AUTUMN 2022

european energyinnovation

Connecting Europe's Stakeholders in Energy and Transport

EU SUSTAINABLE ENERGY WEEK

REPowerEU

INNOVATIVE RENEWABLES

RAW MATERIALS

Includes editorial contributions from:

Morten Helveg Petersen
MEP

Karima Delli
MEP

Sean Kelly
MEP

International Conference

World Sustainable Energy Days 2023

28 February - 3 March 2023
Wels/Austria

CALL FOR PAPERS

10 October 2022

Conferences:

- European Energy Efficiency Conference
- European Pellet Conference
- Industrial Energy Efficiency Conference
- Smart E-Mobility Conference
- Young Energy Researchers Conference

www.wsed.at

OÖ Energiesparverband, Linz/Austria, Tel. +43 732-7720-14386, office@esv.or.at, www.wsed.at

Contents

The publishers of European Energy Innovation would like to offer their sincere thanks to all individuals and organisations who have contributed editorial images photos and illustrations to the magazine. Whilst every effort has been made to ensure accuracy of the content, the publishers of European Energy Innovation accept no responsibility for errors or omissions.

European Energy Innovation is published by: Prologue Media Ltd
1a Shire Lane,
Chorleywood,
Hertfordshire WD3 5NQ,
United Kingdom

Tel: +44 1923 286238
www.europeanenergyinnovation.eu

Editor
Michael Edmund
editor@europeanenergyinnovation.eu

Business Development Director
Philip Beausire
philip@europeanenergyinnovation.eu

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

Design & Production
RayHeathDesign.com

Website design
pulseart.co.uk

Print
The Magazine Printing Company,
Enfield, Middlesex, United Kingdom

#ESGC2022

POLICY

TECHNOLOGY

MARKET

ENERGY STORAGE

Global Conference

BRUSSELS, 11 – 13 October 2022

The fifth edition of the Energy Storage Global Conference (ESGC) is organised by EASE – The European Association for Storage of Energy, with the support of the European Commission's Joint Research Centre, at Hotel Le Plaza in Brussels.

For more information and registration, visit

www.esgc.org

Foreword

Even as this Summer's record temperatures and wildfires scorched Europe and seared the words 'climate change' even deeper into our collective consciousness, events in Ukraine have imparted a fresh sense of urgency to our fight to stop the planet overheating. Russian weaponisation of gas has drawn predictably furious responses from those most reliant upon it – including the scramble to fill reserves and find alternative sources. With equally predictable effects on gas prices in particular, and energy prices in general as, with ghastly inevitability, a slow-motion economic tsunami bears down upon our interconnected world of finely-tuned, just-in-time consumer supply chains – "From German tomatoes to Swedish bread", intones Bloomberg solemnly. For nothing can be grown, manufactured or moved without Energy. And Winter is just around the corner. And the supermarket shelves still need to be replenished.

Morten Helveg Petersen sums up this most pressing issue very succinctly. "Putin has reminded us all", he says, "that saving energy is the only quick fix around that immediately reduces our dependency on his gas". More on Petersen's excellent article later.

Gas, then, something of a critical resource: so much the better, then, if we can produce it from a renewable source. In this issue, the IEA assesses biogas within a new policy context of RePowerEU - which envisions a 40% average annual growth in biomethane production over the next 7 years.

Meanwhile, Harry Boyd-Carpenter explores the explosion in demand for minerals associated with new RE technologies and new infrastructure. "Being green", he says "goes hand in hand with supporting exploration for and the extraction of those minerals." To illustrate the issue, he shares the startling fact that China processes 98% of the EU's rare earth elements, and goes on to discuss the activity of the EBRD in supporting novel mining and electronic recycling projects to reduce supply risk within the EU.

Seán Kelly MEP makes a welcome return to our pages, with a review of how PV is being integrated into the building stock. Kelly is at great pains to point out the solution must not be more painful than the problem. Reminding us that buildings are responsible for 36% of Europe's emissions, and 40% of the energy it consumes, he warns that the Energy Performance of Buildings Directive must acknowledge that imposing obligations without providing sufficient means to achieve standards will simply increase inequality. He sees rooftop solar power as an attractive option, especially if the EPBD makes rooftop solar panels mandatory on new commercial and public buildings, as well as new residential buildings by 2029.

We feature Transport with an article by Karima Delli MEP, who explores the thinking behind moves to regulate the emissions of light-duty road vehicles. Given that transport is responsible for about 25% of CO_2 emissions in the EU; and with its talk of phasing out ICE vehicles and the planned stopping of new commercial ICE vehicles as soon as 2030, there is much to ponder here.

And so to Morten Helveg Petersen's discussion of Energy Efficiency - "so often the neglected stepchild of energy policy", he says, because insulation materials and thermostats don't offer as tangible a vision of progress as a 100 metre-tall wind turbine. With 75 percent of Europe's buildings demonstrating poor energy performance, we are simply allowing energy to slip through our fingers. But Petersen counters by pointing out that reduced electricity consumption means less wasted energy; district heating is more energy-efficient than central heating; energy efficiency speeds the green transition; jobs will be created in construction and companies producing energy efficiency solutions.The case for Energy Efficiency is based upon the familiar mantra that the greenest energy is the energy we don't use. But Petersen provides a long list of compellingly tangible benefits behind those words.

But perhaps the most significant consequence is weaning ourselves off our dependence on a resource for which are paying vast sums of money. Money that is used to finance genocidal war aims.

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

Michael Edmund
Editor

26-29 September 2022

EUROPEAN SUSTAINABLE ENERGY WEEK

Explore the programme on the event platform. Click on the sessions for direct access.

ONLINE / ONSITE (CHARLEMAGNE BUILDING, BRUSSELS)

	DAY 1 MONDAY 26 SEPTEMBER	DAY 2 TUESDAY 27 SEPTEMBER			
09.00 - 09.30		KEYNOTE SPEECH ON **REPowerEU**			
09.30 - 10.00	**OPENING SESSION**	REPowerEU	LESSONS ON CLIMATE NEUTRALITY AND ENERGY INDEPENDENCE FROM THE EU ISLANDS	FAST TRACK TO AFFORDABLE, SECURE AND SUSTAINABLE ENERGY: THE GREEN DEAL TO BOOST RES AND EFFICIENCY	GREENING THE PIPELINES: THE ROLE OF BIOMETHANE IN EUROPE'S SUSTAINABLE ENERGY TRANSITION AND ENERGY SECURITY
10.00 - 10.30					
10.30 - 11.00	Coffee break		Coffee break / Energy Talks (onsite only)		
11.00 - 11.30	**EUSEW AWARDS CEREMONY**				
11.30 - 12.00			REPOWEREU: SAVE ENERGY, DIVERSIFY, BUILD A GREENER EU ENERGY SYSTEM	THE COMMODIFICATION OF GREEN HYDROGEN FOR EUROPE	RENEWABLES DEPLOYMENT: DOUBLE THE SPEED
12.00 - 12.30	**DEBATE WITH AMBASSADORS**				
12.30 - 13.00					
13.00 - 13.30	Lunch break	Lunch break			
13.30 - 14.00					
14.00 - 14.30	**EUROPEAN YOUTH ENERGY DAY** 'How to ensure that Europe's future energy independence is sustainable'	KEYNOTE SPEECH ON **DIGITALISATION**			
14.30 - 15.00		DIGITALISATION	THE POWER OF DIGITAL INNOVATION HUBS TO ACCELERATE THE DIGITALISATION OF EUROPE'S ENERGY TRANSITION	SUPPORTING INVESTMENTS IN INNOVATION FOR A MORE DIGITALISED ELECTRICITY GRID	REPOWERING EUROPE BY EMPOWERING ENERGY COMMUNITIES: A PERSPECTIVE ON DIGITAL AND SOCIAL INNOVATION
15.00 - 15.30					
15.30 - 16.00	Coffee break		Coffee break / Energy Talks (onsite only)		
16.00 - 16.30	**EUROPEAN YOUTH ENERGY DAY** 'How will our energy future look in 20 years?'				
16.30 - 17.00			DATA EXCHANGE AND GOVERNANCE MODELS FOR ENERGY DATA HUBS	ENERGY TRANSITION, DIGITALISATION AND CYBERSECURITY	MAKING DATA CENTRES IN EUROPE SUSTAINABLE
17.00 - 17.30					
17.30 - 18.00					
18.00 - 18.30					
18.30 - 19.00					

WHAT TO EXPECT FROM THE POLICY CONFERENCE:

PLENARIES

Featuring high-profile speakers such as European Commissioner for Energy Kadri Simson, Executive Vice-President Margrethe Vestager, and representatives from the Czech presidency of the Council, the Ukrainian Ministry for Energy and the European Parliament, the Opening and Closing Ceremonies will present the EU's key priorities for the energy transition in the context of the REPowerEU plan and Europe's Green Deal.

KEYNOTE SPEECHES

Impactful speeches from key actors in energy policy set out the priorities for Europe's energy transition. Expect insightful contributions on the REPowerEU plan, Digitalisation, Energy Efficiency, Renewables, Consumers and a Fair Energy Transition, and Decarbonisation.
These keynote interventions are the prelude to the thematic block on the topic addressed.

EUSEW AWARDS CEREMONY

The European Sustainable Energy Awards recognise outstanding individuals and projects for their innovation and efforts in energy efficiency and renewables. The Awards Ceremony will bring together European Commissioner for Energy Kadri Simson, members of the high-level jury and the finalists of the four categories in order to announce the winners in Innovation, Local Energy Action, Woman in Energy, and Young Energy Trailblazer.

NETWORKING OPPORTUNITIES

The Networking Village features a series of activities to allow participants to interact with topics of their interest, connect with other participants with shared interests, as well as visit exhibition booths online and onsite to find more information and further networking opportunities.
The online networking features are available until Friday 30 September included.

DAY 3 WEDNESDAY 28 SEPTEMBER

KEYNOTE SPEECH ON **ENERGY EFFICIENCY**

NERGY IENCY AND BLE ENERGIES UILDING ENERGY MANCE: LOCAL ES FROM THE ANEAN REGIONS	REPOWER THE EU: MOBILISING INVESTMENTS AND CITIZEN EMPOWERMENT	HARNESSING THE POTENTIAL OF ENERGY MANAGEMENT AND DISTRICT HEATING IN REPOWEREU
Coffee break / Energy Talks (onsite only)		
GY SYSTEM ENCY FOR A -EFFECTIVE ONISATION AND Y RESILIENCE	FINANCING ENERGY EFFICIENCY FIRST FOR FIT FOR 55: THE ROLE OF FINANCIAL INSTITUTIONS	FAST-TRACKING THE ENERGY TRANSITION AND AUTONOMY IN DEFENCE
UNCH OF THE EUROPEAN BIOMETHANE INDUSTRIAL PARTNERSHIP		
Lunch break		

KEYNOTE SPEECH ON **RENEWABLES**

-EMISSION NGS: HOW TO VE CLIMATE- AL HEATING OLING FROM M (FINLAND) TO PASO (CYPRUS)	RENEWABLE AND LOW CARBON FUELS: SCALING-UP FOR SUSTAINABLE AVIATION AND WATERBORNE TRANSPORT	SHAPING THE SOLAR TERAWATT AGE: IMPLEMENTING THE EU SOLAR STRATEGY
Coffee break / Energy Talks (onsite only)		
THE EUROPEAN VALUE CHAIN E-PROOF BY NG IN PEOPLE, ND INNOVATION	ANY WAY THE WIND BLOWS: EU SUPPORT FOR OFFSHORE WIND ENERGY AND INFRASTRUCTURE	MAKING THE SUN SHINE AT NIGHT: WHAT IS NEEDED TO BUILD A 100% RENEWABLE-BASED ENERGY SYSTEM?

