on multidisciplinary approaches, gathering together different perspectives from the fields of engineering, social sciences, economics, law, environmental sciences that have not extensively been included in previous projects", says Steven Frigerio, the Science Communication Coordinator.

This sector has produced, over the last years, numerous important projects. The main ones aim to demonstrate how flexible Hydropower technologies can deliver a low-carbon, secure and resilient power system. The goal is to introduce new Hydropower technologies such as smart controls, enhanced variable- and fixed speed turbine systems. More specifically, to develop the technology permitting highly flexible operation of HP stations, within excellent environmental and social conditions while being economically competitive.

PEN@Hydropower COST Action will evaluate the role of Hydropower and Pumped Hydro Storage (PHS) in the European power sector. The research network aims to establish a scientific framework that will empower Hydropower producers and investors to enhance the performance and competitiveness of existing and new Hydropower and Pumped Hydro Storage plants within the European electricity system.

The Action will develop a holistic scientific strategy that takes into account crucial factors such as digitalisation, climate change adaptation, the balance between production and industrial demands, and the environmental impact.

Additionally, understanding the role of hydropower and pumped hydro storage, will shape the sustainable development of the European energy sector. The research findings will provide valuable insights for policymakers, investors, and industry stakeholders, ultimately contributing to a cleaner and more resilient energy future. One of the key objectives is to map the current legislative and market framework in the European Union while identifying policy gaps and barriers. With a multidisciplinary approach and a network of experts, PEN@Hydropower COST Action strives to address the complex challenges of the rapidly evolving energy landscape.

As part of the activities of the COST Action, capacity building training schools, along with targeted grants within PEN@Hydropower provide the opportunity for sustainability professional to increase their exposure and knowledge on topics related to hydropower, with the first Training School held in Timisoara, Romania in May 2023.

"The high interest and participation in our activities is testament to the importance of this network and the relevance of hydropower in increasing our renewable energy mix and combatting climate change", concludes Dr. Doujak.

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EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

View the Action websites

View the network Website: https://www.pen-hydropower.eu/

Follow PEN@Hydropower on social media: Twitter, LinkedIn

Rethinking Europe's energy security: a new paradigm for system security

By Kristian Ruby (pictured), Eurelectric Secretary General

Foreign military drones over EU power plants and oil rigs, sabotage against the Nord Stream gas pipelines, systematic bombardments of Ukraine's power installations: last year, Europe's energy transition took an unexpected geopolitical turn that few could have imagined just a year earlier.

The EU rose to the challenge of a completely changed risk landscape and took swift action to support Ukraine and reject Russia's bold energy blackmail. With a combination of rerouted gas flows, new LNG infrastructure, energy savings, gas storage requirements, and accelerated renewable buildout, we managed to avert worst-case scenarios and turbocharge the transition instead.

The results are impressive. Nearly 40% of Europe's gas supply was sourced via pipeline from Russia before their invasion of Ukraine, today that's less than 10%. In 2022, the EU reduced the overall gas consumption by 18% compared to the previous year. Renewable projects grew by 16% year-on-year and are expected to continue this upward trend, with a 17% increase and an estimated additional 69 GW of installed capacity by the end of the year.

The crisis, however, came with spiraling inflation and high costs for citizens and businesses. Industrial production in the EU took a serious hit. We were blessed by a mild winter, without which the impacts could have been much more severe. While the crisis exposed once and for all the downside of our dependence on foreign fossil fuels, it also demonstrated some weaknesses of an aging power system challenged by increasingly extreme weather.

Russia's war against Ukraine is just one element in a rapidly shifting international order characterised by rising protectionism, geopolitical tensions and ideological rivalry. A new balance of power is emerging, spurring the EU to come to terms with its exposure to energy imports, critical industrial products and raw materials. The EU needs a new paradigm for energy security, one that has the net-zero agenda as its starting point and seeks to build resilience to withstand ever more frequent external shocks.

We are not short of challenges. Climate change-driven extreme weather events, such as the current droughts in Spain and disastrous floods in Italy, score new records every year and have a particularly high impact on the electricity value chain. Cyber-attacks, but also physical, military threats have added complexity to our journey towards climate neutrality.

A new paradigm needs to consider all these aspects and maximise Europe's power sector resilience at all stages of the value chain. To do so, we must combine our recent efforts in a more integrated future-oriented way.

Energy savings – a key instrument in the geopolitical toolbox

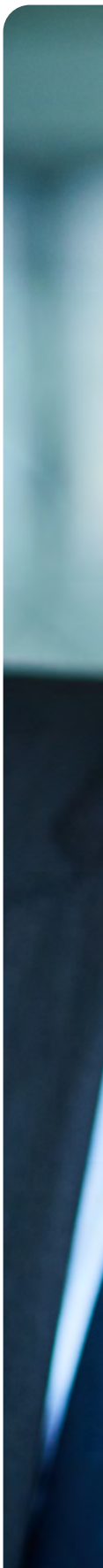
The starting point needs to be that clean energy is and will remain scarce for the coming years. The cheapest and most secure energy will be the one we don't use. The EU is already putting ambitious legislation in place with the Energy Efficiency Directive and the Energy Performance of Buildings Directive.

