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Includes editorial contributions from:



Kai Mykkänen
Minister of Climate and
the Environment of Finland



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



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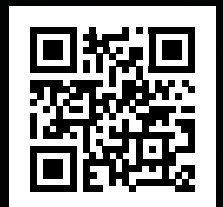
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Foreword

Seeming to do is not doing – Thomas Edison

The First Global Stocktake Will Make or Break 1.5°C

So thunders the ECO newsletter in its COP28-focused Autumn issue. There is certainly a credibility issue (not to say a hint of farce) when an annual conference dedicated to the decarbonisation of energy is hosted by a major oil-producing state; and whose chair this year has somewhat controversially denied the science behind 1.5⁽²⁾; and which has, according to one source, accredited *four times* more fossil fuel lobbyists than last year: more than actual delegates from the 10 most climate-vulnerable countries combined⁽³⁾. What is *said* in Dubai will fill column inches; what is *decided* in Dubai may indeed be make-or-break; but what is *done* over the next decade will determine the habitability of our planet – for man and beast alike.

Sun, wind and security

EEL is delighted to feature Morten Helveg Petersen once again; in another excellent article, he argues that we must protect the European Wind Industry. Listing an intimidating cocktail of threats to Europe's pre-eminence, he identifies Chinese state-subsidised competition as the most significant, citing the solar sector as a warning from history. Russia's illegal incursion into Ukraine conflates energy security and physical security, and Petersen introduces us to the phrase "Security Politics". Setting out political objectives for Wind, he informs us that auction design has been overhauled to include consideration of biodiversity and human rights; and points out the need for quicker permitting.

A coalition of coalitions

Underscoring the importance of Wind, Sarah Vanden Eede and Sarah Tilkin explore the role of the Belgian sector of the North Sea. A model project is the Princess Elisabeth Energy Island, and they explain how joined-up planning of wind farms should consider the marine environment – from design and construction, through operation to eventual decommissioning; and the impact of activities as diverse as gravel extraction and tourism; and how all this can be addressed by combining the forces of environmental groups, business and the RE community.

Isn't it always about the money? Should it be?

Thomas Östros discusses the role of clean energy finance in the protection of Europe's most vulnerable citizens. His opening words "*There is never a good moment for a crisis*" begin his discussion of the ramifications of three crises. Highlighting the significance of leadership in digital and clean energy technologies and decarbonising the economy in a way that protects the most vulnerable, he points out that Europe is being comprehensively outspent by major international competitors – and has been for at least a decade. He coins the memorable phrase "*We need to put our money where our gap is.*" before suggesting boosting investment (spending more) and getting money where it's needed (spending more wisely).

Protons and electrons

It is fair to say that hydrogen has not featured as prominently as

other potential sources of RE. Kai Mykkänen, Finland's Minister of Climate and the Environment of Finland explains why this should change. Reminding us of the country's climate-neutral ambition, and its track record in engineering, he suggests a "remarkable" role for hydrogen in the green transition while remaining careful not to exaggerate its potential. Pulling together experience with battery technology and natural resources such as forestry, he foresees potential in the e-fuel sector; and €200 billion investments will play a part in turning potential into actual. The key is recolouring hydrogen – from black, brown, grey or blue to green.

An old caboose, rickety tracks and a critical turning point

The report card on climate action and implementation of the Paris Agreement does not make for comfortable reading. According to Executive Secretary Simon Stiell, "*We can only overcome the climate crisis by ditching business-as-usual.*" Maybe this was a diplomatically-coded warning to the host country, but there was no mistaking Stiell's message when he said... "*we need COP to deliver a bullet train to speed up climate action. We currently have an old caboose chugging over rickety tracks.*"

Or, as Eleanor Roosevelt put it, "*Philosophy is not best expressed in words; it is expressed in the choices one makes.*"

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

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EUROPEAN SUSTAINABLE ENERGY WEEK 2024 18TH EDITION

Organised by the European Commission, the European Sustainable Energy Week (EUSEW) is the biggest annual event dedicated to renewables and efficient energy use in Europe.

On 11-13 June 2024, the 18th edition of EUSEW will take place in a hybrid format, allowing both participants and speakers to attend either online or onsite, under the theme: 'Net-zero energy solutions for a competitive Europe'.

Since 2007, EUSEW has grown into a vibrant and diverse community of energy stakeholders, which meets annually to debate the latest developments and ideas in the sector.

Do not miss this year's high-level Policy Conference, the EUSEW Awards or the fifth European Youth Energy Day, as well as opportunities to discover new net-zero energy solutions at the Energy Fair.



We must protect the European Wind Industry from unfair Chinese competition

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



The European Wind industry is facing immense challenges. I led the negotiations of the EU Offshore Renewables Energy Strategy, which was unveiled in early 2022. The strategy tackled a multitude of obstacles to the implementation of offshore renewables, charting a path toward European global exports success. However, less than two years later, Europe's position as a worldwide wind technology leader is jeopardized by inflation, supply chain disruptions, exorbitant interest rates, sluggish permitting procedures, and the unjust competition posed by state-subsidised Chinese manufacturers. Media reports are now rife with accounts of major wind projects faltering on a weekly basis.

The importance of the European wind industry

Undoubtedly, the European wind industry is pivotal to the EU. With our goal of reducing emissions by 55% before 2030, a significant increase in renewables is imperative to achieve our climate targets. To put this into perspective, we have committed to elevating the share of renewables in the bloc's overall energy mix to 42.5% by 2030, a substantial leap from the current 17%. Such an ambitious endeavor hinges heavily on the wind industry. Thus, the bottlenecks impeding the wind industry's progress are cause for alarm. If we fail to heed these warnings, Europe's position may falter, allowing China to gain a stronghold on the market. We must not permit history to repeat itself.

The solar history and security politics

While the solar industry should have

been a European powerhouse, it was ultimately ceded to China, who swiftly produced superior and more cost-effective solar panels, aided by substantial state subsidies. This history is one we cannot afford to replicate. We cannot afford to lose the market, and, more importantly, it is a matter of security.

The recent events surrounding Putin's incursion in Ukraine have underscored the fact that energy politics is synonymous with security politics. We are fervently striving to break free from reliance on Putin's influence. We must not extricate ourselves from this situation only to plunge into another dependence relationship with China. Our sole reliance should be on our own green energy, and to achieve this, we must take action.

Europe's leading position

As the European Parliament's spokesperson on offshore renewables, I have engaged extensively with industry stakeholders, as well as Energy Commissioner Kadri Simson. Our aim is clear: We must ensure that European manufacturers have access to the necessary supplies, establish transparency and predictability for green investors, streamline bureaucratic hurdles, and safeguard the industry from unfair competition. The race in the wind industry is far from over, but we must labor effectively and diligently to uphold Europe's leading position in the field.

Fortunately, our concerns have not gone unnoticed. Ursula von der Leyen announced in her State of the European Union speech that

the Commission would introduce a 'European Wind Power Package,' which was recently presented.

The Commission takes action

I am generally content with the initiatives and guidelines laid out by the Commission. New standards for auction design have been implemented, considering biodiversity and human rights, both for ethical considerations and to ensure European competitiveness.

The Chinese industry might be cheaper but does not prioritize the wellbeing of nature and people. Thus, the European industry becomes the sustainable choice for investors.

Moreover, the Commission is now committed to expediting the permitting process in member states. The call for quicker permitting is not novel, as the Commission has often vocalized this need without much success. The permitting process in member states has languished for many years, rendering the market too uncertain for substantial investment, thereby impeding progress toward climate targets and energy independence.

In its presentation, the Commission affirmed its willingness to support member states in expediting permitting through technical assistance and education. In essence, the Commission is reinforcing its call to action, demonstrating a willingness to act instead of merely speaking, and I really hope that member states will follow suit. We really need to work for quicker permitting. For the sake of our green transition and our safety. ●

Unlocking clean energy finance to protect Europe's most vulnerable

By Thomas Östros (pictured), Vice-President of the European Investment Bank





There is never a good moment for a crisis. But the timing of the latest events that gripped the world – from the pandemic to Russia’s invasion of Ukraine and the recent Israel-Hamas war in the Middle East – turned out to be especially unfortunate. Those multifaceted crises have increased uncertainty and pushed up prices, with ripple effects in Europe’s poorest regions. But they also endanger the continent’s ability to invest on the scale required to meet the climate emergency and to build a more digital economy. Europe needs significant investment to remain competitive, innovative and strong enough to resist future shocks.

The continent must channel sufficient resources to strengthen its leadership in digital technologies, maintain its advantage in clean-energy technologies and decarbonise its economy in a way that protects the most vulnerable by 2050. However, Europe is being outspent by major international competitors. The European Union trails the United States in productive investment to the tune of 1.5% to 2% of EU gross domestic product per year, according to the European Investment Bank [Investment Report 2022/2023](#). This situation has persisted for at least a decade now. It cannot continue. We need to put our money where our gap is.

Getting money where it’s needed

Europe is pioneering the green transition. What used to be a priority has now become an emergency. Russia’s invasion of Ukraine has made Europeans aware of our overreliance on imported fossil fuels. High oil prices caused a major deterioration in the European Union’s terms of trade. At one point, this drove a depreciation in the euro and resulted in imported inflation.

While the rising cost of living drives down living standards for everyone

in Europe, some groups are more exposed than others. Think of poorer, younger and less qualified households whose finances took a hit during the pandemic and who tend to spend a higher portion of their income on food and energy. Countries with higher inflation and higher inequality, such as those in Central and Eastern Europe are likely to see the biggest increases in poverty.

Boosting investment

What can be done to stimulate the investment that Europe needs? It is clear that public policies supporting investment in sustainable areas like digital and green innovation are the best way to protect Europe’s people and to create high-quality jobs. Well-designed policies, proper incentives and a strong commitment to investment are needed.

Credit must flow to the most innovative and transformative projects in all sectors and regions of the European Union to ensure a transition that leaves no one behind and supports cohesive and sustainable development. Investment in the European Union is stifled by impediments that must be addressed immediately with coordinated national policies and the active use of European regulatory, competition and monetary policy. We need to do more with the scarce public funds we have and use them better. But above all, we need to attract private investment and direct it toward green and cutting-edge projects.

This can be achieved by de-risking instruments. Well-targeted risk-sharing through loans and guarantees put forward by EU institutions can boost investment and crowd-in private sector investors. Take the example of the [European Tech Champions Initiative](#) that the European Investment Bank Group founded this year.

This fund of funds will provide late-stage growth capital to European

innovators, who currently find it difficult to raise capital to scale up their business. This support is crucial, not only because it keeps Europe competitive but also because many of the essential technologies needed for an orderly energy transition are not yet commercially available, or if they are, they are too expensive. This is especially important in sectors that are hard to decarbonise like aviation or the heavy industry. Here, the world is on the look-out for clean alternatives that also work economically.