DAY 4 THURSDAY 29 SEPTEMBER

KEYNOTE SPEECHES ON **CONSUMERS AND A FAIR ENERGY TRANSITION + DECARBONISATION**

CONSUMERS AND A FAIR ENERGY TRANSITION	TOWARDS ENERGY-AWARE BEHAVIOURS: HOW STUDIES ON YOUNG GENERATIONS CAN INFORM BETTER POLICY DESIGN	BUILDING BLOCKS TO ELECTRIFY MOBILITY: NOW AND THE FUTURE	ACHIEVING ENERGY INDEPENDENCE AND THE GREEN TRANSITION: REPOWERING CONSUMERS
	Coffee break / Energy Talks (onsite only)		
	STRONGER TOGETHER: COMMUNITY-BASED RENEWABLE ENERGY PROJECTS FOR A JUST AND GREEN TRANSITION	DIVERSIFYING THE ENERGY TRANSITION: GENDER PERSPECTIVES IN ENERGY POVERTY POLICIES	LOCAL SOLUTIONS TO THE ENERGY CRISIS: EMPOWERING CITIZENS THROUGH RENEWABLE ENERGY COMMUNITIES
	Lunch break		
DECARBONISATION	THE POTENTIAL OF RENEWABLE GASES TO SUPPORT THE ENERGY TRANSITION AND GUARANTEE SECURITY OF SUPPLY	INTERNATIONAL COOPERATION FOR ENERGY RESILIENT AND DECARBONISED INDUSTRIES	FINANCING THE EU'S ENERGY TRANSITION: THE POWER OF EU FUNDING, NATIONAL SCHEMES AND PRIVATE FINANCE
	Coffee break / Energy Talks (onsite only)		
	CONSUMER VALUE, STEADY POWER: HOW HEAT PUMPS CAN HELP TRANSFORM THE ELECTRICITY GRID	THE ROLE OF TAXATION IN ENSURING THE EU'S STRATEGIC ENERGY AUTONOMY WHILE ACHIEVING DECARBONISATION	CHALLENGES FOR DECARBONISING EU INDUSTRIES
	CLOSING SESSION		
	Networking drink		

DEBATE WITH AMBASSADORS

A dynamic exchange between EUSEW Digital Ambassadors from the non-profit sector, energy cooperatives and finance will be led by Director-General for Energy, Ditte Juul Jørgensen. Panellists will have the opportunity to engage with topics relating to the REPowerEU plan to boost the EU's energy independence, financial support for the green transition, and the need to cooperate globally to enact meaningful climate action.

DEDICATED YOUTH PROGRAMME

In the context of the European Year of Youth European Commissioner for Energy Kadri Simson will open the third European Youth Energy Day, which will feature discussions with young individuals from across Member States and an interactive session spotlighting innovators taking concrete steps towards a carbon-neutral future for Europe.
All policy sessions relating to the European Year of Youth are marked in green on this programme.

#EUSEW2022

Programme updated on 6 September 2022

European Commission

Finally energy efficiency gets the credit it deserves

By Morten Helveg Petersen (pictured), Renew Europe,
Vice-chair of the Committee on Industry, Research and Energy

As the saying goes, the greenest energy is the energy we do not use. Yet, energy efficiency has always been the neglected stepchild of energy policy. While a 300 feet windmill makes up a great photo opportunity to demonstrate the progress of the climate agenda, isolation materials and thermostats fades in comparison.

Likewise, energy efficiency has never been a topic capable of setting constituency meetings on fire, rather the exercise would be to avoid the audience drifting off. In short, energy efficiency has simply not been politically sexy. That is until now, of course.

When increasing EU energy efficiency by 1 percent corresponds to 2,6 percent less dependency on Russian gas imports, Brussels is listening. As Putin brutally invaded Ukraine, he also catapulted energy efficiency onto the top-shelf European security policy.

Energy efficiency's new status as politically sexy was prominently featured in the European Parliament's adoption of the Energy Efficiency Directive earlier this month with its staggering 40 percent energy efficiency target. While the European Parliament surely is the institution to set the bar of EU climate policy high, this would have been unheard of in the beginning of the year.

The sad circumstances aside, it is extremely important that energy efficiency has finally been brought to the centre of the stage. Without increased energy efficiency ambitions we will simply not achieve our climate targets in 2030, or 2050 for that matter.

A look at the numbers reveals the potential. Taking starting point in Europe's buildings, which are currently being targeted through the European Performance of Building Directive, a file I am active on, 40 percent of EU energy consumption stems from buildings. At the same time, 75 percent have poor energy performance. Heat, or cold for that matter, simply slips away through leaks in our buildings. It goes without saying that is waste we cannot afford.

According to the Commission's fit for 55 package, the target is to increase energy efficiency in buildings by 36 percent compared to 2007 levels. This does not only constitute a direct gain from energy savings. Reduced energy consumption in our buildings also requires less use of electricity, and consequently energy waste is reduced there as well.

Energy efficiency is the perfect complement to the establishing of renewables. Energy savings from, say, green renovation, is energy saved years on end. Thus, energy efficiency makes the green transition easier, less extensive and cheaper. We will need less wind- and solar parks, which also reduces the demand for land use. This aspect is often overlooked, but can be of high importance in countries where land is scarce, and protests over the establishing of renewables are frequent. Public support of the green

transition cannot and should not be taken for granted.

Finally, energy efficiency will create lots of jobs in construction and companies producing solutions for energy efficiency, providing a boost to economy. However, there is a risk of energy efficiency being received counter intuitively across finance ministries in the Member States. Reduced energy consumption will, all else being equal, also mean less taxes, and that is an obstacle governments across Europe have to come to terms with, when developing national plans for energy efficiency.

In my opinion, the European Commission has done a good job so far in analysing the potential and mobilising funds for Europe's energy savings. On one account, I see the Commission fall short though. The potential of district heating and cooling is not highly estimated, while recent research from Aalborg University in Denmark suggests that district heating could potentially cover as much as 50 percent of Europe, primarily in urban areas. Moving from central to district heating implies massive energy savings, and there are potential synergy effects available by integrating district heating with ptx production and utilise the surplus heat from the ptx facility.

Nevertheless, energy efficiency in Europe is in a somewhat good place, now that Putin has reminded us all of energy savings being the only quick fix around that immediately reduces our dependency on his gas.

European countries can unlock huge cost and emissions savings by unleashing the potential of renewable energy

By Jan Andersson (pictured), General Manager, Market Development, Wärtsilä Energy

As Europe scrambles to replace Russian hydrocarbons and shore up its energy supply, there is a once-in-a-generation opportunity to lay the foundations for net zero, whilst cutting energy bills and increasing energy independence.

However, with energy prices continuing to rise at an alarming pace, baseload fossil fuel power plants are being refired. In Germany, mothballed coal plants are being restarted, with coal trains now taking priority over passenger transport as the country struggles to deal with the increased demand. In the UK, ambitious plans to achieve a net zero energy system by 2035 have been partially stalled as bills rise and the country transitions to a new prime minister, with some now calling for its 2050 net zero target to be pushed back.

While European states across the continent are looking at fossil fuels as the solution to their current energy security and price challenges, the opportunity to harness the full potential of renewable energy is being missed. Scaling up renewables will cut emissions, reduce energy bills, and improve energy independence across Europe.

A concerted political effort is now required. To achieve its renewable potential, Europe should accelerate

its renewable pipeline, diversify its energy supply, and ensure energy is used as efficiently as possible to reduce waste.

The global coal phase-out is at risk of stalling

Last year's Conference of the Parties (COP26) produced a landmark global consensus that coal must be "consigned to history". However, with COP27 around the corner, this previously assured consensus has wavered. The current energy crisis has left many countries planning to extend their reliance on coal.

Nowhere is this truer than in Germany. The new "traffic light" coalition government – formed on a foundation of green policies – has been hit by a perfect storm. Germany was dependent on Russia for around 60% of its gas before the war, meaning it has now been forced to introduce several reactive measures to cut gas consumption by 15% by March 2023, including refiring mothballed coal plants.

Despite this backslide, hopes of a 2030 coal phase-out should not be lost. To get there, new renewable energy is urgently needed. Our modelling indicates that by 2035, Germany will require 780 TWh of renewable energy to operate a net zero electricity system, up from 195 TWh today, supported by grid balancing technology to provide backup supply when energy is not being produced by renewables. That will require at least 45 TWh of new renewable capacity each year, which amounts to a 10% year-on-year increase, or 7500 new wind turbines each year[1].

Worryingly, things are moving in the wrong direction. Recently, it was reported that Germany had only built 235 wind turbines this year and permits for new projects were down by 15%.

Illustration of a future energy system. Renewable energy – plus flexible solutions such as balancing engines and energy storage – offers the most effective solution to bring energy bills down and reclaim energy independence.

This trend must be reversed rapidly to ensure that renewable energy can be levelled up to provide almost all of Germany's power demand by the 2030s. The urgent deployment of renewables should be combined with power system flexibility from energy storage and balancing engines which can be converted to run on sustainable fuels in the future.

Germany should rise to this challenge, as the rapid deployment of the renewable energy offers huge opportunities for European nations. Modelling by Wärtsilä demonstrates that if renewables can be scaled up across Europe, gas consumption can be halved, reducing energy costs by €323 billion by 2030. To get there 80 GW of renewable capacity is needed across Europe every year. This would not only usher in an era of energy independence for Europe, but it would also lay the foundations for net zero – and Germany can lead this transition.

Applying policy lessons to the rest of Europe, and the world

We have completed an in-depth study into Germany's energy system which provides several lessons that can be applied around the world.

Firstly, renewable energy – plus flexible solutions such as balancing engines and energy storage – offers the most effective solution to bring energy bills down and reclaim energy independence. Clear and concerted political will is needed to level-up renewable energy to become the primary source of energy, including the removal of restrictive planning regulations that limit the level of new development.

Secondly, energy efficiency is crucial. Energy waste must not only be reduced by the end user, but also by improved grid flexibility. To provide an example, it cost the UK £500M in 2021 to curtail wind energy due to the presence of inflexible power plants which are unable to manage the intermittency of renewables[2]. Flexibility solutions, such as balancing engines and energy storage, will help to supercharge the country's decarbonisation by reducing waste.

Thirdly, energy must come from diverse sources in the future. This is not only true in the short term, but also in terms of building future power systems where energy storage and green hydrogen will play an important role. Ensuring technological diversity is crucial, especially for flexibility where both short and long-duration storage is needed to manage daily and seasonal peaks.

Without doubt, this will require a herculean effort. However, if policymakers around Europe can rapidly scale up renewable energy, and deliver diverse flexible power systems, they will not only significantly reduce carbon emissions but also unlock cheaper energy bills across the continent.

1 An average wind turbine with a capacity of 2.5-3 MW can produce 6000 MWh per year, or 0.006 TWh.
2 https://www.drax.com/press_release/cost-of-turning-off-uk-wind-farms-reached-record-high-in-2021/

Integrating solar energy into Europe's build environment

By Sean Kelly, MEP (pictured)

Renovation of the EU's building stock is a key Green Deal priority, but since this designation, the landscape in Europe has changed. We have faced, and overcome, the worst pandemic in 100 years, the economic consequences of which will have lasting implications, but also a war on our doorstep that has fundamentally changed the trajectory of the energy transition and caused a crisis in security of our energy supply.

This has caused inflation to skyrocket and soaring energy prices for consumers, significantly affecting millions of EU citizens, business and the economy more broadly. We have to face the reality that things may get worse before they get better, but in the meantime we must do everything we can to mitigate the effects of the crisis.

However, in reacting to the crisis we must trade one dependency for another. The war poses an immediate an acute danger that will require a comprehensive and cooperative approach from the international community.

Climate change on the other hand has not gone away; it poses an existential problem for the human race and the effects are plain to see. One only has to look at

Pakistan, where one-third of the country is currently completely submerged due to historic flooding. These compounding factors will make the next few years difficult, to put it mildly, but it must spore governments to take concrete action.

To reduce dependency on fossil fuels, particularly gas, it is clear that further action is needed to reduce buildings' energy consumption. A massive scale-up in renewable energy in power generation, industry, buildings and transport will accelerate our phasing out of Russian fossil fuels. It will also, over time, lower electricity prices and reduce fossil fuel imports.

Buildings are responsible for 36% of greenhouse gas emissions and 40% of the energy consumption in the EU. It is clear they need to be sufficiently addressed if we are to reach our climate targets. There is no question of that.

As the main EU-level legal instrument for decarbonising Member States' building stock, the Energy Performance of Buildings Directive will soon take centre stage.