The political targets won't do it alone, however. They must be complemented by behavioural change and a clearer acknowledgement of the value of energy. A clear price signal from a well-functioning electricity market is key to incentivise such change. Another critical element is to prioritise direct electrification wherever possible, as the efficiency of electric vehicles and heat pumps is far superior to their fossil fuelled alternatives.

A reliable electricity system

As society relies more on electricity, electricity needs to be reliable. A swift buildout of renewables is a core element of the EU's joint quest for decarbonisation and energy independence. A big share of the additional renewables will be decentralised, a fact that comes with an upside from an energy security point of view.

Yet, to integrate the massive amount of variable generation, it is necessary that storage as well as firm and flexible capacity complement the



accelerated renewable rollout. Investments must catch up in this area. Long-term investment signals are of essence for these dispatchable technologies and should be combined with incentives for storage innovation and flexibility remuneration.

www.europeanenergyinnovation.eu

Resilient infrastructure

Just like the rest of the power system, the infrastructure will need to get fit for the future. The currently negotiated EU power market reform incentivises anticipatory investments for distribution grids. This is good, as investments need to be initiated now for the orderly buildout of the system. But creating a resilient infrastructure goes beyond this.

First, it is important to explicitly prioritise low and medium-voltage electricity infrastructure. The electric distribution grids will be the backbone of a more decentral and electrified energy system. This requires better planning as well as proper funding.

Second, we must acknowledge that resilience comes with a price tag. A recent study by Eurelectric estimated the cost of resilience to be around 8% of the total investment needs for distribution grids. This amount, however, is expected to rise as extreme weather becomes more frequent.

Third, we need to deal with the changing risk landscape. Going forward, a proper framework is needed to handle physical and military threats to our energy infrastructure. This task will go beyond what the sector or individual companies can solve on their own.

We need a new type of cooperation between national defense bodies, public authorities, and the energy sector to identify threats, establish early warning systems, conduct monitoring, defense and deterrence activities and develop contingency plans.

Achieving Europe's decarbonisation and energy independence is a daunting challenge. Electricity is an indispensable part of the solution. Let's make sure the power sector is fully equipped to succeed.

The decisive decade for energy efficiency

By Arianna Vitali Roscini, Secretarl General, The Coalition for Energy Savings

After years of timid progress on energy savings actions, the multiple crises we are experiencing must be the turning point in the way Europe produces and consumes its energy. To give a long-term answer to high and volatile energy prices, address energy security challenges in a way that is climate compatible and socially fair, actions on energy savings and energy efficiency cannot be delayed further.

The 'Fit for 55 package' and the REPowerEU plan proposed to upgrade the current Energy Efficiency Directive (EED) to align it with the higher 2030 climate objective and speed up the phase-out of fossil fuel imports from Russia. After almost two years of negotiations, the European Parliament, the Council of the EU and the European Commission agreed this March on a joint text that makes the existing energy efficiency framework more ambitious and reliable, even if not to the level needed to grasp the energy savings potential and deliver its full benefits.

Turning the new EED into national actions must be an immediate priority for Member States; they must urgently start planning additional measures and investments, allocate resources, engage with citizens, and mobilise stakeholders and local authorities to implement the new provisions. For example, the new 2023 EED recast introduces:

- **An increased EU energy efficiency target for 2030:** the EU will have to cut its primary and final energy consumption in 2030 by at least 11.7% compared to forecasts of energy use made in 2020. When translated with measures on the ground, an 11.7% target would save 118 billion euros in energy and transport expenditures for the whole EU in 2030, equivalent to about 600 euros per household.

- **A stronger annual end-use energy savings objective targeted to the most vulnerable:** the current Energy Savings Obligation, a pillar of the EED, is progressively strengthened and a certain amount of energy savings will have to be delivered among people affected by energy poverty, vulnerable customers and low-income households.