Some of those alternatives might be backed by dedicated EIB support to [REPowerEU](#), a European Commission plan to rapidly reduce dependence on Russian fossil fuels and fast-forward the green transition. The European Investment Bank is committing an additional €45 billion over the next five years, on top of its regular lending to clean energy projects.

At a time of high interest rates, our REPowerEU financing offers essential funding, including for risky, highly innovative projects. By taking on part of the risk, we make those projects more attractive to private investors. This worked 20 years ago, when we supported offshore wind farms, and we are confident that it will work for other sectors too.

Investment in climate action and environmental sustainability is especially important for less-developed cohesion regions and for those struggling with rising energy prices. Prioritising green, digital and innovative investments can boost regional economies, while reducing carbon emissions and strengthening Europe’s independence. It’s no use closing the investment gap if we don’t address those other issues. To do so risks exposing some European regions to the chill of poverty and division. Coordinated programmes are needed to strengthen our economy and keep us safe and prosperous. ●

Accelerating decarbonisation through a business model gamechanger: as-a-service solutions

The need for the energy transition is clear and doing so by positioning the EU as a leader in climate policy and securing competitiveness to SMEs through energy efficiency is the most successful way of delivering it.

Beyond technology innovation, business model innovation can be a strong enabler to accelerate the market transition to energy efficient solutions. The servitisation business model has the potential to align the interests of businesses, people and the planet, with all benefiting from social, economic and environmental gains.

Furthermore, it permits embedding additional value to address the circular economy. The maturity of the solutions and current implementation varies across sectors and geographies, as experienced in the past three years by the consortium delivering the Efficient Equipment as a Service initiative (EaaS).

The EaaS project

The EaaS project, led by BASE, has received funding from the European Union's Horizon 2020 research and innovation programme and ran from June 2020 until November 2023. The project objectives were to develop and deploy the servitisation (or pay-per-use) model and a financial structure to enable the transition and accelerate the market adoption of energy efficient solutions by Small and Medium-sized Enterprises (SMEs) in the EU and in particular in Belgium with Agoria, the Netherlands with EIT Innoenergy and Spain with ANESE.

With EaaS, end customers pay for the service they receive, rather than purchasing the physical product, therefore avoiding the upfront costs of expensive modern efficient systems. The technology provider installs and maintains the equipment, recovering the costs through periodic payments made by the customer. This fee includes implementation, maintenance, repairs, and running

costs – such as electricity and water.

EaaS Tools

Throughout the duration of the EaaS project, the consortium has developed tools for the deployment of the servitisation model. The tools include **standardised contracts** for each of the countries Belgium, the Netherlands and Spain. The contract also lists the rights and requirements of both parties, including liabilities and confidentiality guidelines, as well as dispute resolution in case either party breaches the contract. During 2021, stakeholder consultations were conducted with potential clients, insurances, financial entities and providers to integrate requirements within the standardised contract. Legal consultants in each country provided inputs to comply with the national commercial and fiscal regulations, (e.g. link with IFRS International Financial Reporting and national Standards).

A **pricing tool** has also been



“A transition to a circular economy is one EU’s Green Deal main pillar. Slowly but surely, companies are increasingly looking at embedding circularity in their way of operating, and EaaS provides a way to realise this objective in a competitive manner. With EaaS, suppliers keep track of and maintain responsibility over their equipment during their full lifecycle.”

Mira Tayah, Circular Economy Expert, AGORIA.



“We are thrilled to see the interest in Efficiency-as-a-Service taking up in Europe through the duration of our project. We are convinced that this is a business model that can enable access to many different efficient solutions and play an important role in reaching EU

climate goals.”

Livia Miethke Morais, Senior Sustainable Energy Finance Specialist at BASE.

developed for the simulation and demonstration of financial costs and cash flow for the servitisation model of high-efficient system in comparison to upfront purchase of a medium-efficiency system with customer loan financing, and the legacy use of a low-efficiency system. Solution providers shifting to offering EaaS may need some tools to set up a pricing strategy for the new service. The pricing model can support this process, as it provides an estimation for the price per unit of service delivered as well as the expected return of the project. The tool may also be useful for providers to show interested customers that the EaaS service may offer economic benefits against investments in low- or medium-efficiency equipment. Investors including for instance banks or investment funds may use the tool to have a better understanding of the returns that can be expected from EaaS projects.

As part of the EaaS initiative, an evaluation of the risks potentially occurring in such projects was completed and summarised into **guidelines of risk mitigation**. These were studied for each stakeholder active on EaaS projects: the provider, the financial partner and the client. The list of risks includes inadequate pricing, volume, counterparty demand, performance, early contract termination, change in electricity and energy tariffs, credit risk and other risks for solution providers; and

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providers’ existential risk, performance risk, system breakdown, slow response to repair, data protection risks for clients. Country-specific risks and possible mitigation actions were also listed in the guidelines.

Technology/service providers and potential clients also shared best practices in **measuring, reporting and verifying (MRV) the MWh and GHG savings** from the solutions implemented, and contributions to net zero strategies, to yield conclusions on the climate impact. Servitisation brings the economic incentive to reliably measure the consumption of solutions implemented: generated revenues collected for the companies supplying the service depend on it.

Key learnings and Case studies

Besides the webinars and workshops for the development of the tools, the EaaS consortium conducted matchmaking sessions and

extensive exchanges with all the different stakeholders in the three markets and across Europe, from clients to manufacturers, installers and financiers. The **case studies** collected enable to illustrate how servitisation contributes to the EU taxonomy on sustainable activities and promotes circular economy via Light as a service (LaaS), Heating or Cooling as a service (HaaS or CaaS), Battery as a Service (BaaS) and explore the different parameters, fees structure and possible financing structures (sale and lease back, SPV etc). Key learnings and the outlook for the uptake of servitisation in Europe have been captured in the **EaaS Briefing**.

We invite you to check out the tools, case studies, articles and briefing on the websites www.eaas-initiative.org and continue the dialogue under the global Servitisation for Energy Transition (SET) Alliance <https://set-alliance.org>. ●



Efficiency as a Service
Plugging a new energy model

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Opportunities and challenges for heat pump deployment in buildings in Europe

By Vangelis Tzimas and Agne Toleikyte, Joint Research Centre, Energy Transition Insights for Policy Unit

Buildings are responsible for 40% of the EU's total energy consumption and for 36% of total greenhouse gas (GHG) emissions. The main use of energy by households is for heating their homes where fossil fuels, especially gas, oil and coal, cover more than half of this consumption. Other sources such as renewables, derived heat, and electricity account for 29%, 10% and 4%, respectively. A rapid reduction in the use of fossil fuel is needed to achieve by 2030 the target of reducing GHG emissions by 55% compared to 1990 levels, to meet our climate neutrality goal and secure the EU's energy supply. A significant shift towards low-carbon heating alternatives is urgently needed, with the transition from individual fossil-based boilers to heat pumps emerging as a promising option.

The heat pump market has experienced significant growth during the last decade, with an average annual increase of sales by 11%. Sales boomed in 2022, partly due to the ongoing gas crisis, resulting in the installation of a record 3 million heat pumps in the EU. The heat pump industry is less optimistic for 2023 for which sales are likely to contract as compared to 2022, although they will remain much higher than in 2021. While 22 million heat pump units have been installed for heating purposes, they still represent a minority of EU buildings. There are around 86 million gas and oil boilers in use, with new boilers still being installed. However, heat pumps have taken the lead in several countries, including the Nordics and Estonia.

The heat pump industry has become

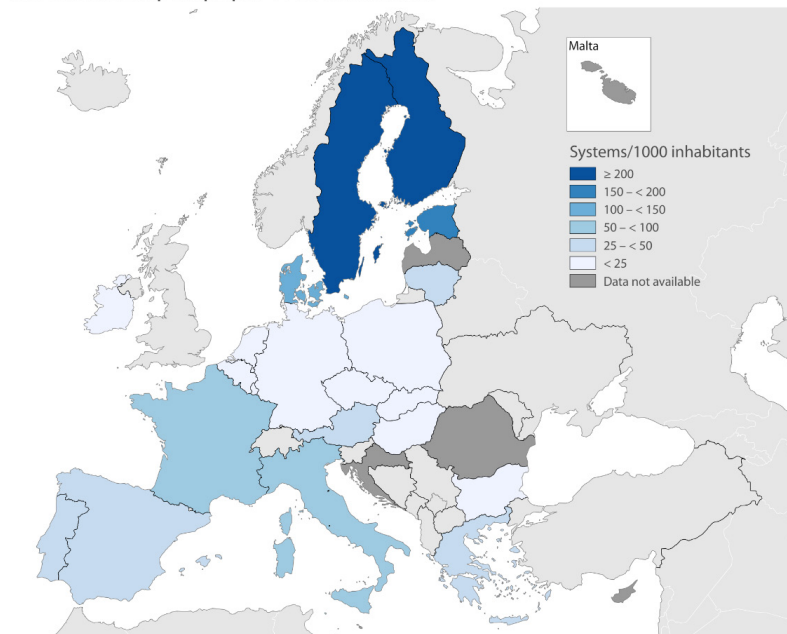
one of the largest employers within the renewable energy sector in the EU, employing nearly 320 000 people. Looking ahead, the European Heat Pump Association (EHPA) estimates that at least 500 000 skilled workers are needed by 2030 to meet an increase in demand.

The heat pump wave is an opportunity to strengthen the European heat pump industry. While many heat pumps sold and installed in Europe are manufactured within the EU, the industry needs long-term supporting regulation to be able to scale up fast enough to meet the exploding demand. In response, the Net-Zero Industry Act is positioned to strengthen the resilience and competitiveness of heat pumps manufacturing in the EU.

Heat pumps offer efficient heating, cooling and hot water supply for buildings by utilising ambient heat sources, such as air, water and ground. They offer an almost-perfect substitution for existing boilers. Most European houses can install a heat pump without any major adjustments. However, the worst performing houses in terms of energy efficiency have to be renovated for heat pumps to work efficiently.

Our estimations show that around 40% of all EU dwellings currently heated by gas boilers are sufficiently insulated, meaning that heat pumps can function at high efficiency in these buildings. For the remaining buildings, various measures can be implemented to lower radiator temperatures, including improving thermal insulation, replacing radiators

Heat Pump Stock
 Installed heat pumps per 1000 inhabitants



EHPA, 2023. EurObserver 2021.

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
 Cartography: Eurostat – IMAGE, 11/2023

Electricity-Gas Ratio 2023 S1 prices - Eurostat data

and optimizing water flow in heating systems.

Replacing a gas boiler with an air-water heat pump results in significant energy savings. We estimated that, for typical single-family buildings across all EU countries, the potential energy consumption reduction can reach up to 78%. For example, a newer house in Austria (built between 2000 and 2010) would lower its final energy consumption from 120 kWh/m² of gas to 47 kWh/m² of electricity, while a house in Italy (built between 1990 and 1999) would decrease from 128 kWh/m² to 38 kWh/m².