The slowing economy and increases in cost of living will have significant implications for consumer purchasing power and personal savings. Therefore, we must be aware that imposing obligations without providing sufficient means to achieve standards has the potential to increase inequality. Those who can afford renovations will be insulated by rising energy costs, while those who cannot will face rising costs. This point cannot be emphasised enough.

The EPBD will be a very important piece of legislation. Finding a balance between the need to revamp the built environment and not impose undue financial burden on households and business will be extremely difficult, but necessary.

Currently, 72% of renovations are self-funded, yet only 18% consumers are taking loans to renovate their homes, as they are too expensive. This is compounded by the complexity of navigating the subsidy schemes and seeking technical expertise. Those barriers are even bigger for deep renovation projects. The EPBD should seek to establish firmer links between the financial sector and the renovation sector.

The energy crisis has highlighted the need to utilise available resources, from a buildings perspective, solar becomes an ever more attractive investment. The use of energy saving and generation technologies will be pivotal for buildings. These are cost effective solutions with a high yield on return of investment, allowing use to utilise much cleaner primary energy consumption.

The 'Solar Rooftop Initiative', a core element of the REPowerEU plan unveiled, includes a proposal to include in the EPBD to make rooftop solar photovoltaic (PV) panels mandatory on new commercial and public buildings, as well as new residential buildings by 2029.

I represent that Parliaments largest Group, the European Peoples Party (EPP), in the negotiations of the EPBD. In my amendments to this legislation, I included a new article to address the rooftop initiative. Of course, solar generation capacity differs across the union and Member States should have sufficient flexibility to operate support schemes. Nonetheless, the technology has advanced to the point where it is also a viable solution for northern Europe as well as sunnier south.

Rooftop solar PV in a sense is a low hanging fruit if we want to see a swift and cost effective ramp up of green power capacity. Approximately half of the energy consumed in Europe is used for heating and cooling, most of this is based on fossil fuels. Solar heating & cooling (SHC) technologies can displace the need to use natural gas, protecting consumers from fluctuations energy prices.

By 2030, the Commission has said that solar energy could provide a quarter of the EU's electricity, which is more than is currently generated in gas-fired power stations. The energy system must undergo a fundamental change, the envisaged mass installations of solar generation will create millions of "prosumers", who both produce and consume energy. This is my view will aid the speed of the energy transition as citizens become more directly involved.

Millions of homes and buildings across the EU have potential not realised, but we also ensure we have the skilled workers on hand to install the technologies.

For this, I believe we need to see a coordinated and clear effort by the Commission and Member States to address the issue of skills. Member States must invest in capacity building, technical assistance and on upskilling and reskilling policies to realise the twin transition of a green and digital transition.

Over the next few years and decades, we will have massive challenges ahead, some of which we may not even fully appreciate yet. However, the role of solar technology will only increase in meeting these challenges.

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

Powering GREEN Energy Transition in Mediterranian rural communities through social and territorial innovation

Energy transition alredy mark the political agenda in the UE Members States, not only by the commitments achieved, but also by the urgency of Climate Change hazards.

The Mediterranean region is particularly vulnerable to climate change, being one of the world's most rapidly warming regions (rise of temperatures, sea level rise and scarcity of water and resources). Environmental degradation and overexploitation of natural resources poses additional challenges for the regional development. Energy supply is one of the priorities for Europe and Mediterranen regions , and most of the efforts should be oriented on renewables as the principal energy source option to support. The communities and institutions of the Mediterranean countries are now at a crossroad to turn this challenging situation into an opportunity.

Despite the fact that urban areas are the most densely populated, rural areas represent more extension of European territory than urban areas. In the case of the MED area, this is not the exception, an important part of the territory of Portugal, Spain, France, Italy or Greece is considered as rural typology of regions (Eurostat 2021).

Rural regions are diverse and highly influenced by their specific natural endowments. Their development path is different from urban areas. Rural regions are often characterised by a lower population and development density, as well as a high proportion of natural assets and agricultural land[1].

Rural areas face unique transition challenges, highlighting the importance of a just transition. Physical isolation, limited economic diversity, high rates of vulnerable populations due to lower incomes and higher poverty rates, combined with lower educational and employment opportunities and an aging population increase the vulnerability of rural communities. Declining public and private services in rural areas and remoteness and limited access also means higher car dependency. Consequently, some rural regions will likely experience employment losses and shifts, which need to be compensated. **Ensuring an energy transition requires measures, tools to alleviate negative consequences and help firms, employees and regions to reorient.**

The **Interreg MED Renewable Energy project**[2] brings new ideas and initiatives for energy transition not only at scientific field but also for economy and social development. The aim of the project is to boost and mainstream the green energy

transition in all rural and island municipalities across the region. In order to achieve this, the community is bringing together a group of like-minded municipalities and organisations committed to the **Ecosystem Transition Unit (ETU)**[3] **Inititaive** a goverance framework based on five main revitalisation principles: apply an ecological approach, ensure territorial equality, encourage social innovation, promote green economy, and based on cooperation and commitment.

The ETU Initiative[4] is addressed to local authorities, entities and organisations that:

- Want to foster a local energy community;
- Are in the process of updating their Sustainable Energy Action Plan (SEAP) and developing their Sustainable Energy and Climate Action Plan (SECAP);
- Wish to promote a project or initiative linked to energy and ecological transition in their territory

The energy transition requires **the active participation** of society, local authorities and associations, businesses and innovative centres. The ETU aims to synthesise an integrated approach for the rural revitalisation process, taking energy transition as a starting point.

In the framework of the Interreg MED Renewable Energy project, the ETU Initiative launched a call in 2021 addressed to small municipalities, rural areas and islands[6]. The experience allowed to mainstreamed the ETU toolbox to 9 flagship cases across Spain, Italy, Croatia, and Greece by supporting their renewable energy plans, renewable energy communities, and strategic climate-neutral and circular economy projects. An overall impact on around 156,000 inhabitants distributed 21.3% in islands, 70.2% in small municipalities, and 8.5% in rural areas.

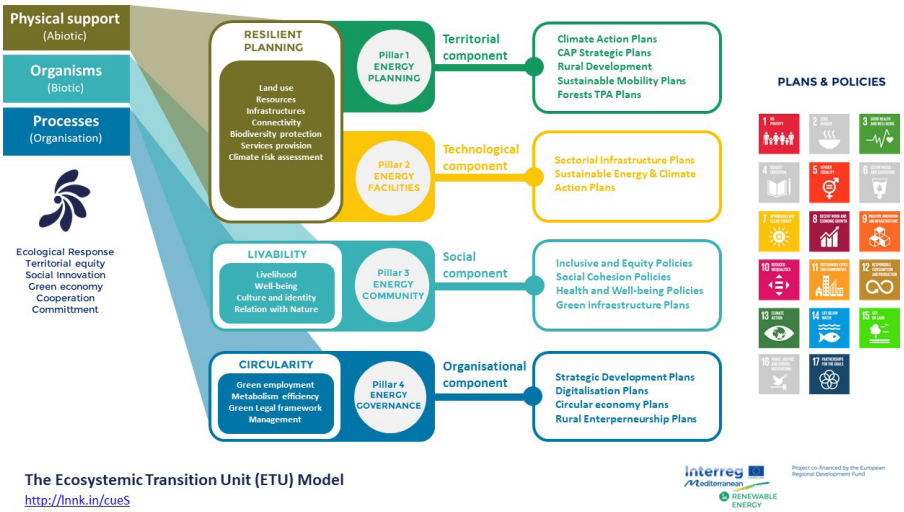


Fig 2: ETU model components and mainstreaming policies. Source: ETU White Paper (2022) Interreg Med Renewable Energy[5].

What we had learned is that rural areas despite of their low density, have a lot of potential when it comes to achieving energy transition objectives, also for the implementation of renewable energy communities. Nevertheless, rural areas and islands require tools and solutions to identify, coordinate and establish strategic alliances to accelerate the transition in an inclusive and green way.

The ETU Initiative continues encouraging other municipalities and local entities to join the movement by showcasing their energy transition actions based on an holistic governance approach (ecological, territorial, social and economic). Municipalities are invited to share their experiences and support the ETU principles through the Letter of Commitment[7]. All signatories will help to encourage the visibility of good practices based on fair and inclusive energy transition in rural areas.

We intive you to attend the official workshop as part **of EU week of regions and cities:**

Powering GREEN Energy Transition in rural communities through social and territorial innovation[8] **ONLINE -Tuesday, October 11, 2022 9:30 AM to 11:00 AM.**

1 OECD (2020) »Managing Environmental and Energy Transitions for Regions and Cities« https://www.oecd-ilibrary.org.
2 https://renewable-energies.interreg-med.eu/
3 Cynthia Echave.; Danilo Ceh.; Alexia Boulanger.; Jennifer Shaw-Taberlet. (2019); An ecosystemic approach for the energy transition in the Mediterranean Region; SyNERGY MED 2019. shorturl.at/dnpS0
4 https://etuinitiative.eu
5 C. Echave et al. (2022) »ETU White Paper«. Interreg MED Renewable Energy. https://etuinitiative.eu/the-etu/#toolbox
6 ETU Flagship Cases Booklet.
7 https://etuinitiative.eu/etu-letter-of-commitment/
8 https://eu.app.swapcard.com/event/euregionsweek-2022/planning/UGxhbm5pbmdfOTYwNjMx

A new policy context for assessing biogas and biomethane

By Peter Zeniewski, Energy Analyst at International Energy Agency (IEA)

The EU's biogas and biomethane industry is growing, and has been given a large boost by the RePowerEU plan, which aims to achieve a target of at least 35 bcm (350 TWh) annual biomethane production by 2030.

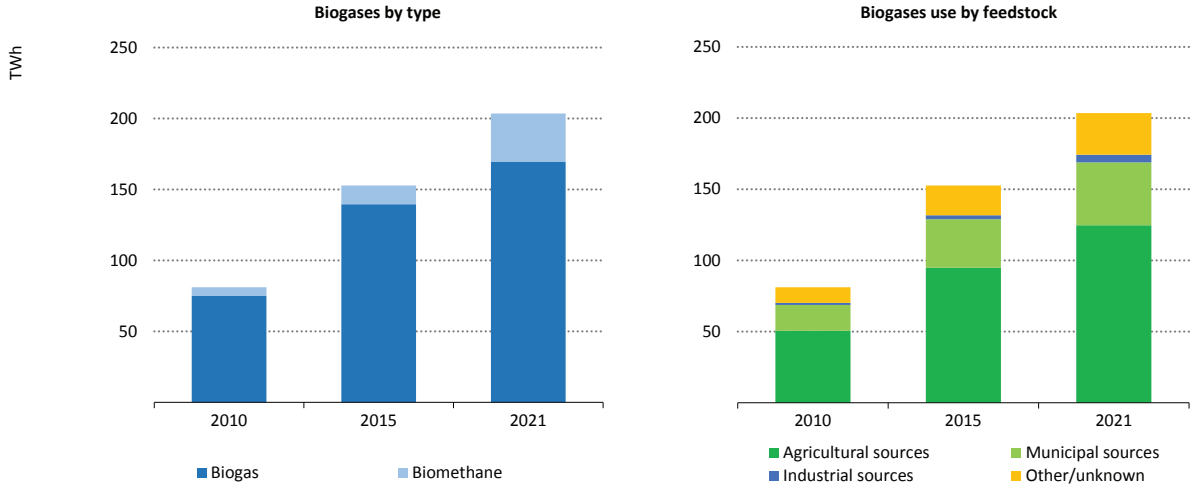
There are many EU and national policies already in place that support biogas and biomethane, and several near-term actions are proposed in the RePowerEU plan to support its development. An industry partnership has been proposed that would serve as a platform for public-private engagement and the sharing of best practices around permitting, financing, incentives and environmental regulations. The EU plan encourages national biomethane strategies to evaluate potential and identify barriers to production as well as enabling conditions at the local and national levels. It also suggests an integration of biomethane into an EU-wide strategy for rural development and local job creation, including the use of energy communities and farmers cooperatives.