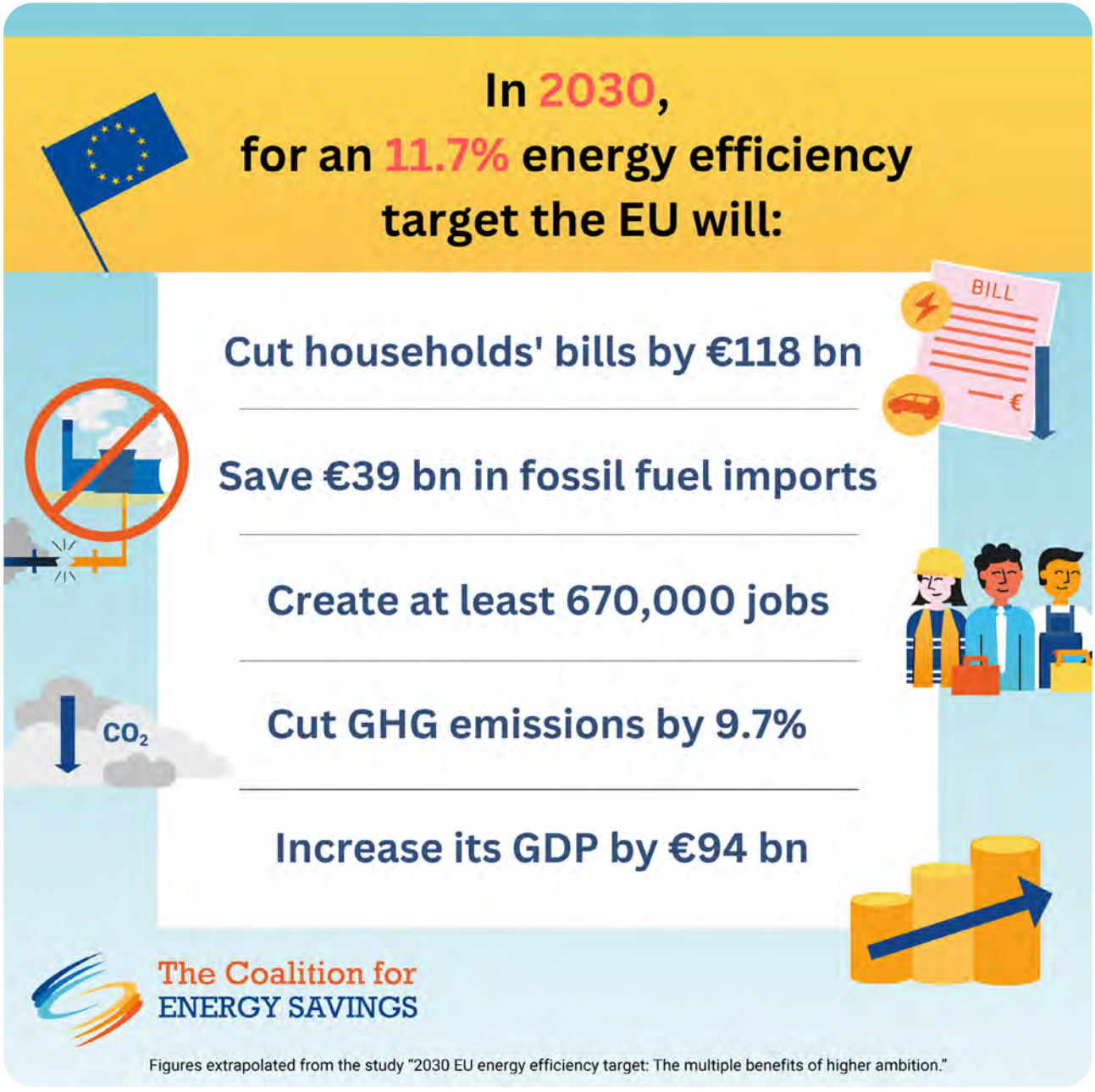
- **A highly energy-efficient public sector:** The 2023 EED includes an overall objective for all public bodies to decrease their energy consumption by 1.9% each year in every Member State and an obligation to renovate 3% of the floor area of buildings owned by public bodies to very low energy consumption levels.

2030 is around the corner. While

the 2023 EED has not entered into force yet, Member States must already integrate several of these new elements in the draft updates of their national energy and climate plans (NECPs), due at the end of this month.

At the Coalition for Energy Savings, we are convinced that the update of the NECPs, with the implementation of the 2023 EED as a central pillar, are crucial to make this decade the decisive one for energy savings. Member States should make the most of this opportunity to align their national policies with the higher EU climate and energy objectives and provide a well-designed strategy to save energy up to 2030 and beyond. To support them in that effort, the Coalition just published a detailed report providing guidance and recommendations for national planning and implementation of the new EED requirements.

The EED can drive energy savings actions on the ground and improve the resilience of the EU energy system, while alleviating environmental and climate impacts at lower costs for consumers. Measures and investments to save energy must be accelerated immediately to both prepare for next winter and to achieve the new, higher, EU 2030 energy efficiency target, for the benefit of citizens, businesses, and the climate. ●



Mining for Climate – sustainable raw materials for green technologies

BY Florian Anderhuber, Director Energy & Climate, Euromines

Addressing climate change necessitates comprehensive solutions that tackle its systemit nature. Increasingly, policies and regulations have broadened their scope beyond specific applications or technologies to encompass entire value chains. This shift is driven by the understanding that the sustainability impact of a product, such as a battery, heavily relies on the sustainability performance of the raw materials it is made of.