Changing a fossil fuel boiler to a heat pump also results in substantial cost savings for the majority of households. According to our analysis, annual energy cost savings can range from 20% to 60% – although the actual savings depend on variables such as electricity and gas prices, as well as the level of efficiency achieved. However, water-based heat pumps require a higher upfront investment than gas boilers, hindering many building owners from making the investment.

How to overcome the remaining barriers?

The price ratio between electricity and gas is one of the main barriers for consumers. Simply put, if it is more expensive to heat with a heat pump compared to other options, few homeowners will opt for that solution. Moderate gas prices, together with higher levies and taxes on electricity, make heat pumps less attractive as an investment in several countries. When the ratio exceeds the seasonal performance factor (SPF) of heat pumps, the fuel cost of heat pumps becomes higher than that of gas boilers. As heat pumps are typically three times more efficient than gas boilers and also more expensive than boilers, the electricity price should be significantly lower than three times the price of gas or oil for the heat pump to be cost

effective. In 2021, 19 EU countries had an electricity-to-gas ratio exceeding three, while eight did in the second half of 2023.

Longer payback times are expected for less efficient buildings, as these buildings require energy efficiency improvements to their envelope or adjustment to the heating distribution system, which contribute significantly to the overall cost. Subsidies and preferential loans are effective ways to incentivise these larger investments. It is clear that the heat pump wave and the renovation wave should go hand in hand.

The guidance of energy experts is essential to assist households in making informed decisions. These experts can offer insights into heat pump selection, sizing, integration into existing systems, and potential combinations with other energy upgrades. Moreover, good information tools such as one-stop-shops and building renovation passports would support households by providing step-by-step renovation roadmaps for their specific buildings.

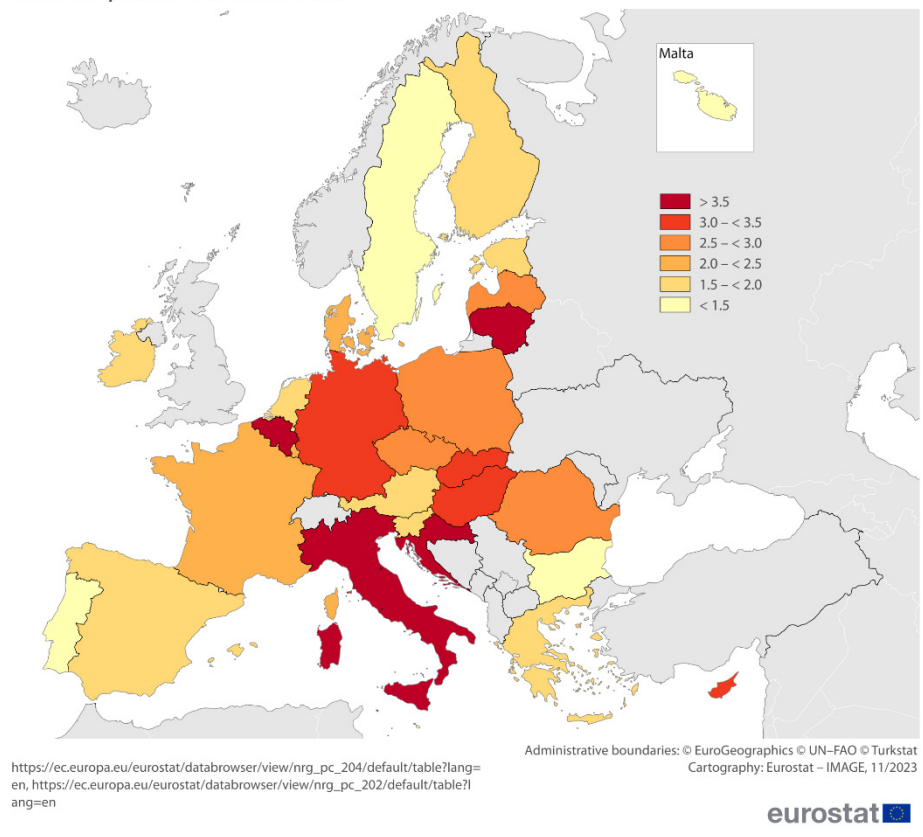
The high upfront costs of heat pumps risk excluding vulnerable households

from the clean energy transition. Special support should be directed towards these groups to ensure that heat pumps are successfully implemented across all segments of society.

The electrification of heating through heat pumps will influence electricity market dynamics by increasing the supply requirements and the system's peak hourly demand. These effects can be mitigated by taking counter-measures in terms of smart operation of the heat pumps, inclusion of flexibility in the systems and demand response. Moreover, additional grid investments might be required.

Hence, overcoming barriers to heat pump growth requires planning sufficiently ahead and ensuring continuity of support to the sector. This is the mere reason why Europe is preparing a [Heat Pump Action plan](#) which will allow to follow heat pump deployment and enabling conditions in time.

More information can be found in the report [The Heat Pump Wave: Opportunities and Challenges](#) published by the Joint Research Centre of the European Commission. ●



Wind energy and nature protection can and must advance together in the North Sea

By Sarah Vanden Eede (WWF Belgium) and Sarah Tilkin (Natuurpunt vzw), on behalf of 4Sea

The Belgian part of the North Sea has a crucial role to play in the triple planetary crisis of climate change, biodiversity loss and the pollution and waste problem. A climate-neutral and biodiverse North Sea is possible with careful consideration, planning, and development of renewable energy activities. The Belgian 4Sea coalition (Bond Beter Leefmilieu, Greenpeace Belgium, Natuurpunt and WWF-Belgium) strives to make the development of wind energy in the Belgian part of the North Sea beneficial for both nature and climate. To that end, nature protection, conservation and restoration should be a top priority in the design, construction, operation and decommissioning of wind farms in Belgian offshore wind zones, some of which are (partly) located in protected Natura 2000 areas.

Coalition with the Belgian Offshore Platform and SeaCoop

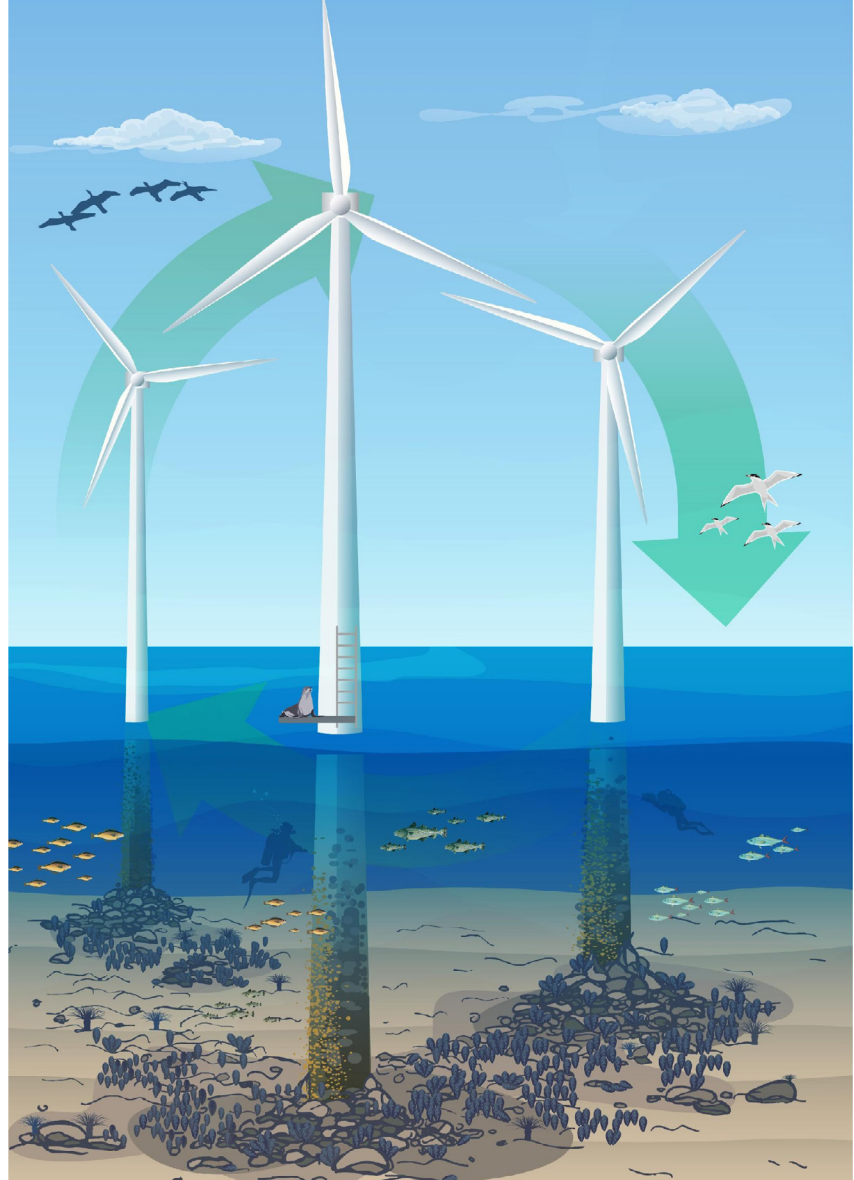
To prioritize nature in offshore wind farms and fully adopt a nature inclusive, circular design of offshore wind farms, 4Sea co-signed a letter of intent with two crucial offshore wind stakeholders. Since June 2021, the [Belgian Offshore Platform](#), an association of investors and owners of wind farms in the Belgian part of the North Sea, and 4Sea work together to maximize the protection, enhancement and restoration of the biodiversity values of the North Sea.

Since June 2023, [SeaCoop](#) also works together with 4Sea.

SeaCoop cvso is the Belgian renewable energy community founded by 33 citizen cooperatives for renewable

energy, all of which are members of REScoop Flanders or REScoop Wallonia. After all, a socially fair and just energy transformation plays a critical role in how we will reach our climate and biodiversity targets.

Nature inclusive design of wind farms, source: 4Sea publication





Nesting sites for seagulls. Photo: ©Tyne Kittiwakes

Nature inclusive design of wind farms⁴

Based on the findings of more than 10 years of scientific research on the effects of the installation of wind turbines on the marine ecosystem (WinMon.BE), 4Sea is convinced that further development of offshore wind energy can and must go together with the protection, strengthening and restoration of the marine environment and marine biodiversity. In the Belgian part of the North Sea, we strive for optimisation and customisation, always starting from the biodiversity values to be protected, a critical step towards measures to solve the climate and biodiversity crises.