The growth in biomethane production envisioned in the RePowerEU plan would imply a 40% average annual growth rate from 2023-30 compared to 17% between 2015-2021. Factors that could accelerate growth include streamlined permitting procedures, factory-style fabrication of standardised biodigesters and related equipment, dedicated biogas financing facilities, and robust support schemes such as quotas, feed-in tariffs, and contracts for difference, in addition to an EU-wide system for low-carbon gases certification.

Potential and costs of biomethane in the EU

The IEA has produced country-level estimates of the feedstock potential within the European Union, using Eurostat, FAO and World Bank data. The largest potential lies in Germany, France, Spain and Italy, owing to their size, population and relatively large gross agricultural output. Comparing

Biogas and biomethane production in the European Union by type and feedstock



potential to the size of the gas market, the Nordic and Baltic States have significant quantities of available feedstock that can be converted to biomethane, in some cases exceeding annual natural gas demand requirements.

Our analysis suggests that 35 bcm of biomethane can be produced in the EU for less than USD 20/MBtu, at an average near USD 15/MBtu. This is below the prices seen since July 2021, but well above the average of the past decade. It also does not include injection costs into pipelines or compression/liquefaction costs if transporting the gas in this way. These overall estimates depend on three main cost elements: feedstock, biodigesters and gasification units and grid connection costs.

Key issues for scaling up biomethane production

There are several outstanding considerations regarding the sustainability, cost and technical characteristics of different biomethane production pathways, and these will need to addressed in order to responsibly achieve the biomethane production targets in the EU.

One issue warranting further investigation is the lifecycle emissions of different biomethane production pathways. Key issues are the extent to which open storage of cattle slurry or residual digestate from the production process leads to significant levels of fugitive methane emissions. Other emissions might arise from the collection, processing and transport of different biogas feedstocks, which need to be weighed against the CO2 emissions that arise during the production, processing and transport of natural gas. On the other hand, some of the feedstocks that are used to produce biomethane would decompose and produce methane emissions naturally if not captured by a biogas production process.

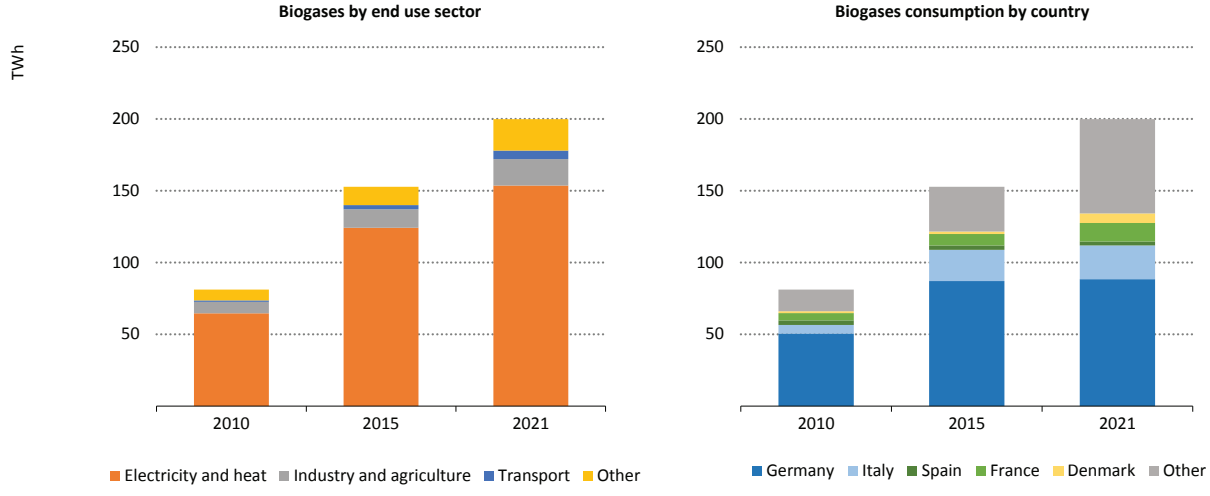
On the logistics side, a very significant barrier to collection of cattle manure is an animal husbandry system whereby cattle are pasture grazed for the majority of the year, making manure collection difficult. If crop residues are chosen as the main feedstock, it is important to consider their use as animal feed, and the fact that a significant portion is kept in the soil to maintain a sustainable amount of nutrients and avoid soil erosion.

Therefore, reserving crop residues for use in biogas production must be carried out as one part of a wider agricultural and land management plan. There are also prospects for the use of sequential crops for biogases production, grown between two harvested crops as a soil management solution that helps to preserve the fertility of soil, retain soil carbon and avoid erosion. Sequential cropping has been tested at scale in Italy through the BiogasDoneRight concept.

Notwithstanding current record high gas prices, the production and utilisation of biomethane requires supportive access to financing and incentives to become competitive. A large-scale biogas project with a capacity of around 500 m^3/hr can cost approximately €1.5 to 2 million.

Financing support is therefore necessary for many project sponsors, but banks often lack technical expertise in this area and there are few benchmarks to assess the unique risk/return profile for biomethane projects. These gaps can increase the perception of risk, raising the cost of capital or reducing the loan tenures.

Biogas and biomethane production in the European Union by sector and country

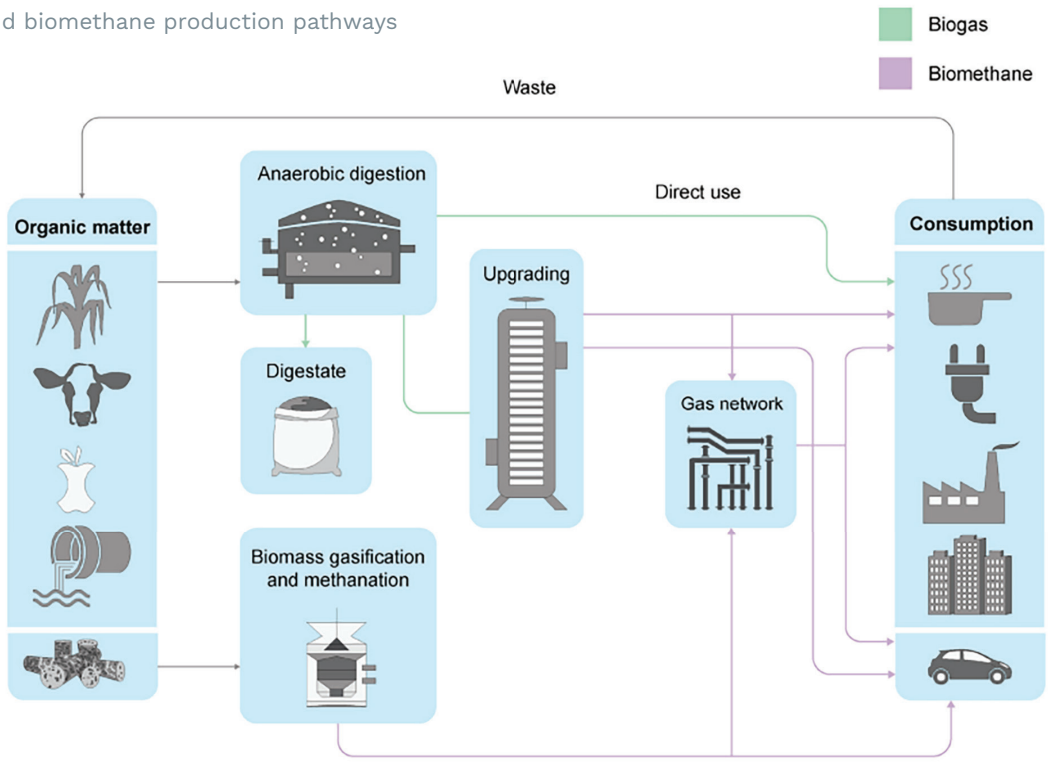


The road ahead

Expanding biomethane production to 35 bcm will require a 12-fold increase in biomethane production across EU in less than 8 years. To meet this ambitious timeline, policymakers should focus their efforts on the following key areas:

1. **Close the competitiveness gap.** Notwithstanding current record high prices for natural gas, further incentives are needed that give biomethane a value linked to its GHG performance, alongside multiple co-benefits (rural development, dispatchable generation, avoided methane emissions, value of digestate as biofertiliser, etc).
2. **Improve feedstock management** The majority of the EU biogas production comes from landfills, wastewater treatment, energy crops and some agricultural wastes like manure. Biogas producers will need to scale supply chains for these wastes and construct many efficient facilities to use these feedstocks. Standards should be put in place that avoids negative impacts on soil and nutrient cycles, farm management practices, biodiversity, or animal husbandry.
3. **Facilitate investment:** Meeting the 35 bcm target will require EUR 70 billion of new investment, according to the RePowerEU plan. Reducing the risk of biogas and biomethane investment by extending public financing or loan guarantees, or by securing long-term offtake agreements with creditworthy buyers, can help finance larger projects and therefore attract larger private sources of capital.
4. **Measure, report and verify emisssions** There remains considerable uncertainty around the lifecycle emissions of biogas and biomethane plants. Operators should be obliged to measure and report their emissions at each stage of the production process.
5. **Increase facility sizes:** Most biomethane units in the EU have a capacity to produce around 50-250 m^3/h. Plant sizes will likely need to increase, potentially requiring the pooling of multiple feedstock sources and development of centralised upgrading facilities, in order to achieve economies of scale and reduce integration costs.
6. **Prepare gas networks for biomethane injection:** Natural gas network operators will need to accomodate higher rates of biomethane injection, that comes with different supply profiles and quality specifications, while maintaining reliable supplies.
7. **Create a harmonised trading network:** Trade can help expand the pace and scale of biomethane growth by connecting production and demand centres. This requires consistent biomethane standards, trading platforms for physical and greenhouse attribute trading and shared sustainability certification.

Biogas and biomethane production pathways



Decarbonize aviation the right way

ewaba
European Waste-based & Advanced Biofuels Association

Our industry in perspective

Waste-based and advanced biodiesel has been a major driving force behind a steady reduction of road/heavy duty transport emissions and it is playing an increasing role decarbonizing the maritime sector. Waste-based biodiesel using used cooking oil (UCO) achieves the highest greenhouse gas (GHG) savings on record under the revised Renewable Energy Directive (REDIII). Over the past 15 years, our industry has been setting up collection systems to secure feedstocks that would otherwise pollute the environment and generate additional emissions, while investing heavily in plant optimization and pre-treatment technologies to process low-quality wastes and residues. Fast-forward a decade and a half and the European waste-based biodiesel industry is confronting highly negative unintended consequences stemming from the draft ReFuelEU Aviation Regulation, currently under discussion.

The issue at stake

In its original draft the ReFuelEU Aviation proposal strongly relies on sustainable aviation fuels (SAF) produced from UCO. While UCO use would certainly reduce sector emissions compared with jet kerosene, in absence of a holistic approach across transport sectors the proposed legislation would significantly increase emissions in transport as a whole, put enormous pressure on waste lipids such as UCO and animal fats (which have more efficient uses), and at the same time fail to boldly promote novel and scalable SAF technologies that are essential to decarbonize aviation.

Climate in focus

By diverting waste feedstocks from road and maritime uses to aviation, transport emissions will increase as waste-based biodiesel achieves up to +90% GHG savings versus 76% GHG savings achieved by UCO-based SAF (HEFA). In short, this means that at least 1 million tons of additional GHG emissions will be released in the atmosphere already from 2025. That is of course unless European lawmakers significantly improve the ReFuelEU proposal by:

- placing a hard limitation on the contribution of HEFA,
- broadening the feedstock base for SAF production, and
- establishing bolder promotion for key technologies such as e-fuels and alcohol-to jet.

Promote the best types of SAF

Using waste lipids is at the moment a comparatively cost-effective option to reduce emissions in aviation but over-relying on waste lipids in the 2025-2035 period is the wrong policy choice as the above-mentioned negative consequences far outweigh the immediate benefits. For these reasons certain governments have opted to support more promising novel pathways instead of waste lipids: the UK chose to focus on SAF from cellulosic residues, municipal solid waste, etc, while Germany is exclusively promoting e-fuels with a deployment stage in the mid-2020s. Both countries have excluded waste lipids from SAF promotion. When it comes to decarbonising our economy, the EU legislator should pursue the most efficient technologies and not pick winners and losers at the expense of net GHG emissions.

ewaba
European Waste-based & Advanced Biofuels Association

The ReFuelEU proposal puts the overall EU transport decarbonisation effort and European SMEs at risk

Waste-based and advanced biodiesel for road and maritime use (FAME*) is a more efficient process (sGU study) than lipid-based Sustainable Aviation Fuel - SAF (HEFA**) for aviation. Given that there is a limited source of waste lipids - diversion from road/ maritime to aviation leads to higher GHG emissions.