To effectively mitigate climate change while maintaining prosperity, it is crucial to recognize that the transition involves not only an energy and technology shift but also a commodity transition. The demand for metals required in the sustainability transition is set to skyrocket. Copper, zinc, steel, lithium, rare earths, and precious metals will be in high demand for the construction of solar panels, wind turbines, hydrogen electrolysers, and infrastructure that accommodates volatile renewable energy and consumption patterns.

European mining will play a pivotal role in addressing the raw materials conundrum. While these materials can be recycled indefinitely, the significant benefits of recycling will only be realized once there is a sufficient stock to recycle from. A study by KU Leuven suggests that this tipping point will likely be around 2040. Until then, new supplies of virgin materials will be necessary to sustain production.

To do so in the most sustainable and responsible way, there are a few fallacies that need attention:

Europe is not alone

The EU's Green Deal is not the sole policy aimed at mitigating climate change and ensuring environmental protection. As the race for raw materials intensifies, it becomes vital to secure access to promising deposits. Control over extraction rights and refining capacity will be the defining geopolitical challenge for the decades to come.

Europe needs to reckon with this on three accounts:

1. **Use your own backyard:** Europe should prioritize tapping into its own backyard, as there are numerous deposits of critical and strategic materials within the continent. With over a century of experience in exploration and extraction, EU mining companies possess the knowledge and expertise to operate with minimal environmental impact. Developing these resources domestically, such as the Peir Geir deposit, presents a significant opportunity to enhance strategic autonomy and reduce dependence on external sources,

particularly China, which currently supplies 95% of rare earths.

2. **Engage with friends:** Outsourcing to regions with lower regulatory requirements should not be an option when supply gaps cannot be fulfilled by domestic deposits. Europe must seek partnerships with countries and regions that are willing and able to uphold similar high standards in environmental, social, and governance issues. Any compromise on these standards would undermine the credibility of supply chains for materials crucial to the sustainability transition, making them more vulnerable.

3. **Tap the full potential of the Circular Economy:** While recycling is an essential aspect of the circular economy, its application should extend beyond traditional recycling practices. Integrating mining within the circular economy framework can help reduce the extraction of virgin raw materials for other sectors. This untapped potential offers a promising avenue for sustainable resource management.

EU Mining cannot do it alone

Raw materials are often considered as a mere procurement issue – and this is an important rift between downstream manufacturing and upstream mining companies that render supply chains fragile, prone to disruptions and not conducive to promote high ESG and human rights standards and technologies.

Recent shifts, such as the challenges posed by gas and magnesium metal supply, highlight the need to overcome this rift: extraction, refining and manufacturing need to compete on more than prices. Just-in-time and lowest costs are not a suitable approach anymore. To unlock the full potential, a sustainable supply chain for manufacturers must consider factors beyond price, incorporating security of supply as a key consideration. This is a prerequisite to have a business case for a more sustainable extraction and more honesty in how we fulfil our own sustainability ambitions.

Sustainability is not an externality

Internalizing high production standards within the mining sector and acknowledging the externalities related to security of supply within manufacturing must go hand in hand. Mining as the base of many Green Deal objectives – if done right – decarbonizes entire value chain. LKAB's pellets are 7 times less CO_2-intensive than sinter production and key for decarbonized steel production. Boliden's Aitik and Kevitsa mines are prime examples of mine electrification - providing low-carbon copper and zinc that are needed for further electrification through increased deployment of fossil free electricity.

The EU mining industry has all the elements ready – from deposits, environmentally friendly extraction processes to a world-class R&D ambition to further reduce the impact of mining and providing critical and strategic raw materials. To make this happen Europe must act now!

The Critical Raw Materials Act is a paradigm shift politically recognizing the benefits of our own backyard. However, more is needed: indirect cost compensation to account for the increased electrification of mining operations, recognition of recycled carbon fuels beyond 2045 to decarbonize hard to abate processes, funding for CCUS, mining as part of the Sustainable Finance Taxonomy and last but not least: expedited permitting procedures.

The momentum initiated with the CRM Act must not be slowed down – there is still a lot to do if we are serious about the global green transition while the window of opportunity to take the right investment decisions is closing in.

About the author

Florian Anderhuber has gathered extensive experience in EU public affairs, both from a corporate and an association angle and within the EU institutions. In his capacity as Director for Energy and Climate for Euromines, the EU mining association, he is also responsible for sustainability matters such as Sustainable Finance and sustainability reporting, addressing EU mining causes in various EU Expert Groups and at OECD level.

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