The following points are important in the design, construction, operation and decommissioning of wind farms in the North Sea. First and foremost, wind farms in Natura 2000 areas are an exception and can only be developed under strict conditions, including the mandatory appropriate assessment as stipulated in the Habitats Directive. Second, further investment in scientific research and innovation is necessary to

minimize the impact on nature and to maximize the opportunities for nature. Third, nature-inclusive design of (new) wind farm constructions should be the norm. The wind farm and its infrastructure must mitigate any negative effects and, where possible, create positive effects for biodiversity. Lastly, renewable energy production must be future-proof. This is heeding the urgent need for a dialogue with the sector on how to combine the improvement of nature values and renewable energy production, within a circular approach from design to decommissioning, including the demand for raw materials.

Energy island in the Belgian part of the North Sea

The Princess Elisabeth Island is an extension of the electricity grid in the Belgian part of the North Sea. It connects wind farms from the sea to the mainland and creates new connections with neighboring countries. A consortium comprising Belgian marine construction companies DEME and Jan De Nul has already started preparing the site where it will build the caissons. In

the meantime, Elia is putting the final touches on a nature-inclusive design for the island. Together with various external experts from science, policy and civil society, the island design was examined to determine which items could be adjusted or added with a view to strengthen, enhance and boost biodiversity on and around the island.

4Sea hopes that the current societal paradigms of geopolitical instability and energy supply security will not rush the construction of any energy infrastructure, including the energy island, at the expense of nature and biodiversity. We must prevent any large-scale and long-life offshore structure from lying unused for years. Especially since the real bottleneck in the development of offshore energy lies in landing the generated offshore power and the connection to our electricity grid. The mainland electricity grid needs an urgent update to increase the stability of the power grid in the region, Belgium and Europe, to ensure the safe landfall of energy from current and future offshore wind farms, and to realise current and future



Northern gannet at the Belgian part of the North Sea. Photo: @Gert Vanautgaerden

electrical interconnections with other countries, which will positively affect the electricity price. Therefore, the development of 2 priority infrastructure projects for Belgium is crucial, namely the reliable networks of Ventilus through West Flanders and Boucle du Hainaut through Wallonia.

Marine spatial planning

Despite the limited space, it is quite busy in, on and around the Belgian part of the North Sea. Various users are looking for space. Think of fisheries and aquaculture, military activities, sand and gravel extraction, shipping, ports, renewable energy production, pipelines and cables, tourism and recreation, scientific research... Belgium has been one of the first countries in the world to draft a marine spatial plan, back in 2014. This plan legally determines, for a period of 6 years (8 years from the marine spatial plan 2026-2034 onwards), where each activity is (or isn't) allowed at sea.

The existing Natura 2000 areas were already designated in the marine spatial plan of 2014, but until now these areas lack effective protection.

The new areas for offshore energy, as indicated in the marine spatial plan for 2020-2026, are partly situated in the Natura 2000 areas.

The limited space for offshore activities, combined with Belgium's leading position in offshore wind, results in many countries watching us with great interest. That's why we need good, ecosystem-based marine spatial planning in the entire North Sea area, with regards to both the necessary transition from fossil to renewable energy in a cross-border offshore and onshore renewable energy network, and to the protection of marine biodiversity in a Natura 2000 network. This needs to be in line with relevant national, regional and international legislation and biodiversity targets (e.g., the Kunming-Montreal Global Biodiversity Framework) and relevant regional conservation initiatives

(e.g. Natura 2000 directives, Marine Strategy Framework Directive). By endorsing nature-inclusive, circular renewable energy, possible conflicts between nature and climate goals are mitigated or even avoided. The goal of a climate-neutral and biodiverse North Sea can be achieved more quickly.

There is a great need for an overview in the form of an energy plan for Belgium, embedded in a European context, including the North Sea waters. This way we can focus on how we can solve the energy issue in the best possible way, in terms of modularity, flexibility and circularity. At sea, this energy plan must certainly coincide with a biodiversity plan, to protect, strengthen and restore nature. As such, the (partial) solution to the climate crisis does not amplify the biodiversity crisis in the North Sea. ●



Prefabricated modular façade to achieve NZEB: the ENSNARE solution

The ENSNARE project, funded under Horizon 2020, aims to advance the renovation of residential buildings toward Nearly Zero Energy Building (NZEB) standards by developing a systemic methodology that integrates novel technologies.

Leveraging the key contribution of the building envelope, the project focuses on a highly industrialized modular façade as a key solution. This façade incorporates advanced functionalities beyond passive thermal barriers, integrating energy harvesting, and distribution technologies.

Fully industrialised Modular and Multifunctional Envelope Mesh

The Modular Envelope is made up of an Inner Layer with the main frame, insulation, and waterproof membrane, and an Outer Technology Layer with independent panels housing active technologies. The modular façade provides adaptability and ease of replacement and maintenance tasks thanks to a plug & play connection design.

A registrable area, that can be arranged either horizontally or vertically, is also included in the module, enabling the creation of continuous tracks to interconnect the technological panels throughout the envelope.

The system allows multiple configurations by combining different active technologies as cladding, granting flexibility and versatility for various façade rehabilitation scenarios. This system is not only adaptable to the physiognomy of buildings but also to their energy demands.

www.europeanenergyinnovation.eu



Figure 1. Integration of photovoltaic technology on synthetic stone in a full-scale prototype of the façade system. The horizontal registrable area interconnecting the three modules is displaced in the top part.

A bottom-up assembly process is used and the combination of modules and their aluminium frame generates the structural mesh of the new skin. The main frame of each individual module is anchored to the existing wall by means of a hook-type element that can be precisely positioned thanks to the support of advanced digital tools.

Technology Layer

The Technology Layer integrates various active technologies, including photovoltaic, thermal solar and hybrid panels. The connection of those with the internal building's services is achieved thanks to the registrable area. Additionally, the opening elements are also incorporated in this layer, with an

optional active window element which integrates an intelligent ventilation and heat recovery system.

Validation and demonstration of the modular façade

To validate the performance and applicability of the modular façade, ENSNARE will install solutions in three pilot buildings in Bulgaria, Estonia, and Italy. The modular approach demonstrates flexibility in accommodating different building characteristics and limitations, showcasing adaptable solutions within the system's ranges. Through this validation and demonstration process, ENSNARE aims to boost the adoption of advanced technologies in building renovations, contributing to the transition to NZEB standards. ●

More information:

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

Twitter/X: @ENSNARE_h2020

LinkedIn: @ENSNARE

Modular envelope mesh video

Informative video ENSNARE

Subscribe to our newsletter here!



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958445.

The Power to act: delivering on the promises of the Green Deal

By Kristian Ruby (pictured), Secretary General, Eurelectric

In the past five years we have seen a massive push to strengthen climate protection in Europe. In 2023 the EU successfully finalised most of the **Fit for 55** legislative package plotting a clear course for the future. In the next five years we will have to ensure these rules are transformed into action on the ground.

Europe's future is set to be one where renewables cover over 40% of final energy consumption, where emissions are capped with a more stringent Emissions Trading System (ETS), sales of polluting vehicles are phased out by 2035 and buildings become more energy efficient.

Meanwhile, the world around us has fundamentally changed from when the last European elections took place. Russia's invasion of Ukraine and their related energy blackmail have triggered an energy crisis not seen in Europe since the 1970s. The price of electricity skyrocketed on

the back of gas supply shutoffs and energy security has risen to the top of the political agenda.

With higher energy prices, interest rates and aggressive industrial competition, Europe needs to deal with a real risk of deindustrialisation. As shown in Eurelectric's **Power Barometer 2023**, energy-intensive industries such as aluminium, zinc, and silicon manufacturers had to curtail production at a rate of 35% to 45% in 2022.

While broader geopolitical tensions threaten our supply chains for secure energy and raise prices, the climate crisis is worsening. Balancing the energy trilemma of affordable, secure and sustainable energy is becoming a growing challenge.

Keeping promises...

With ambitious commitments on one hand and new challenges on the other, the incoming European Commission and Parliament - which

will preside over the continent until just before the Fit for 55 targets are due - must make delivering on the promises of the Green Deal a key priority. We owe it to the next generation not only to formulate laws which combat climate change, but also to transform these laws into action on the ground.

This means more power lines, new wind turbines and solar parks, backed by a diverse set of robust low-carbon solutions to keep the power sector reliable as it increasingly powers clean transport and heating needs for European businesses and households. Enabling such a future calls for accelerating electrification this decade.

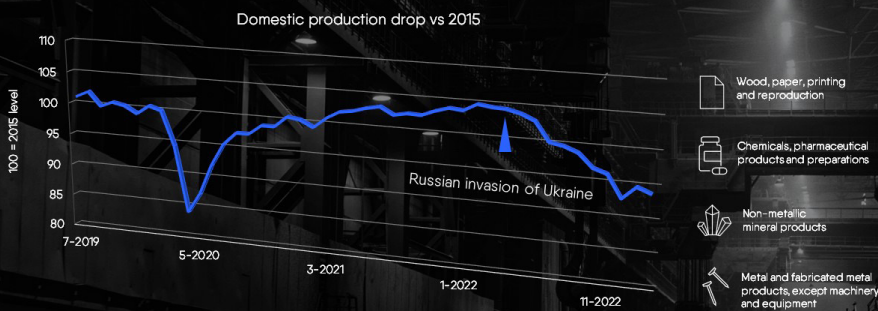
...while making electricity the key to Europe's energy security and carbon neutrality

Clean, European-generated power can cut emissions and secure our energy supply, while also providing a cheaper source of energy than the conventional sources we have been used to in the past.

Multiple scenarios have shown that reaching climate neutrality requires an increase in electrification of around 60% by 2050. Yet, electrification rates have been stagnating for the past fifteen years at only 23% of the EU total energy use. This means that while we are working hard to decarbonise electricity, large parts of the economy are still running on fossil fuels.

The EU can play a crucial role in breaking this impasse by turbo-charging electrification across the

Energy-intensives saw their production decrease



35-45% EU aluminium, zinc, and silicon taken offline, with risk of permanent smelter closures, in 2022.



EU with an Electrification Action Plan and tangible measures to accelerate the uptake of electricity. The plan should send a clear signal to both national authorities and private investors and contribute to prioritising electrification as the most cost-efficient solution not only for carbon neutrality but also for our energy security.

As society relies more on electricity, electricity must be reliable. Once a technical matter, security of supply is now a much more political discussion, one that should be firmly kept on the radar of the next legislative period. The energy crisis has shown us the strength of standing united in the face of threats to our energy supply and the critical role of the internal market in doing so. Policymakers should therefore make it a key priority to safeguard the EU internal electricity market.