Waste biodiesel for our trucks

Waste-based and advanced biodiesel reduces greenhouse gas (GHG) emissions by up to 90% compared with fossil-based diesel.

Full-scale electrification for the road sector (especially heavy-duty) will take decades to take place and waste-derived biodiesel is the best solution to decarbonize the existing fleet.

A 2% SAF mandate in 2025 will consume more than 80% of all UCO used by EWABA members and cause min. 1 million tons of additional emissions in the atmosphere per year.

Process option			Process option
HEFA**			**FAME***
Yield	**1.000 kg** used cooking oil (UCO)		Yield
610 kg UCO-HEFA (SAF)			**1.004 kg UCO-Biodiesel**
Usage options			Usage options
Aircraft			**Car, Truck, Vessel**
Greenhouse gas emissions			Greenhouse gas emissions
24 g CO_2eq/MJ			**10 g CO_2eq/MJ**

Waste biodiesel into shipping

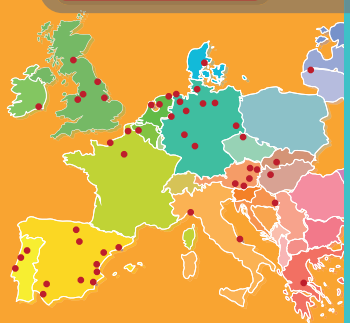
Waste-biodiesel can easily be blended in existing fuel oil ships without any modifications to the engine or existing infrastructure.

Waste-based biodiesel can be deployed immediately and is favored by ship operators due to its very high energy density, a sufficient parameter for long intercontinental voyages with no opportunity to refuel along the way.

The European Waste-based biodiesel map

Apart from its decarbonisation efficiency, the waste-based and advanced biodiesel industry supports over 25,000 jobs across 55+ production facilities scattered across 19 EU member states.

Diverting waste oils to aviation will significantly hurt climate mitigation efforts but also damage an EU industry largely based on SMEs, often located in remote and rural regions.



Environmental Protection

The collection of used cooking oils prevents their improper disposal in sinks, which leads to the blockage of sewer systems and to the formation of so-called 'fatbergs'.

These mountains of waste are very difficult to clean and extremely costly for cities and water companies. Also, animal fats and other residues (advanced feedstocks) are often left to landfill where they produce additional emissions. And most importantly, a very useful 'wasted' resource is lost!

* FAME - Fatty Acid Methyl Ester
** HEFA - Hydroprocessed esters and fatty acids

Climate, energy and system crises: an urgent call for embracing sobriety

By Adel El Gammal (pictured), Secretary General of the European Energy Research Alliance (EERA)

In this late August, one is figuring out how far the state of the world has degraded during the usual summer break. Many of us tried to disconnect, in some cases unsuccessfully, with the hope of pausing time and silencing the almost surreal unfolding events for a while.

The Mediterranean region, where I spent some days, was still somehow inspiring what could resemble past paradise. But temperatures were persistently unsustainable. Wildfires were monstrous, also impacting historically humid regions. Water shortages across Europe hit agricultural output but also halted as diverse sectors as power generation or fluvial transport. Food insecurity is growing in the Global South.

Even as the planet is literarily burning under our feet, the ultimate window of opportunity for world nations to pull their acts together and avoid inevitable climate chaos, superpowers are multiplying rhetorical confrontations and provocative military demonstrations instead. And the website of the 27th Conference of the Parties (COP27), due to take place in November in Sharm-El Sheik, Egypt, remains dramatically void.

Is COP 27 still on?

Meanwhile, dirt still flies high as the war roars through Ukraine, which, beyond the tragic human toll, fundamentally reshuffles the post-cold war geopolitical order, announcing the end of multilateralism and the so-called "dividends of peace". The world has changed.

Europe is additionally facing an unprecedented challenge. Beyond its profound geopolitical implications, the invasion of Ukraine by Russian forces unveiled Europe's tragic dependency on Russian fuel imports, which for gas, represented 40% of its demand, crucial for power generation, domestic heating, and industrial use.

In the EU political response to the Russian aggression, REPowerEU - the EU blueprint for emancipating the bloc from Russian fuels dependency - stands as a highly remarkable strategy to accelerate the transformation of the entire EU energy system.

If REPowerEU can only be praised for its highly ambitious targets, applying simple maths and basic reality checks shows how assumptions seem highly over-optimistic. This only highlights the unprecedented severity of the challenge Europe – its institutions, its governments, and its citizens – will face in the coming months and years and how hazardous the path to a more auspicious future will be.

In this worrying context, the European Energy Research Alliance (EERA) reaffirms its strategic energy and climate advisory role to EU policymakers. Resulting from a broad consultation across a range of leading scientific experts, EERA will soon release its "Research & Innovation Manifesto on REPowerEU" at the High-Level Policy Conference "REPowering Europe for a sustainable EU strategic autonomy" to take place on 19 October 2022 in Brussels.

The Manifesto provides a critical

REPowerEU, an ambitious dual strategy against climate change and Russian dependency, and a highly uncertain and perilous path towards a more promising future.

analysis of measures proposed under the REPowerEU strategy to highlight its perceived shortfalls and propose complementary actions to secure and, where possible, bolster its expected impact.

The analysis was carried out under the conceptual and methodological framework of the EERA White Paper on the Clean Energy Transition. Once more, it highlighted the very intricate and intertwined nature of the energy transition that can only be addressed from a fundamentally holistic, systemic, and cross-sectoral perspective.

REPowerEU or REEnergiseEU?

A fundamental observation of EERA's work resides in that, although it is commonly accepted that the decarbonisation of our economy will vastly rely on higher electrification supported by clean power generation, **electricity still only represents less than 25% of the final energy consumption in Europe**. The EERA Manifesto highlights the enormous importance of scrutinising heating and cooling, which still represents about 50% of the EU's total energy demand. This is even more true considering the likely prolonged scarcity of gas, as about 35% of gas demand is used for space heating and 23% for industrial applications.

Managing compressed time horizons: designing new technologies earlier, deploying existing technologies faster

Radically transforming the energy system in just a few years, which usually deals with cycle times of several decades, can only remain a vastly underestimated challenge.

It is commonly accepted that half of carbon abatements to occur after 2030 will have to be provided by technologies that are not yet on the market today. Therefore, the EU must speed up its research and innovation output to deliver the range of new technologies that will help support the decarbonisation effort further down to climate neutrality at a much faster pace. At the same time, reducing the EU's dependency on critical minerals, technologies and components that need to be sourced offshore is core to building its strategic autonomy.

Creating excellent research knowledge for designing new technologies has been the historical role of EERA, generating a continuous flow of technological and social innovations for reaching the EU's long-term objectives of climate neutrality by 2050.

But first and foremost, REPowerEU mandates an unprecedented acceleration of the short-term deployment of a range of available low-carbon technologies. Sensibly accelerating their deployment rate remains conditioned by the numerous bottlenecks of their global supply chains, broken under the combined effect of the pandemic, the commodity price crisis, and the increasing geopolitical tensions. All of the above is vastly out of the control of EU institutions and governments. At the EU bloc scale alone, the availability of the range of skilled workforce required downstream the supply chain (planning, sourcing, financing, installing, operating, maintaining, etc.) will equally constitute a major limitation to any significant deployment acceleration.

Recognising this double pressure on EU Research and Innovation capabilities, the European Energy Research Alliance recognises and endorses its role in accelerating the implementation of existing knowledge and scaling up already validated solutions. EERA will bolster such a contribution in generating **implementation knowledge** by studying and advising on the conditions for faster and more efficient implementation of existing knowledge and solutions. Fig. 1 illustrates this dual role of research showing how the **research knowledge** and **implementation knowledge** loops work and interact in a complementary way.

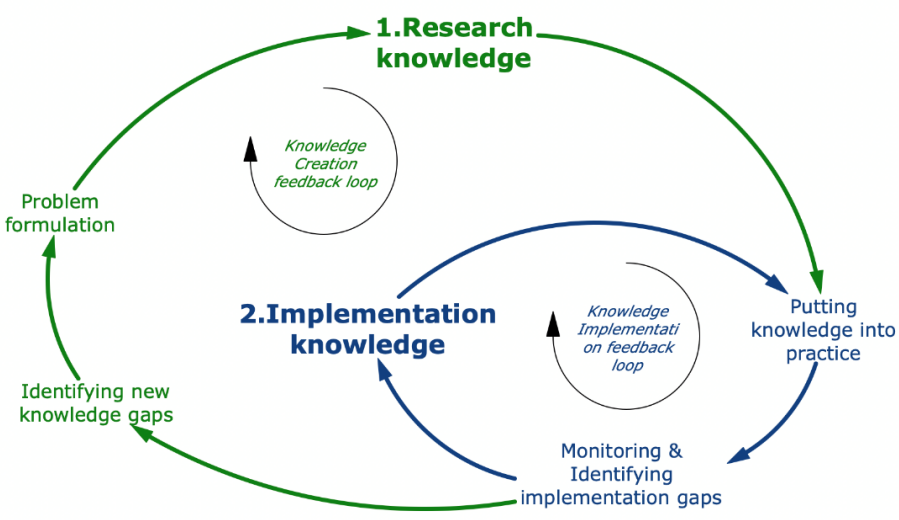


Fig. 1 - Research knowledge and implementation knowleedge feedback loops

Embracing the era of sobriety, "Hic et Nunc."

"Drastically reducing energy demand" was a key policy recommendation of the EERA White Paper on the Clean Energy Transition released just a year ago. This recommendation could not be more premonitory of the absolute imperative we are facing here and now. Today, weaning the EU from its dependence on Russian fossil fuels and avoiding a collapse of its social and economic model dictates us to deeply cut our energy consumption in all sectors, mainly those fuelled by gas, such as space heating, industry, and electricity, since about a third of EU power is generated from gas.

At the time of writing this article, gas trade in the EU is above 320 €/MWh, i.e. a sixteen-fold increase compared to last year's spring. Under these conditions, heating and electricity bills will be unaffordable for most EU citizens, compromising the EU's social stability. Moreover, industrial activity will collapse, driving the EU economy to contract, while supply-generated inflation will create stagflation conditions. One can also anticipate that the highly contrasting situation for different member states might generate unprecedented political tensions within the Union. Only if demand reduction can dry out the EU's dependency on Russian gas might we get energy prices back in control and avoid the devastating effects of the current energy crisis.

Two years ago, in the European Energy Innovation summer edition, I alerted that reaching the Paris Agreement targets would require us to decrease global emissions by about 8% yearly. This was before a conflict started at the EU doors, bringing much of what we knew about the energy system under question. Should we not increase the ambition of our goals, achieving the EU's recommended 15% reduction in gas consumption would only entail less than a 4% decrease in CO_2 emissions.

However, most important than the numbers is that to do this, we must be conscious that there are privileges we will need to give up in order to obtain what we aim for, which is critical in our path to carbon neutrality and strategic autonomy objectives. Unavoidable pillars of our strength as not only an economic bloc but as a referential social model. The era of sobriety has started.

The EERA "Research & Innovation Manifesto on REPowerEU" will be officially released at the occasion of the high-level policy conference "REPowerEU for an EU sustainable strategic autonomy" that will take place on October 19 in Brussels and online. For further information and registrations please scan the QR code next to this box.

About EERA

The European Energy Research Alliance (EERA) is the association of European public research centres and universities active in low-carbon energy research. EERA pursues the mission of catalysing European energy research for a climate-neutral society by 2050. Bringing together more than 250 organisations from 30 countries, EERA is Europe's largest energy research community. EERA coordinates its research activities through 18 Joint Programmes and is a key stakeholder in the European Union's Strategic Energy Technology (SET) Plan. In line with its mission, EERA is committed to supporting Europe in achieving a successful energy transition in line with the EU's climate 2050 goals and Paris commitments.

For further information, see https://www.eera-set.eu

Email: a.elgammal@eera-set.eu LinkedIn

H2020 ENVISION contributes to a sustainable future!

In ENVISION, several solutions have been developed to harness solar energy and heat from the entire surface of buildings; the walls, roofs and even the windows. These solutions make energy positive buildings possible; buildings that produce more energy and/or heat than they consume.

There are 60 billion m² of unused facade area in the European Union. And an equally large amount of roof space is available, where solar energy generation can be further expanded. This provides opportunities. The ENVISION project focuses on a full renovation concept in which innovative solutions for obtaining heat and electricity from solar radiation are developed. The maximum is achieved in terms of yield, while retaining the aesthetics and function of the façade. Development within ENVISION took place in four phases:

1. The development of aesthetic façade elements that absorb solar heat and PV solutions for installation in glass
2. The development of a flexible, modular facade concept with a click-on mounting system
3. The integration and interaction of the heat and energy extraction systems with existing networks and heat systems at both building and network level
4. A full-scale demonstration of ENVISION technologies in houses in Helmond and Eindhoven; office buildings in Enschede and Bischofshofen (Austria), linked to a heat network in Genova (Italy).

The practical demonstrations show how widely applicable ENVISION technologies are. From houses to flats to office buildings and in different climate scenarios. The innovations developed within ENVISION make the most of heat and energy generation, are cost competitive, easy to install and maintain and do not detract from the design of a building.

Energy-positive buildings are within reach thanks to the innovations and developments within the ENVISION project. Another step towards a sustainable future with renewable energy!

Project Coordinators:
Dr. ir. Bart Erich
E: bart.erich@tno.nl

Nicole Meulendijks B.Sc.
E: nicole.meulendijks@tno.nl

High Tech Campus
HTC 25
5656AE Eindhoven

ENVISION H2020 Project

EUSEW2022 | Project using entire building surface to harvest energy

This project has recieved the European Union's Horizon 2020 innovation programme under Grant Agreement No 767180.

Future energy solutions tested in Turku

By Matti Välimäki

The Turku Student Village is being turned into an energy positive residential area that will produce more energy than it consumes. As a part of the EU-Response project, the Student Village will also serve as a unique testing laboratory for new innovations.

Funded by the EU's Horizon 2020 programme, the Response project is developing smart and carbon-neutral solutions for energy production, building technology and mobility in sustainable cities.

Representing Turku in the project is the largest single student housing complex in Finland with some 4,000 residents, the Turku Student Village.

Project Coordinator Sini Lamoureux says that new innovations are currently being introduced in the area, especially in the newly completed Tyyssija building.

"For example, the building has a new kind of energy system where the heat pump is supplied by return heat from district cooling, i.e. surplus heat recovered from other properties."

On the roof of Tyyssija, there will be two-sided solar panels that can also tap into the sunbeams reflected from the building's roof. In the past, similar panels have only been used in larger solar power plants.

New kinds of energy storage solutions are also being tested at Tyyssija:

"We are storing electricity in a system made of used electric car batteries. The site will also have phase change storage that uses different kinds of salts for thermal energy storage. A solution like this takes up less space than a conventional hot-water tank."

Upgrades are happening in other parts of the Student Village as well, such as extensive energy efficiency renovations for older buildings in the complex. For example, apartments will be equipped with nano coating 4-glazing panels windows, energy-efficient ventilation and water-saving nozzles for taps.

"We are turning the Student Village into an energy positive area, with 120 to 130% of its energy needs produced in a climate-friendly way."

Wide cooperation network

There has been a wide cooperation network participating in the development of the innovations in Tyyssija and other Student Village sites.

Turku-based partners are the City of Turku, the Student Village Foundation of Turku, Turku Energia, Turku City Data and Turku University of Applied Sciences. The project has also received scientific support from VTT Ltd.

"We also have several corporate partners around Finland who we have provided with a testing platform."

October 2022 will see the start of a three-year monitoring period with the purpose of gathering information on how functional and practical the new innovations are.

“Whenever you develop something new, you’ll have some inventions that work well and others that are less effective than expected. But even a single new solution can have a huge impact if it is something that can be used in other places as well.”

Lamoureux mentions some more innovations in Tyyssija: “The apartments have sensors that help optimise heating. Tyyssija will also have a V2G charging point for electric cars, which will make it possible for residents to sell electricity stored in their car batteries to the grid if they do not need it for themselves.”

Spreading innovations around

The objective of the Response project is to specifically create solutions that can be reproduced. Turku and Dijon in France are the pilot sites of the project, followed subsequently by Brussels (Belgium), Zaragoza (Spain), Botoșani (Romania) Ptolemaida (Greece), Gabrovo (Bulgaria) and Severodonetsk (Ukraine) (Latest information before the city was taken over by Russian forces was that the Ukrainians want to stay involved in the project)

“The idea is that the subsequent cities will draw up a plan on how they can implement the innovations of the pilot cities.”

An effort will also be made to utilise the solutions elsewhere in Turku, especially in Turku Science Park and the Runosmäki residential area.

“The Response project is also one way of bringing Turku closer to its goal of being carbon neutral by 2029”, says Lamoureux.

Lecturer Samuli Ranta from Turku University of Applied Sciences was also interviewed for this article.

Fast travel from Turku Science Park to the Helsinki Metropolitan Area

An internationally significant cluster of expertise merging science and business in line with sustainable development is being built in Turku. The one-hour Turku Rail Link will add Turku Science Park under the commuting umbrella of the Helsinki Metropolitan Area.

A fairly compact area in Turku features two universities of applied sciences, the Student Village, the hospital complex and a significant number of businesses.

Director of Urban Planning Timo Hintsanen says that the area in question, titled Turku Science Park, is now being expanded and made into a more integrated entity.

“The idea is to promote encounters that facilitate creative innovations. Cooperation also opens up other synergic benefits; for example, the area already has a new resource-smart laboratory shared by two universities.”

Turku Science Park is mainly located in the districts of Kupittaa and Itäharju. The plan is to integrate these two areas even more closely together with a deck structure that will reach across the railway and motorway and feature several green areas.

On the other hand, the railway will connect the area closely to the Helsinki Metropolitan Area. With the high-speed Turku Rail Link, the journey from the Helsinki Metropolitan Area to Turku Science Park would take about an hour.

“And within Turku Science Park, everything would be less than a 10 minute walk away.”

The area is also well-connected to the rest of Turku:

“There is a plan for a tramway to pass through the Science Park, and the area is easy to reach by bus as well. We’ll also have urban planning that supports cycling and walking – but primarily not private car use.”

Construction is already ongoing in Turku Science Park, and the entire area will be completed by 2050. The aim is that, by then, more than one million new square metres will have been built in the area, with apartments for more than 20,000 Turku residents and over 10,000 new jobs created compared to today.

Energy prices, supply concerns & decarbonisation: how to square the

By Kristian Ruby (pictured), Eurelectric Secretary General

Europe is facing one of the most severe energy crises in decades. Mounting inflation, soaring prices, and threats to gas supply afflict our continent. Russia has been weaponising gas trade to neutralise sanctions and destabilise the EU. Meanwhile, the war in Ukraine still rages, as do this summer's heatwaves, fires, and droughts in many EU countries.

In the coming months, there is no way around a strong moderation of energy demand. For the medium and longer term, the good news is we have the solution to tackle the twin energy and climate crises: electrification. This is the cleanest, most cost-efficient solution to reduce our dependence on fossil fuel imports, improve energy security, and abate price volatility while striving to decarbonise our economy well before 2050. Roadblocks to this untapped potential exist, but we know the way forward. Now, what we need is concrete enabling measures to make sure that ambitions turn into reality.

Explaining the price surge's root cause: gas

The EU is too dependent on imported fossil fuels. This is an obvious, but cruel, reality. 90% of natural gas and 96% of oil and petroleum are imported, with Russia as leading supplier of both. The consequence of this dependence is painfully clear: gas prices have increased dramatically since January 2021, contributing to a rise of inflation to 8.1%. Russia's invasion of Ukraine has only exacerbated these trends.

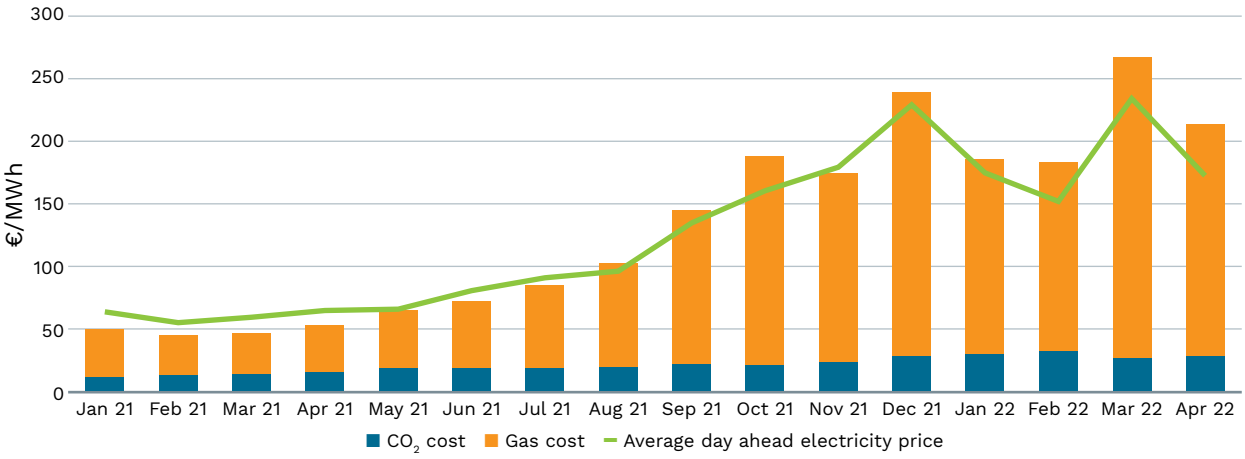
Since electricity wholesale prices follow pay-as-clear market rules, natural gas has become the price setter, driving the electricity price surge. While wholesale prices rose 178% compared to January 2021, fixed-term contracts temporarily shielded the bulk of retail prices. New contracts in several capital cities, however, have shown an increase of 84% from January 2021 to June 2022.

What is the root cause of this surge? The data is clear: gas price increases have made up the bulk of it and they should be addressed forcefully. This means taking short-term emergency measures to moderate gas demand across key use sectors and considering how to best cap wholesale gas prices at a level that truly protects consumers. At the same time, targeted support measures such as energy vouchers, VAT reduction on electricity, and energy efficiency incentives can mitigate the price rise impact on consumers and rapidly relieve the pressure without distorting market and investment incentives in electricity.