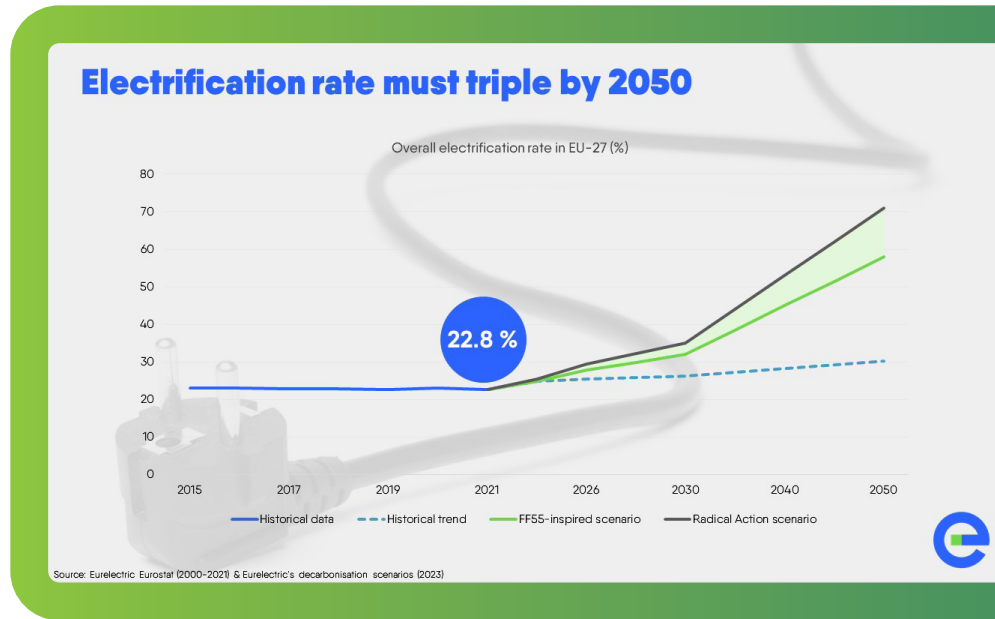
Taking the next step on future-proofing Europe's electricity grid...

A power infrastructure that is fit for purpose is a precondition for all of this. The plan launched recently by the European Commission rightfully highlights the need for innovative regulatory principles and investment conditions by calling for the anticipatory planning and buildout of power infrastructure to reflect our evolving energy system.

While this plan was an excellent first step, it is crucial that the next legislative cycle continues on the same path to ensure the expansion and digitalisation of our infrastructure considering higher demand for electricity. Allowing for anticipatory investments combined with positive incentives is the way forward.

...and bringing consumers on board

As the stakes of the energy transition are rising and time is running out, it is critical that we keep sight of the customer perspective and ensure that everybody gets a fair deal. Consumers should be actively



encouraged to contribute to our continent's transition. This is easier said than done at a time where we face a cost-of-living crisis and no immediate drop of power prices on the horizon.

Both electricity suppliers and policy makers need to chip in to solve this and help ensure that new directly electrified solutions for transportation and heating, such as electric vehicles, heat pumps and smart thermostats can empower both businesses and

households to save energy and make more affordable decisions.

On the positive side, policymakers have been putting many of the needed tools in place over the past five years, so a key part of the answer is to implement the market reforms that have been already agreed. The next legislative cycle will be instrumental for our efforts to reduce emissions while maintaining a strong, competitive and independent Europe. The power industry is committed to play its part. ●



InComEss



Funded by
the European Union

Innovative polymer-based composite systems for high-efficient energy scavenging and storage www.incomess-project.com

Insight

InComEss project focuses on the development of polymer-based efficient smart materials with energy harvesting and storage capabilities in a cost-efficient manner for widening the implementation of IoT. The project will contribute to the European goals of CO₂ emissions reduction by developing recyclable new energy harvesting and storage devices while minimizing the hazardous waste.

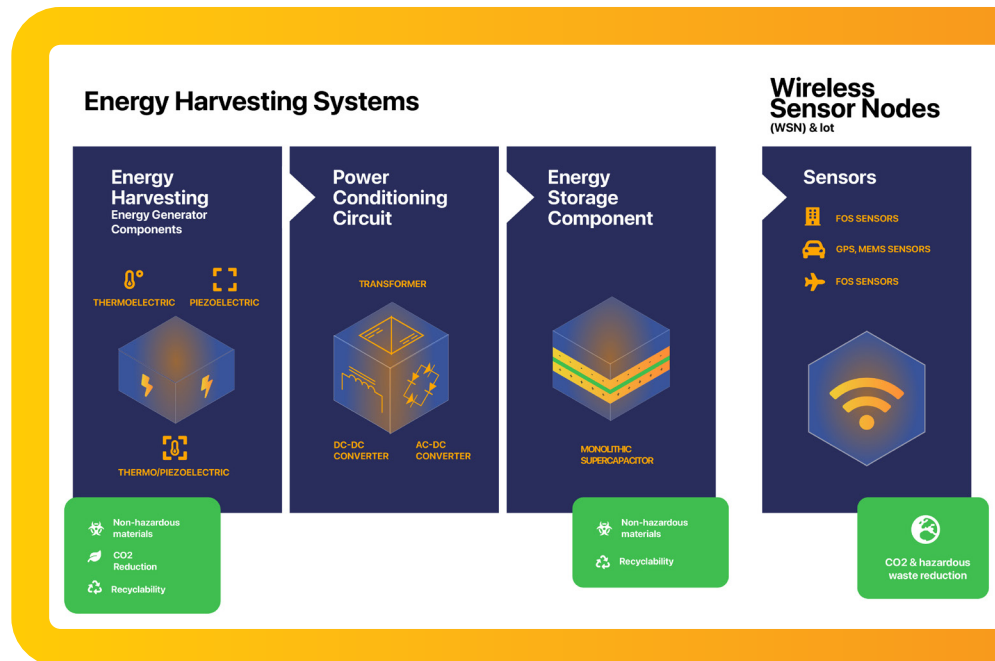
Concept

InComEss seeks to develop next generation of smart materials capable of harvesting mechanical energy and waste heat, generating, and storing electric energy with the aim of powering wireless sensor nodes (WSN) in different scenarios (building, automotive and aeronautic) for data monitoring through an IoT gateway. In this sense, eco-friendly lead-free piezoelectric materials and polymer-based thermoelectric materials have been developed to construct a piezoelectric and thermoelectric generator/harvester. While as energy storage component, cost-effective screen-printed monolithic supercapacitors were researched and fabricated.

An advanced power conditioning circuit was also engineered for maximizing the energy transfer from the energy generators/harvesters to the energy storage devices and for feeding WSN by developing wireless communication protocols with low energy consumption.

Goals

InComEss targets to develop high-performance piezoelectric, thermoelectric materials/harvesters



comparable with the commercial existing solutions (based on lead and rare earth elements) and to fabricate supercapacitors with energy densities similar to those shown by the batteries. The developed eco-friendly energy harvesting systems will allow to reduce the manufacturing costs and overall materials compared to the current employed solutions by using highly recyclable polymers and cost-effective processing routes while helping to decrease the Green House Gas (GHG) emissions.

InComEss will also contribute with the integration of sensors and potential linkage to IoT while assessing market perspectives and standardisation aspects for the new materials.

About InComEss project

InComEss is a 48-month research project funded by the European

Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 862597 with €6,967,226.25 in funding. The Project Consortium is made of 18 partners from 10 different European countries. The project is coordinated by AIMEN Technology Centre set in O Porriño (Spain) which is also involved in the research activities of developing polymer-based piezoelectric and thermoelectric materials and wireless sensor communication for reduced energy consumption. ●

Start date: March 2020

Duration: 48 Months

Project coordinator: AIMEN – Asociacion De Investigacion Metalurgica Del Noroeste

Author: Technical project coordinator: Cintia Mateo, AIMEN Technology Centre

More value, more bioenergy, less cost: enhanced and simplified digestion

Sludge from EU wastewater treatment plants (WWTP) is heaping up, with 750 M citizens producing a yearly volume to fill the new Bernabeu Stadium in Madrid around 200 times with almost 100 Mm³/yr, counting around 17 Mt/yr of dry sludge when dewatered to between 20 and 25% dryness. And the new revision of the EU urban wastewater treatment directive is about to increase that quantity, exceeding the capacity of existing facilities and increasing further the high operating costs.

Nonetheless, the concept of circular economy enhances the need for recovery of energy, nutrients, and other products from biosolids. Conventional treatment of sewage sludge (both primary and secondary) by anaerobic digestion in mesophilic conditions at 37°C reduces its volume by about half, providing stabilisation for its use as fertilizer while producing biomethane, a renewable source of energy. Recently, improved pre-conditioning has intensified the digestion, including mechanical, chemical, thermal, biological processes – or a combination of them.

Aqualia has worked intensively on the development of innovative solutions for the efficient management of sewage sludge, transforming it into high value-added products and creating new opportunities for the circular economy.

One such innovative solution is DAHLIA®, the Decentralized Anaerobic digestion of biowastes by High-performance Low-cost system for Isolated Areas – which Aqualia developed to treat sludge of small WWTPs (<2,000 h-e),

using simple polyethylene bags for anaerobic digestion. DAHLIA® has succeeded in improving sewage sludge treatment in terms of solids removal (67% DAHLIA® vs 42% conventional systems). This low-cost system allows to produce biogas in rural environments, and can be coupled to pre- or post- treatment, allowing advanced treatment to yield disinfected fertilizer.

For medium size WWTPs (2,000-40,000 h-e), Aqualia equipped a low-cost anaerobic digester with an innovative heating system using 100% renewable energy (thermal and electric). This process, baptised **Camellia**, integrates thermal pre-treatment to increase biogas productivity and obtain a hygienized digestate that is easy to dewater, and is currently under start-up at Iscar WWTP.

Finally, for large WWTP, **DUAL digestion** couples thermophilic anaerobic and mesophilic digestion to achieve an increase of up to 35% in biogas production and solids destruction compared to conventional digesters. In addition, DUAL Digestion is geared towards co-digestion or industrial residues, thus offering efficient urban-industrial symbiosis for the management of biowaste.

In the DUAL digestion pilot plant designed and operated by Aqualia, with a capacity of 1500 and 5000 litres in the thermophilic and mesophilic reactors, respectively, sludge co-digestion assays have been



carried out with vinasse. In these assays, a methane production of 400 L CH₄/kg SV_{fed} was achieved, which is a 16% increase compared to sludge digestion.

On an industrial scale, the co-digestion process with different wastes is practised in different WWTPs such as Guijuelo, Guillarei, Lleida, Jerez or Salamanca.

In the latter, the three systems are operated within the framework of the Rewaise project (REsilient WATER Innovation for Smart Economy) to optimize them further. This project aims to create a new “smart water ecosystem”, to integrate WWTP and anaerobic digestion into a carbon-free, sustainable hydrological cycle within a resilient circular economy. Nutrient Recovery, bioplastics extraction, sludge pre-treatment, enhanced and simplified anaerobic digestion as well as biogas post-treatment for biomethane production and CO₂ recycling to obtain carboxylic acids are all part of a new biofactory approach, yielding high value products with a minimal carbon footprint. ●



The Rewaise project is co-funded by the EU Horizon 2020 Research and Innovation programme, GA no 869496. This article reflects only Aqualia's view. The European Commission is not responsible for any use that may be made of the information it contains.