Electrifying our way out of the energy crisis

Electrification can curb imports by enabling the switch from fossil fuels to domestic clean and renewable electricity. Heat pumps and electric arc furnaces can replace up to 57% of the gas consumed by buildings and industries for hot water, space, and process heating. These technologies are four times more energy efficient than gas-fuelled boilers, enabling

EU average: Gas Price effect on electricity prices

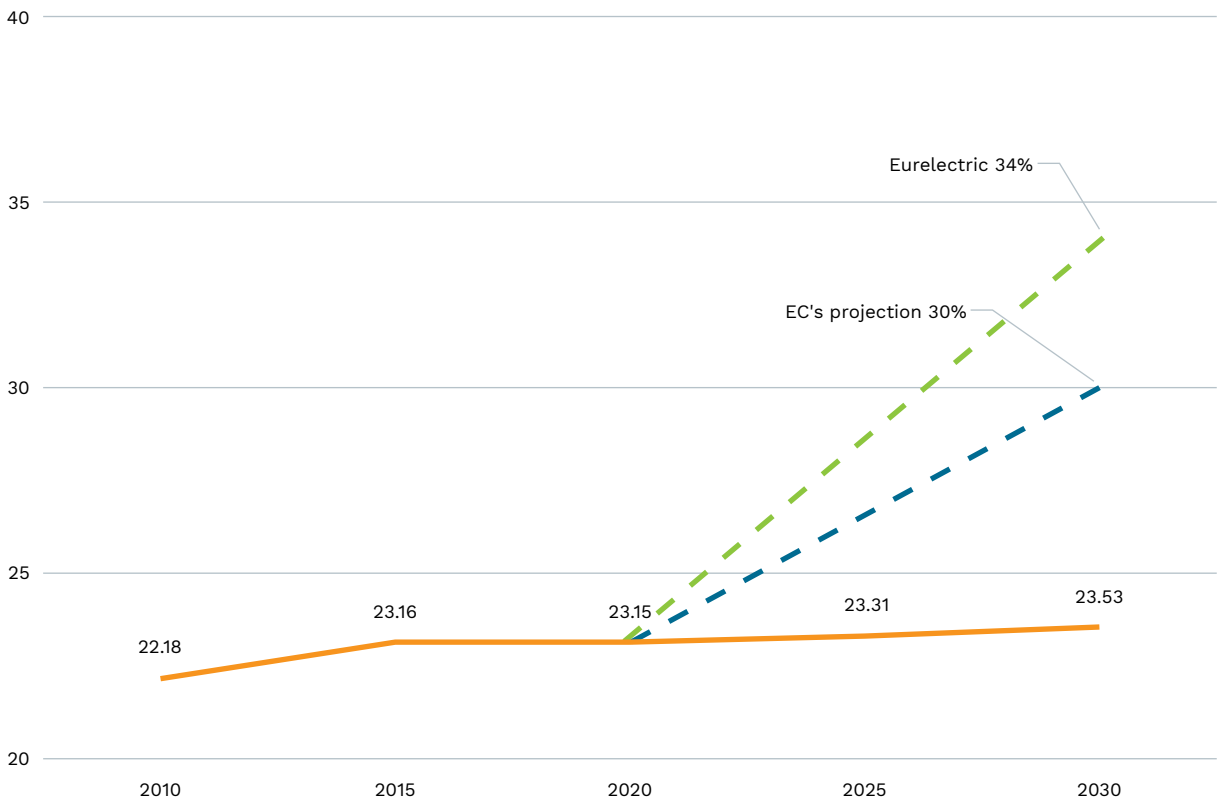


impressive reductions in energy demand.

In 2021, heat pump sales grew by 25% compared to 2020, reaching two million units. RePowerEU calls now for their annual deployment to double by 2026 and triple by 2030, reaching a cumulative stock of 50 million. The switch to electric alternatives for heating is now more urgent than ever as pointed out in the European Commission's gas demand reduction plan.

E-mobility has an equally high potential to replace imported oil, of which 63% is used by transport and 46% by the road sector alone.

Electrification offers a route toward a net-zero-emission future. Yet, current electrification rates must urgently ramp up to make this future possible. Supported by the right enablers, we could electrify our economy by up to 34% by 2030.



To speed up these rates, it is essential to remove gas subsidies, ad-hoc taxes and levies from electricity bills, as well as ensure a level playing field between energy carriers based on their carbon content. The revision of the EU Energy Taxation Directive is therefore key.

Energy independence & decarbonisation: making it happen?

The EU's 2030 decarbonisation agenda requires a 62% increase in generation capacity from 2021 levels. This translates into investments of €79 billion per year. Yet, market interventions and lengthy permitting procedures risk undermining investor confidence. Instead, what is needed is a stable, reliable, predictable market-based framework, long-term investment signals and faster permitting.

Renewable energy is certainly key, but all clean technologies will be needed to power a clean energy system. RePowerEU has further raised renewables (RES) rollout targets by an additional 41 GW of wind power and 62 GW of solar compared to Fit-for-55 objectives. In total, 753 GW of new RES capacity will be needed by 2030.

Such an impressive ramp-up requires overcoming global supply chain bottlenecks. Rising prices of critical raw materials might slow down project deployment. Stimulating sustainable domestic production, innovation investments, efficiency improvements, and economies of scale can help counter this.

Moreover, we cannot reap the full benefits of clean and renewable electricity without a modern grid to connect and spread them across Europe. DSOs are the backbone of the transition as they enable demand-side flexibility and ensure a reliable electricity network. Speeding up their digitalisation can also raise consumer awareness, better structure their energy consumption and help them become actively involved in the energy transition. By 2030, up to 70% of installed renewables will be integrated at distribution level. To meet such a target, grid investment levels must increase by more than 30% in the coming years.

This is the time to step up our efforts for a clean, energy-independent Europe.

Let's make it happen.

Next Generation Energy Performance Certificates cluster

2019

Qual DeEPC

U-CERT
User-Centred Energy Performance Assessment and Certification

X-tendo

2020

D2EPC

E-DYCE

ePANACEA
Smart European Energy Performance Assessment & Certification

EPC RECAST
ENERGY PERFORMANCE CERTIFICATE RECAST

2021

crossCert
Next-generation of Energy Performance Assessment and Certification

EUB SuperHub

iBRoad2EPC

TIMEPAC
The new EPC for Europe

2022

Smart living EPC

CHRONICLE

These projects have received funding from the European Union's Horizon 2020 and Horizon Europe research and innovation programmes. The European Union is not liable for any use that may be made of the information contained in this document, which is merely representing the authors' view."

Next Gen EPC cluster – Next Generation Energy Performance Certificates cluster

The Next Generation Energy Performance Certificates cluster of sister projects funded by the Horizon 2020 and Horizon Europe research and innovation programmes gathers 13 projects that started their activities in 4 successive generations:

- **2019:** QualDeEPC, U-CERT & X-tendo
- **2020:** D^2EPC, E-DYCE, ePANACEA, EPC RECAST
- **2021:** crossCert, EUB Super Hub, iBRoad2EPC, TIMEPAC
- **2022:** CHRONICLE, SmartLivingEPC

The main mantra of the Next Gen EPC cluster is going farther together as opposed to going fast alone for allowing an open co-creation process maximizing quality, relevance, utility and effectiveness while avoiding reinventing the wheel and ensure a coordinated and convergent approach. This approach empowers decision makers at both EU and Member State levels and the overall EPBD related stakeholder community to swiftly leverage the emerging results of this family of projects for the continuous EPBD transposition, implementation and monitoring process and the way the package of policy instruments are meaningfully weaved together.

Energy performance certificates (EPCs) are becoming the centre piece of the EPBD being linked to all the other policy instruments (e.g. SRI, Digital Building Logbooks, Renovation Roadmaps & Passports, Level(s)...) and soon to be used as reference for financing building performance activities. Thus, they withhold the highest potential to ensure an EPB coherence framework for all instruments to flawlessly work together. Together the Next Gen EPC cluster sister projects greatly support the digital and green transformation of the EU's building stock which in turn will enable and facilitate to arrive by 2050 at healthy, safe, efficient, flexible and zero-emission buildings for the people.

QualDeEPC – High-quality Energy Performance Assessment and Certification in Europe Accelerating Deep Energy Renovation

QualDeEPC stands for the high-quality energy performance assessment and certification in Europe accelerating deep energy renovation. The project partners work on the EU-wide conver-gence of the building assessment and the issuance, and verification of quality-enhanced EPCs as well as their recommendations for building renovation. The aim is to generate a coherent link between these recommendations and a deep energy renovation towards a nearly-zero energy building stock by 2050. To create consensus in the participating countries and EU-wide, and to implement as many improvements as possible during the project period, an intensive dialogue involving the important stakeholders at all levels takes place. Together with national experts the partners defined seven priorities QualDeEPC develops further to improve the long-term reliabil-ity and utilisation of EPC schemes and to tackle the grand challenge of the harmonization of EPCs across the EU: Improving the recommendations for renovation, provided on the EPCs, towards deep energy renovation; Online tool for comparing EPC recommendations to deep energy reno-vation recommendations; Creating deep renovation network platforms; Regular mandatory EPC assessor training; High user-friendliness of the EPC; Voluntary/ mandatory advertising guidelines for EPCs; and Improving compliance with the mandatory use of EPCs in real estate advertise-ments. Visit QualDeEPC and have a look at results so far.

Website: https://qualdeepc.eu/
Twitter: @QualDeEPC
LinkedIn: QualDeEPC project

U-CERT – Towards a new generation of user-centred Energy Performance Assessment and Certification; facilitated and empowered by the EPB Center

U-CERT is a Horizon 2020 Coordination and Support Action project (September 2019 – November 2022) with the main aim to introduce a next generation of user-centred Energy Performance Assessment and Certification Scheme to value buildings in a holistic and cost-effective manner.

- Facilitate convergence of quality and reliability, using the set of CEN/ISO EPB standards, enabling a technology neutral approach that is transparently presenting the national and regional choices on a comparable basis
- Encourage the development and application of holistic user-centred innovative solutions, including the Smart Readiness Indicator for buildings and Indoor Environmental Quality
- Encourage and support users in decision making (e.g. on deep renovation), nudge for better choices and instil trust by making visible added (building) value, using EPCs

U-CERT has a focus on strengthening actual implementation of the EPBD by providing and applying insights from a user perspective and creating a level playing field for sharing implementation experience to all involved stakeholders, facilitated and empowered by the EPB Center.

Website: https://u-certproject.eu/
Twitter: @cert_u
LinkedIn: U-CERT PROJECT
Facebook: @ucertproject

D^2EPC – Next-generation Dynamic Digital EPCs for Enhanced Quality and User Awareness

D^2EPC ambitiously aims to set the grounds for the next generation of dynamic Energy Performance Certificates (EPCs) for buildings. The proposed framework sets its foundations on the smart-readiness level of the buildings and the corresponding data collection infrastructure and management systems.

It is fed by operational data and adopts the 'digital twin' concept to advance Building Information Modelling, calculate a novel set of energy, environmental, financial, and human comfort/ wellbeing indicators, and through them the EPC classification of the building in question. Under the project vision, the proposed indicators will render dynamic EPCs a realistic, accurate and comprehensive tool that can lead the transformation of the European building stock into zero-energy buildings and stimulate an energy-efficient behavioural change in the building occupants. D^2EPC proposes a digital platform that will enable the issuance and update of new EPCs on a regular basis, integrate a GIS environment and provide services including user-centered recommendations for energy renovation, benchmarking and forecasting of buildings' performance as well as performance verification services. The proposed scheme will contribute to the redefinition of EPC-related policies and to the update of current standards, along with guidance for their implementation.

Website: https://www.d2epc.eu/en
Twitter: @D2Epc
LinkedIn: D2EPC

ePANACEA – Smart European Energy Performance Assessment and Certification

After 10 years of track record, the current EPC schemes across the EU face several challenges which have led to a not full accomplishment of their initial objectives: lack of accuracy, a gap between theoretical and real consumption patterns, absence of proper protocols for inclusion of smart and novel technologies, little convergence across Europe, lack of trust in the market and very little user awareness related to energy efficiency.

The objective of the ePANACEA project is to develop a holistic methodology for energy performance assessment and certification of buildings that can overcome the above-mentioned challenges. The vision of ePANACEA is to become a relevant instrument in the European energy transition through the building sector.

ePANACEA comprises the creation of a prototype (the Smart Energy Performance Assessment Platform) making use of the most advanced techniques in dynamic and automated simulation modelling, big data analysis and machine learning, inverse modelling or the estimation of potential energy savings and economic viability check.

A relevant part of the project is to have a fluent dialogue with European policy makers, certification bodies, end-users and other stakeholders through two types of participatory actions: a feedback loop with policy makers, carried out through the so-called Regional Exploitation Boards (REBs) covering EU-27+UK+Norway on the one hand, and dialogue with end-users, established by means of specific thematic workshops, on the other.

Thanks to these participatory actions, the acceptance of the ePANACEA approach will be tested and validated in order to become aligned with and meet the needs of national public bodies, end-users and other stakeholders.

ePANACEA will demonstrate and validate reliability, accuracy, user-friendliness and cost-effectiveness of its methodology through 15 case studies in 5 European countries.

Website: https://epanacea.eu
Twitter: @H2020ePANACEA
LinkedIn: H2020 ePANACEA project

EPC RECAST – Next Generation of Energy Performance Assessment & Certification

EPC RECAST aims to engage buildings owners towards deep renovation by making EPCs more user-friendly, reliable and accurate. One of the key elements identified by the European Commission to trigger investments into retrofitting was the improvement of Energy Performance Certificates (EPCs).