Profiling the atmospheric boundary layer at European scale

By Dr Claudia Acquistapace, the COST Action Science Communication Manager, Institute for geophysics and meteorology, University of Cologne, Germany

The atmospheric boundary layer (ABL) is the layer closest to the Earth's surface within which most human activities take place. The vertical profile of atmospheric parameters (such as temperature, humidity, wind, turbulence, clouds, and aerosols) in the ABL impacts weather, air quality, and climate.

Surface sensor networks and satellite observations do not provide sufficient

information on the high temporal variability and strong vertical gradients experienced in the ABL. Thus, ABL remains the single most important under-sampled part of the atmosphere.

Consequently, this observational gap currently poses a substantial obstacle to improving accurate weather and air quality forecasts and monitoring, and climate model parameterisations.

In the realm of high-technology ABL profiling instruments, operators often face challenges due to the complex nature of these systems. A common issue is the lack of expertise in determining the most suitable measurement setup and adhering to the best practices necessary for fully leveraging the data.

To optimise the operation of ABL profiling sensors, it is imperative to implement appropriate measurement configurations, consistent maintenance procedures, absolute calibration, post-processing, and quality control measures.

Recognising this, there is a need for comprehensive operational guidelines and standardised processing procedures. These guidelines are essential to ensure that the output of sensor networks attains maximum quality and consistency, thereby enhancing the value derived from the investment made in their deployment and operation.

The ground-based remote sensing instruments able to provide ABL profiles (such as temperature, humidity, wind, aerosol, and cloud) are currently deployed at numerous sites in Europe. Still, the harmonisation of data and procedures is missing, limiting the effective use and societal benefits of the existing ABL profiling data.

Introducing PROBE COST Action

In this context, the COST Action [Profiling the atmospheric Boundary layer at European scale](#) (PROBE) promotes recent advances in profiling



A Doppler Lidar for wind and turbulence profiling, here deployed in a city center to assess the role of the atmospheric boundary layer on temperature and pollution variability (photo credits: Martial Haeffelin, IPSL, France).

A frame from the PROBE video, where clouds are sitting on the atmospheric boundary layer like on a chair. The graphics help to visualise the topic of the video.



the atmospheric boundary layer (ABL) using ground-based remote sensing and instrument networks.

The ABL is a complex system, playing a key role in numerous aspects of weather, climate, and air quality with significant impacts on society and the economy. The understanding, monitoring, and forecast of ABL features require interdisciplinary knowledge, ranging from fundamental science, technology engineering, and operational skills.

PROBE puts together an interdisciplinary group of experts that includes Universities (Physics, Atmospheric Science, Meteorology agencies); national research institutions; European Research and Technological Development organisations; and Instrument manufacturers.

“PROBE is a very original network where we connect stakeholders from diverse economic sectors such as the energy industry, urban planners, air quality agencies, weather

services, satellite agencies, with scientific experts in ABL remote sensing measurements and products, and instrument manufacturers. In particular, the scientific networking in PROBE has led to significant advances in recommendations for optimized Doppler Lidar operations and tools for wind-turbulence profile retrievals” says, Dr Martial HAEFFELIN, the Action Chair. Dr. Domenico CIMINI, the Action main proposer and Vice-chair, adds *“The ABL impacts the amount of energy we produce with renewable sources. Wind profiling instruments are nowadays widely used by the wind energy industry to optimize their yield. We expect this to increase and extend to other ABL profiling instruments as we facilitate data access and demonstrate the added value.”*

Launched in 2019, the PROBE COST Action gathers stakeholders and scientists from 30 European and 7 non-European countries cooperating to measure wind, aerosol, temperature, humidity, and cloud profiles from the ground, using

continental-scale networks of remote sensing instruments. Continuous monitoring is fundamental to increase the accuracy of weather and air quality forecasts and to generate alerts in case of extreme conditions to safeguard our health.

How graphics can explain complex science with success

In 2022, the Action produced a video, to convey such a key complex topic to a non-expert audience. The video **“Atmospheric boundary layer: the Layer where we live”** received a prize in a contest organised by the Italian Meteorological Association (AISAM) as part of their fourth **National Congress**, held in Milan, Italy.

The innovative graphics in the video explains intuitively what happens in the atmospheric layer closest to the Earth’s surface.

The PROBE network developed precise recommendations to support operations of Automatic Lidar and Ceilometers (aerosol and cloud remote sensing), Doppler Lidars (wind

Instruments deployed on the radiation measurement center of the Lindenberg atmospheric observatory, including microwave radiometer profilers and an automatic lidar ceilometer (photo credits: Ronny Leinweber, DWD, Germany).



and turbulence profiling), Microwave Radiometers (temperature and humidity profiles), and Cloud Radars (cloud profiling). The PROBE network also put together new open-source codes to derive geophysical variables that are of interest to diverse user groups products, such as wind and profiles in the boundary layer for the energy sector, air quality, and urban weather applications.

By better targeting the needs of various stakeholders, the PROBE network can provide tools and recommendations to pave the way for advancements in the profitable use of ABL profiling measurements. This collaborative effort not only addresses the current gaps in knowledge but also contributes significantly to the refinement of instruments, measurement procedures, and retrieved products for a broad spectrum of applications. ●



Additional Information

View the network [website](#)

View the Action [website](#)

Further reading

The Action publications, follow [this link](#)

FINLAND ENERGY

Hydrogen is one key towards energy transition of industries

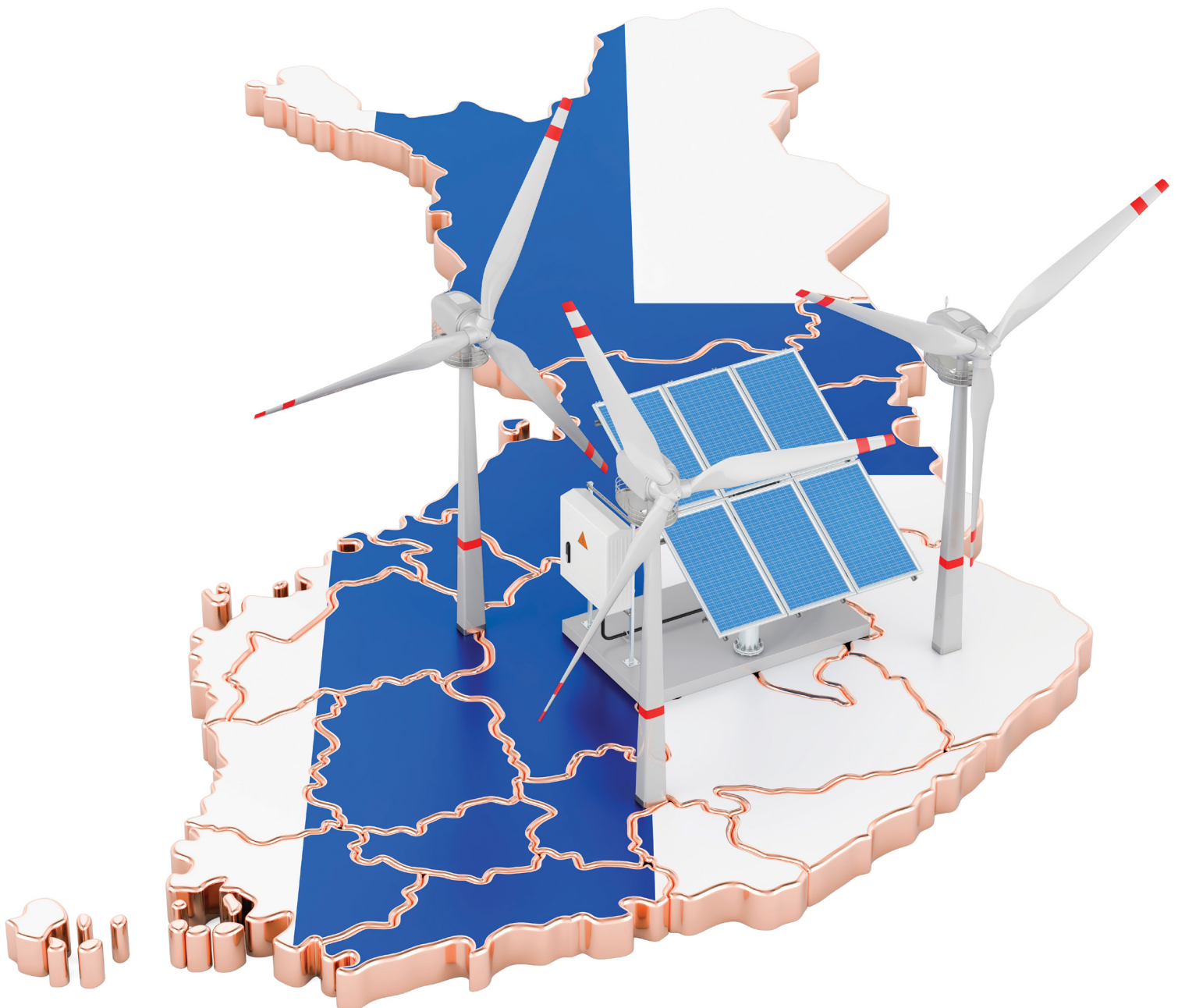
Kai Mykkänen, Minister of Climate and the Environment of Finland

Finland leads the green transition

Henna Virkkunen, MEP

Finland's green energy transition – towards climate neutrality 2035

Miapetra Kumpula-Natri, MEP



Hydrogen is one key towards energy transition of industries

By Kai Mykkänen (pictured), Minister of Climate and the Environment of Finland



Finland is the most northern country in the EU. We are known for being the home of forest industry and Nokia, but more and more we are also known as the forerunner in green transition. We have also taken a very ambitious climate goal as we want to be carbon neutral by 2035.

We have a good track record in engineering and our industries have succeeded in different circumstances over the decades. The latest challenge – and opportunity – is to bring clean hydrogen into energy and industrial systems.

Hydrogen will play a remarkable role in the big green transition in the coming years. The hydrogen of the future will all be clean, which is not the case today.

However, I would be careful to use the concept Hydrogen Economy as the future will not be built only around hydrogen. It may not sound as compelling to talk about electricity but the fact is we will use much more electricity in the future, and not only in road transport but in many other fields of the society as well. Some of this electricity will be transformed into hydrogen and some of the hydrogen will be key component in e-fuels.

Expectations towards hydrogen in recent years have been huge, but today it is easy to say some of expectations have been unrealistic, at least when look at the potential on short term. But I am quite convinced the role will be much bigger on the



long term – even though we do not know yet where hydrogen will be used and where not. It is obvious hydrogen will be integrated into energy system and it will become essential part of it.

But we must understand the breakthrough takes time as we can learn from the battery industries. The expectations on batteries were high some five to six years ago when every country in EU wanted to have a gigafactory of it's own. The landscape has changed remarkably during the last year as the industry is evolving on much slower pace than expected. Nevertheless, despite all the gloom, the industry is still evolving and growing.

In the big picture the EU and the Battery Alliance have done great job in helping a new industry to emerge. We all hope we are able to replicate the same success in the field of hydrogen with strong support coming from the Hydrogen Alliance.

In Finland we have been exploring the potential of green hydrogen as part of our efforts to move to a more sustainable low-carbon economy. We aim to reduce our greenhouse gas emissions and achieve carbon neutrality in the coming decades. As part of these efforts the previous government published a national resolution on hydrogen in early 2023 with strong focus on green hydrogen.

We have abundant renewable energy resources, including wind, solar, bioenergy and hydropower. Utilizing these sources for electrolysis to

produce green hydrogen aligns with our commitment to sustainable energy.

“Our national electricity grid is strong and resilient, and widely viewed as world class. It would be easy to introduce supply (wind power) or consumption (hydrogen production) without limits.”

For e-fuels, there is very much of bio-CO₂ available from forest industry and district heating CHP-plants around the country. The district heating network is ideal for the heat upgraded with heat pumps from hydrogen and e-fuels production. There is plenty of sweet water around. This is such an obvious advantage that we do not always remember it ourselves.

We are also supporting research and development initiatives related to hydrogen technologies. This includes projects aimed at improving the efficiency and cost-effectiveness of electrolysis, as well as exploring various applications for hydrogen.

We have identified various industrial sectors where hydrogen could play a crucial role in decarbonization. Industries such as steel, chemicals, and transportation are areas where green hydrogen can be used as a clean energy carrier. Combined with the availability of biogenic CO₂ from the forest industries, abundant provision of clean water as well as of many strategic minerals, Finland offers an inviting investment environment for clean industries.

Taking all this into account, it should not come as a big surprise that we have a remarkable amount of green transition investments in the pipeline, the total value of the projects exceeding €200 billion.

We are also actively engaged in international collaborations and partnerships to advance different hydrogen initiatives. Collaboration with other European countries and participation in global hydrogen initiatives contribute to the sharing of knowledge and best practices.

To support the widespread adoption of hydrogen, Finland is investing in the development of hydrogen infrastructure, including production facilities, storage, and distribution networks. It is not enough to look only at production and consumption of hydrogen but also at the whole ecosystem.

Finland has been working on creating a supportive policy and regulatory framework to encourage the growth of the hydrogen sector. This includes incentives for businesses and industries to adopt green hydrogen solutions.

With the help of green and clean hydrogen, we are aiming to turn our sustainable economy to become even more sustainable, while also providing exciting opportunities for businesses and talented people. We are not focusing only on the green transition within Finland as we are able to provide solutions on much wider scale, for the global markets. ●

Finland leads the green transition

By Henna Virkkunen, MEP (pictured)

Historically, Finland has not been an energy superpower. Finland does not have fossil fuel resources – no coal, gas nor oil. We have high energy consumption per capita due to cold climate, long distances and energy intensive industries.

However, Finland is now leading the green transition and committed to carbon neutrality already by 2035. How is this possible?

The Finnish energy system is built on a well-balanced energy mix. Together with Sweden, Finland has for long been the EU's top performer in renewable energy. This is thanks to sustainable forest industry and hydropower. Finland is also well under way towards full electrification, especially thanks to nuclear power. Finland triumphs in high energy efficiency both in generation and in use. We also have a strong tradition on sector integration. Overall we are well equipped to respond to the system stability challenges and serve the needs of the hydrogen economy.

A wide energy mix has been a winning solution for Finland also in terms of energy security. Following the energy crisis caused by the Russian invasion to Ukraine, reducing dependency from Russia has been relatively easy in Finland. Gas covers a smaller share of energy than in other European countries and the gaps have been replaced with other energy sources.

The Finnish green transition is encouraged by market based attitudes. Finland is part of the open Nordic wholesale electricity market. Market liberalisation and integration have increased productivity and

environmental efficiency. Overall, it is well understood that price regulation slows down investment and becomes costly for consumers in the longer term. The market based Nordic model has much to offer for the EU wide electricity market.

Sustainable forestry

The Finnish key to sustainability are our forests. They offer climate solutions in two ways: actively managed forests are both a valuable carbon sink and a source of renewable raw materials. Everything that is made from oil can also be made from wood. In Finland, the wood used for energy production is by-products from other forest industry processes. It is in our own interest to take good care of our forests – in no other country does forestry contribute to such a large share of gross domestic product.

Active forestry is important for the whole of Europe. Around 60% of all renewable energy used in the EU is bioenergy and most of it is derived from forest biomass. The bioeconomy has a growing role to play in cutting transport emissions, reducing dependence on fossil energy and ensuring security of supply.

Unfortunately sustainable forestry is often poorly understood at the EU level. The Finns are working hard to ensure that the role of sustainable forestry in climate action would be better acknowledged at the EU level policy making.

Emission-free electricity

With almost all electricity produced either by nuclear power or renewables, Finland's entire electricity production is already practically emission-free. Nuclear

covers approximately 35% of Finland's electricity production and the most powerful nuclear plant unit in Europe, Olkiluoto 3 with a capacity of 1,600 MW, became fully operational this year.

Unlike most of Europe, Finland has consistently been building up nuclear capacity. This has been possible as public opinion regarding nuclear energy has remained positive. Based on a study commissioned by Finnish Energy in April 2023, a record number 68 % of Finns are in favor of nuclear power. The trend has been going on for years, but due to the Russian invasion to Ukraine the Finns are today even more keen on domestic solutions.

In the EU policy making there is an unfortunate tendency to over-emphasise the role of renewables and energy reduction, rather than focus on the actual emissions. This has led to the exclusion of nuclear power. On a positive note, in recent years some member states have rethought their nuclear policies and interest in small modular reactors has increased. In the future Finland will be well positioned to lead the revitalisation of the European nuclear sector.

Critical raw materials

One of the biggest challenges for Europe's green transition is the competition for critical raw materials. Our green and digital transitions rely too much on imports. The majority of raw materials listed as critical in Europe are 90% imported from one country, most from China. The new EU Critical Raw Materials Act is well needed, setting targets for the EU's own production, processing and recycling of critical raw materials.



For Finland the move towards European based value chains for critical raw materials is a major opportunity. Finland is one of the only EU countries where dozens of raw materials listed as critical by the EU can be found. In Finland mining can be carried out on a sustainable basis. Finnish know-how can support the development of green transition ecosystems such as the battery industry.

Regulatory stability

Even if Finland is well underway towards green transition, we also face challenges which are interconnected to the development of the EU as a whole.

Firstly, Europe should be able to green its economy without protectionism. In the challenging global economic situation, the temptation to restore to state aid is strong. Relaxation of the EU state aid rules in the wake of the Covid-19 pandemic increased the pressure in member states to support national economies and introduce national level regulation.

Furthermore, trade developments such as the US Inflation Reduction Act, have undermined the European single market. This poses great challenges for Finland's small export-driven economy. The situation hinders climate efforts EU wide, by encouraging confrontation instead of value added EU-level projects.

Secondly, the unprecedented vastness of EU climate legislation over the past years have led to inconsistent policies and lack of long-term planning. Finnish companies are highly committed to environmental responsibility, which they see as a competitive advantage. However, they need more long term vision for investments. For boosting sustainable growth we need a consistent EU-level policy framework looking ahead to 2050 and beyond. ●

Finland's green energy transition – towards climate neutrality 2035

By Miapetra Kumpula-Natri, MEP (pictured)

Finland aims for carbon neutrality by 2035. Finland has cut energy imports from its neighbouring Russia, and the electricity produced in Finland is already 93% emissions-free. The share of renewable energies of Finland's energy use is 45%. I see Finland not dreaming, but delivering on its energy and climate combined way forward.

Finland has pursued an ambitious energy policy, which aims at Finland becoming the world's first fossil-free welfare society. Russia's war on Ukraine and the urgent need to free Finland from fossil-based energy has proven that a policy aiming for renewable, Finnish and low-emission sources of energy is the right strategy to achieve the green transition for Finland.

What I find encouraging is that, despite the Finnish government changing from a progressive, Social Democratic-led, five-party government including the Greens and liberals, to a right-wing one (led by EPP and ECR member parties), Finland's climate targets were kept: Finland's goal to become carbon neutral by 2035 has been enshrined in law. To me, this is a great national achievement. One reason I find for this is the commitment of the private sector and their call for predictability. During the Finnish parliamentary elections, the Confederation of Finnish Industries published data on planned and already commenced green investments in Finland. The figure was eye opening, and no party could demand policies that would stop those investments.

This means that there is an acknowledgment across the broad political spectrum that the climate emergency is the biggest crisis humanity has faced, and that we all need to be committed to solving it.

On the European Union level, I feel that it is important that we hold on to the commitment to make the entire European Union carbon neutral by 2050, at the latest. The green transition needs guiding to include everyone, ensuring that nobody is left behind. When the

private sector can rely on the way ahead, plan investments accordingly and the social policy is planned to ensure warm and decent housing for all, it helps us – the whole society – achieve the emissions reduction goals by 2030, 2040 and 2050.

I wondered why many regulations of the "Fit for 55" package fall short and set the timeframe of the legislation only until 2030, as this leaves some unpredictability for the long run. Collectively, we have to find the level of ambition in climate policy, and it is essential that we keep this up.



Finland is going to phase out the use of coal in the 2020s and peat as well as natural gas in the 2030s. The energy transition is going to be based on renewable and nuclear energy - as well as by increasing energy efficiency. The cornerstones of Finland's energy policy have been energy security and a low price. The energy transition, to be clear, was started long ago and now, as equal goals, Finland has adopted reducing the environmental effects of energy production, higher reliability of the energy supply and greater self-sufficiency.

We do have challenges, one of the most difficult being heating. Due to the Finnish climate, homes in Finland have had to be well-insulated. Currently, 26% of energy consumed in Finland is used to heat buildings, homes and businesses. The absolute

amount of energy consumed on heating has stayed the same since the mid-1990s when the collection of data began. The energy mix has been transformed from coal to renewable bioenergy that is mostly a by-product of our forest industries: production of sludge and paper from sawmills. We should still strive for homes to become more energy-efficient. This could be achieved, for example, by favouring heat pumps and heat recovery systems.

The effects of Russia's war on Ukraine were felt on energy prices across Europe. In the last winter, the Finnish government - like many other European governments - supported households with their energy bills. For years, there have been support schemes to change the energy system of heating from oil to wood pellets or geothermal heat. Even up here in the north, solar panel installation has been boosted. In addition, households are supported to become more energy efficient through tax credits where it is possible to deduct energy-efficient renovations. Banks have supported better energy efficiency with lower interest rates for loans.

The Finnish electricity production in 2022 was 93% emission free and in 2022 Finland had the second cheapest electricity price in the EU. There are plans to build a lot more wind power as there is more land and a long coastline available in Finland compared to many other EU countries that have dense populations. From 2011 to 2021, Finland's wind power capacity grew from 199 MW to almost 3,300 MW.

Public support of nuclear energy has grown in past years along self-sufficiency and cutting emissions. Opinion surveys last winter indicated that, when Russian imports were cut and the long-delayed fifth nuclear reactor was brought online, 83% of Finns supported nuclear power, and 11% wanted to reduce its use.

I firmly believe that Finland has the capacity to become a European leader in the production of green hydrogen. With increased production of clean electricity, the surplus of clean electricity can be used to produce a hydrogen leap where hydrogen can lead to new industrial investments, use in existing industry, new solutions for traffic and, for example, in the manufacturing of products like ammonia. Also pipelines in the Nordics and to Germany are being planned.

Ensuring the security of the energy supply is important in the future, particularly when bearing in mind the commitment to give up coal, peat and fossil-based natural gas. Security can be strengthened by investing more into renewable energy, the supply network, storage methods, systemic hydrogen and intelligent control methods. Finland sees potential in small modular nuclear reactors too, particularly since there is potential for swift deployment - without compromising safety, of course. The plans to study the use of a small modular nuclear reactor in the district heating system of Helsinki were published just a few weeks ago as part of the capital region doing its part for the climate neutrality goal.

I have worked on the green transition, having served as Member of the European Parliament for nine and a half years, and previously in the Finnish parliament for 11 years. It has not been easy to combine the EU and national ambition in every detail, but in the big picture the goals of Finland have supported EU policies to be ambitious and vice-versa. It is clear that EU-level actions have made it possible for national goals to happen. The most important has been, and still is, the clear signal for the price for carbon, i.e. the ETS system. I am very proud of Finland's track record in its green energy transition, and I have high hopes on what can be achieved in the future. ●

Offshore wind energy – safeguarding

By WindEurope Chief Policy Officer Pierre Tardieu

The growth of offshore wind power in Europe has been a gamechanger for the energy system. The first sea-based turbines were installed off the coast of Denmark in 1991. Since then, the fleet of offshore wind turbines has grown in leaps and bounds. Individual sea-based wind farms like Hornsea 2 in the UK and Hollandse Kust Zuid in the Netherlands have more than 1 GW each, powering millions of homes and businesses and harnessing more of Europe's wind resource than ever before. Until now almost all turbines have been bottom-fixed and located in sea basins with low water depths. Now, with the first large-scale floating wind farms

coming online, more maritime space is opening up to offshore wind development. The prospects for wind at sea are bright.

Europe is rightfully proud of its offshore wind industry. Our offshore turbines are cutting-edge. But it's more than a question of prestige. Offshore wind energy provides jobs for over 70,000 Europeans and €7.5bn to Europe's GDP every year. Every offshore wind turbine installed in Europe creates €20mn of economic activity.

Offshore turbines will be a catalyst for Europe's green energy transition. By tapping into our homegrown wind resource, we

g Europe's maritime revolution

can move away from our reliance on foreign energy imports – and shore up Europe's energy security and independence. Therefore, the expansion of offshore wind isn't just an environmental duty – it's critical to our security, autonomy and economic development.

But there's a long way to go. As it stands, the European Union wants 1,300 GW of wind power by 2050. 300 GW of that will be offshore. There is much more to be unlocked. But offshore wind is facing certain challenges. Permitting is too slow and cumbersome. There are supply chain bottlenecks. And the auction designs many Governments are applying to offshore wind aren't

helpful. Auctions solely based on price award the lowest bid and create a "race to the bottom" among project developers. It is good that the EU is now proposing non-price criteria in renewables auctions to award those bids that bring the biggest value to society.

Out of these, supply chain bottlenecks and auction design are the biggest hurdles – and in many ways the latter feeds into the former. The pressure of inflation and a lack of clarity on future volumes have held back the expansion of Europe's clean tech manufacturing. And too many wind energy auctions have failed to take increases in input

costs into account. What is more, many authorities make bidders pay for the privilege of building a wind farm – a system known as "negative bidding", which just ends up passing additional costs onto consumers and the supply chain. This is an unhealthy development.

The UK's recent offshore wind auction was a particularly bad example of these factors at play. The UK Government hoped to award up to 5 GW of offshore wind, but not a single developer ended up bidding. The maximum allowed strike price was far too low. It didn't reflect the impact of inflation. Hence the lack of bids. It is crucial that the UK Government



WindEurope Chief Policy Officer Pierre Tardieu

is now increasing the ceiling prices by 66% for the next offshore auction round, recognizing the need to adapt to changed market conditions.

Since the outbreak of the war in Ukraine the European Union has acknowledged the need to ramp-up homegrown wind energy in Europe. On the back of this the EU has unveiled a landmark new initiative – the Wind Power Package.

It comes with an Action Plan, setting out 15 urgent steps that the EU and Governments need to take to speed up the growth of wind. On auction design it pushes for the indexation of auction tariffs, avoiding negative bidding. And it pushes pre-qualification criteria. These would set out which projects can or cannot bid into an auction based on non-price factors – such as cybersecurity or the ability to deliver. And crucially it also calls for auctions to be indexed to reflect rising costs.

The Package will take sweeping new measures to finance investments in new factories, infrastructure and a robust wind energy workforce. For offshore wind getting the right infrastructure is vital. We must equip ports with the right facilities, capacity

and vessels to deliver sea-based wind at scale.

The Wind Power Package has already received crucial backing from the North Seas Energy Cooperation – nine Northern European countries working to fast-track offshore wind. At a meeting in the Hague this November, NSEC members also issued their own Action Agenda which addresses other priorities in the offshore sphere – particularly grid development. As Europe's offshore fleet expands we need grid infrastructure which is fit for purpose. That means coordinated grid planning across borders, new cross-border infrastructural projects, and the right framework for offshore hybrids – that is wind farms which connect to more than one country.

The takeoff of offshore wind has been spectacular over many years. But the current market environment poses new threats. Given the pressures weighing down from all sides, dedicated support from European Governments is absolutely crucial. It will help to maintain and accelerate Europe's offshore energy transition – putting us on the road to climate neutrality and creating a real chance at long-term energy security. ●





Ocean energy – leveraging private capital with public support from innovation to commercialisation

By Rémi Gruet, CEO of Ocean Energy Europe.

Ocean energy technologies got a big push in 2023! The EU funded two tidal stream farms through its flagship research and innovation programme, Horizon Europe, as well as two wave energy projects via the Innovation Fund. France awarded a grant and a feed-in-tariff for a first 17MW tidal farm, and the UK published their second round of ‘Contracts for Difference’ – a top-up on the electricity price – resulting in over 90 MW of projects to be deployed in British waters over the next few years.

This could be the start of industrialisation for ocean energies. The sector has been starved for investments due to lack of support

and market visibility for several years. But European utilities, both from the power and oil and gas sectors, are looking at investing again, partnering or funding projects, some even building their own technology.

So why is ocean energy suddenly more palatable?

No security of supply without security of pricing

V. Putin has made sure that security of pricing for gas imports will never be guaranteed again. For decades, a relative price stability gave us the illusion of security of (gas) supply. Today it is clear that climate is not the only or even the main reason to decarbonise: security of supply and

(low) prices to consumers are!

As a renewable and indigenous resource, ocean energy can help stabilise electricity prices and provide that security of supply – kWh costs don’t change once the device is installed. As a technology manufactured locally, it can even ensure the stability of prices for its turbines, thus providing a ‘double price security’. This ensures strong resilience against external disruptions and reinforces Europe’s energy independence.

Decarbonisation requires flexibility providers on the grid

Although just 15 MW are in the water today, ocean energy has the potential to generate about 10% of

Photo: ©CorPower Ocean



Europe's electricity consumption by 2050 – along the Atlantic coast from Portugal to Norway, as well as in the Mediterranean Sea.

But the true value of ocean energy comes from its complementarity to variable renewables: the backbone of a decarbonised European grid will be cheap wind and solar. Both require flexible generation to balance electricity production and consumption at all times. Ocean energy can provide, as tidal is 100% predictable and wave generation follows and continues long after wind generation.

How do we get there? Securing private capital through public investment aid and revenue support

To propel ocean energy to commercialisation, the EU needs a financing framework that helps bridge the gap from innovation to market – similar to how wind and solar got support in the early 2000's.

Such a framework requires investment aid on one side, to improve access to private capital, and reduce the overall financing costs of projects. And revenue support on the other side to makes projects bankable.

Investment aid – Projects use a mix of grants, equity and debt from both public and private sources get to financial close. But private capital can be expensive, as the innovative nature of the technology is perceived as a technical risk justifying high rates.

Investment aid thus plays a critical and double role: first by providing grants, it reduces the amount that needs to be sourced on capital markets, making it easier to reach financial close. Second, it reduces the overall cost of capital for the project, as less of the CAPEX is subject to interest rates or dividends, and as a result, reduces the cost of the electricity. Public equity or loans



Photo: ©HydroQuest

can also work, provided their costs remains at zero or at least well below market rates.

Revenue support – The other piece of the financing puzzle is ensuring a return for private investors. The electricity market price is not high enough to cover the higher costs of using innovative technologies. So a “top up” on electricity sales is needed to ensure returns can attract loaners and investors.

Revenue support is also an excellent way of demonstrating long-term market visibility, which further cements the interest of private capital providers. As for the form, Feed-in-Tariffs, Contracts for Difference, many can work, provided they are well designed.

And as deployments increase, learnings and economies of scale reduce costs, in turn reducing the amount of public support needed a virtuous circle.

Europe needs to act now to safeguard its global leadership

The ocean energy sector has long been led by European companies and Europe is home to the first tidal

farms and the most advanced wave devices.

But the potential and benefits of ocean energy have sparked the interest of other world economies. The US is channelling over €100m per year to develop the sector. China has published deployment targets and enshrined the “mass-deployment of ocean energy” in its 5-year plan. China also provides generous investment aid of up to 50% of total investment AND generous revenue support in excess of 300€/MWh... This is strong competition.

Without appropriate support for ocean energy, Europe risks losing the technology leadership and the dominance of a global market worth €53bn/annum.

There is a strong momentum at the moment and interest from private investors looking for the best technology and projects. The time is right for the European Commission and Member States to join forces and consolidate a finance ecosystem for ocean energy to become investable, reach industrial roll-out and become the next European success story in clean energy! ●

The logo features a stylized yellow and orange leaf-like shape at the top, with a series of yellow and green dots of varying sizes arranged in a curved path below it. The text 'european' is in a light yellow sans-serif font, 'energy' is in a white sans-serif font, and 'innovation' is in a bold yellow sans-serif font.

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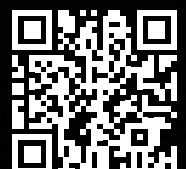
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