To turn them into a robust market tool that can both be trusted and useful for users, a next generation of EPCs is needed. To engage building owners towards deep renovation, structured and tangible pathways need to be provided to reach an energy efficient building.

When it comes to reliability there is still a large variance between EPC assessors in terms of input data and calculation tools, as well as a general lack of understanding on predicted and real energy performance. The EPC RECAST toolbox aims to tackle both issues by providing innovative on-site data collection solutions for assessors, develop a cloud system to improve data interoperability and establish input/output links between EPCs, digital logbooks, renovation passports. This will include information on smart technologies in EPCs with recommendations for control & monitoring systems based on SRI.

Website: https://epc-recast.eu/
Twitter: @EpcRecast
LinkedIn: EPC-RECAST

iBRoad2EPC – Integrating Building Renovation Passports into Energy Performance Certification schemes for a decarbonised building stock

The Horizon 2020 iBRoad2EPC project concept represents a practical next step in energy performance assessment schemes and certification practices, showcasing the integration of Building Renovation Passport (BRP) elements into Energy Performance Certificates (EPC) and related schemes. iBRoad2EPC builds on the results of the Horizon 2020 iBRoad project (2017-2020) which developed, tested and delivered a model for the BRP supporting single-family home-owners with personalised advice to facilitate stepwise deep renovation. iBRoad2EPC aims to bridge the BRP with the EPC, and expand, improve and broaden their format and joint scope with additional features and application to multi-family and public buildings as well. Improving reliability, usefulness and effectiveness, the next generation of EPCs will support Europe's decarbonisation ambitions while improving conditions for building occupants.

iBRoad2EPC project's activities are clustered around four main pillars: (1) assess the needs, potential and practicability of merging the EPC with the BRP; (2) adapt the iBRoad concept to become part of EPCs; (3) test and evaluate the applicability of iBRoad2EPC in six countries (Bulgaria, Greece, Poland, Portugal, Romania and Spain), including training for energy auditors and EPC issuers and (4) facilitate the adoption and exploitation of the iBRoad2EPC model across Europe.

Website: https://ibroad2epc.eu/
Twitter: @H2020iBRoad2EPC
LinkedIn: Horizon 2020 iBRoad2EPC

SmartLivingEPC – Advanced Energy Performance Assessment towards Smart Living in Building & District Level

SmartLivingEPC aims to deliver a dynamic certificate that will be issued with the use of digitized tools and retrieve the necessary assessment information for the building shell and building systems building on BIM literacy, including enriched energy and sustainability-related information for the as designed and the actual performance of the building.

This new generation of EPC will provide information in relation to the operational behaviour of the building, by introducing a new rating scale, based on a weighted approach of life cycle performance aspects, building smartness assessment, and information on the actual performance of the technical systems of buildings provided by technical audits.

The new methodologies to be developed will be based on existing European standards, whereas at the same time, they will trigger the development of new technical standards for smart energy performance certificates. The new certification scheme will also expand its scope, covering aspects related to water consumption, as well as noise pollution and acoustics.

SmartLivingEPC certificate will be fully compatible with digital logbooks, as well as with building renovation passports to allow the integration of the building energy performance information in digital databases. A special aspect of SmartLivingEPC will be its application in building complexes, with the aim of energy certification at the neighbourhood scale.

Twitter: @SmartLivingEPC
LinkedIn: SmartLivingEPC

TIMEPAC Towards Innovative Methods for Energy Performance Assessment and Certification of Buildings

TIMEPAC will improve building energy performance certification processes by developing a holistic approach that considers buildings as dynamic structures integrated in the urban environment. TIMEPAC's approach focuses on the seamless flow of data throughout all the stages of energy performance certification: generation, storage, analysis and exploitation of the EPC.
We have envisaged five future scenarios in which improved EPCs could be used as effective tools to improve the energy efficiency of buildings:

1. Generating EPCs enhanced with BIM data.
2. Enhancing EPC schemes by integrating operational data.
3. Integrating smart readiness indicators and sustainability indicators into EPCs.
4. Creation of building renovation passports from data repositories.
5. Large-scale statistical analysis of EPC databases.

New methods and tools to improve current certification practices will be validated in six European countries: Austria, Croatia, Cyprus, Italy, Slovenia and Spain. The results of these trials will help lay the foundation for new standards and training programmes on energy certification processes across Europe.

The TIMEPAC Academy will provide specific users such as professional certifiers, energy auditors, energy agencies, ESCOs, architects, building managers, owners, tenants and local, regional and national government bodies with training materials to enable them to apply the new methods developed in TIMEPAC to the energy certification of buildings.

Website: https://timepac.eu/
Twitter: @timepac
LinkedIn: TIMEPAC

MODERATE – Marketable Open Data Solutions for Optimized Building-Related Energy Services

MODERATE is a Horizon Europe funded project with the aim to create an open marketplace for building data, connecting data producers with researchers, developers and building stakeholders. Improving the interoperability of building datasets is a key challenge that the project is aiming to tackle.

With the uptake of building monitoring & control systems there has been a rising complexity and variety of building performance data, creating the need for improved interoperability for different stakeholders to be able to share and use each other's data.

For this purpose, the MODERATE marketplace will allow building stakeholders – such as policymakers, building owners, facility managers, service companies – to openly share their data, obtain insights and facilitate their decision-making process.

There's a fine balance for data owners to reliably share this with others while staying line with the privacy regulations. A key component of MODERATE is the use of synthetic data generation techniques, that are not widely applied yet in the construction sector, to allow open better data sharing and enable reliable building services and creating more economic opportunities.

With the use of artificial intelligence, machine learning, blockchain/distributed ledger and the Internet of Things (IoT) the platform will enable users to analyse real-time data from various building systems and provide information on different indicators of the performance of a building.

Website: https://moderate-project.eu/
Twitter: MODERATE_HE
LinkedIn: MODERATE

Join Ruggedised at the European Urban Resilience Forum (EURESFO)!

Digital Twins to Future-Proof Europe's Buildings and Neighbourhoods

September 15th, 2022, from 16:00 to 17:30 (EEST)

Data is a keystone for better decision making at city-level, helping to inform policy making and underpinning the monitoring and fine-tuning of measures for improved climate mitigation and adaptation. Data alone is not enough, however: only when building-, neighbourhood- and city-level information is processed, made accessible and is sufficiently understandable can stakeholders harness it properly.

The EURESFO session, which is being co-organised via the EU-funded RUGGEDISED project, focusses on the power of digital twins in helping cities future-proof their built environment and wider urban systems. The session features a panel discussion between representatives from the leading cities and from the private sector that are working with building- and city-scale modelling applications.

Panellists and the audience will be invited to reflect on current as well as future digital twin applications in European cities, exploring cross-sectoral dimensions to enhanced resilience, citizen engagement potential and enabling factors for the scaling up of building, neighbourhood and city-wide models.

RUGGEDISED is a smart city project funded under the European Union's Horizon 2020 research and innovation programme. It brings together three lighthouse cities: Rotterdam, Glasgow and Umeå and three fellow cities: Brno, Gdansk and Parma to test, implement and accelerate the smart city model across Europe.

This project has received funding from the European Union's 2020 researchand innovation programme under grant agreement no. 731198. The sole responsibility for the content of this website lies with the Ruggedised project and in no way reflects the views of the European Union.

High energy prices – how municipali are alleviating energy poverty

By Arthur Hinsch, Sustainable Resources, Climate and Resilience Officer, ICLEI Europe

The energy crisis has a highly visible impact on Europe's citizens who are seeing their energy prices skyrocket. Inflation and increases in consumer-prices in Europe have reached considerable levels. Energy costs have more than doubled compared to January this year and many citizens are feeling the effects of this every day. "In the heat of summer, we have to think of winter", Commission Executive Vice-President Frans Timmerman's words in relation to the EU's plan to save gas anticipate what might be waiting later this year when energy demand is expected to increase exponentially due to colder temperatures. Nearly all Member States have undertaken measures to alleviate citizens' rising energy and commodity expenses, although the approach and extent differ significantly between the countries.

While the issue of energy or fuel poverty, has gained a huge amount of attention due to recent events, it should not be forgotten that the inability of households to meet their domestic energy needs, is not new and, in 2020 has been affecting 8% of the EU's population. Energy poverty is already addressed in a series of EU strategies and legislation such as the Clean Energy for all Europeans Package, the Renovation Wave and Fit for 55 Packages, REPower EU and the EU Solar Energy Strategy.

National governments are responding to the current situation through different levers such as tax cuts and direct financial support while many municipalities are doubling down on their efforts to reduce energy consumption as part of their commitment to the Cities Energy Savings Sprint promoted by the Covenant of Mayors Europe. Cities & towns, working with local organizations, are already on the forefront of mitigating energy poverty, as part of their local climate & energy planning, and carry out targeted measures based on insights on their local context and direct contact with citizens. In Germany, around 120 municipalities actively support the "Electricity-saving Check". This programme, run by Caritas and the Association of Germany Energy Agencies, provides advice on how citizens can reduce their energy use and, typically, can reduce their annual energy bills between 100 and 250 Euros. Energy supporters, themselves long-term unemployed persons, visit struggling households and provide short-term energy-savings advice. For citizens suffering from energy poverty it is equally important to know who they can

ties

approach and what immediate steps they can undertake to improve their situation. This is where municipal Energy Poverty Alleviation Offices have a huge role to play and are being set up slowly, but steadily in cities around Europe. Such offices can directly support vulnerable citizens by providing a contact point as well as advice on no-regret, low-cost energy efficiency interventions. The City of Barcelona, with a concrete target for eradicating energy poverty by 2030, has successfully set up a number of Energy Advice Points in an effort to protect people's energy rights. Since 2016, they have helped over 90.000 families and halted energy supply cut-offs in 65.000 cases. The City Council of Vitoria-Gasteiz has developed and officially incorporated a social voucher into the city's Sustainable Energy & Climate Action Plan (SECAP). The voucher is given to citizens who are identified to be energy poor who then benefit from reductions in their energy costs. However, establishing an energy poverty alleviation office can be a challenge for municipalities due to personnel and technical equipment. As part of the EU-funded POWERPOOR project supporting energy poor citizens through joint initiatives, the energy poverty alleviation offices of the Municipality of Messini and the Municipality of Souli have been equipped with multi-functional environment testers, which can be used during home visits to identify the living conditions of those struggling with paying their energy bills.

Energy communities also offer a great solution to boost local renewable energy production, while engaging citizens in the energy transition and alleviating energy poverty at the same time, and municipalities are starting to increasingly tap into this potential. A good example of this can be seen in the City of Porto, which is committed to tackling energy poverty citizens living in the city's social housing. The energy community in the "Agra do Amial" neighborhood is located within a micro-area of eight apartment blocks and a public school. Electricity will be generated from PV panels installed on the roofs and consumed within the community, with any excess being sold to the grid. This renewable energy community (REC) will involve 181 families as well as young consumers and will provide rebates on the household's electricity bills. Within the first five years, the electricity generated will be supplied to the members of the community. After that, the locally produced electricity will be supplied to the members of the community at a lower rate than from traditional suppliers. There is a large potential for transferability within the City of Porto and to other municipalities in Portugal due to the relevance of energy poverty overall in the country and the fact that all municipalities own and manage social housing.

The capacity of municipalities to tackle energy poverty effectively varies across the EU, as there are various governance structures, varying degrees of expertise, available funds and political commitment. For navigating the complexity of challenges, but also opportunities offered by local approaches on this topic, the POWERPOOR Energy Poverty Guidebook sheds light on how municipalities can integrate energy poverty into their local climate & energy planning. An important piece of the puzzle that could make the difference in terms of delivery in energy poverty alleviation, is the partnerships with the private sector which can support local governments in filling the gaps when resources are lacking.

As a part of the Sustainable Energy Week (EUSEW) an event shedding light on this topic will take place titled "1 Municipality – 1 REC, can it be done?", on Fri 30 September 8:30-14:00 CEST in Brussels.

CO_2 emissions of light-duty vehicles: no time to waste

By Karima Delli (pictured), MEP

The representatives of the European Parliament and the Czech presidency of the Council of the EU will bear a huge responsibility over the coming months when it comes to phasing out internal combustion engine vehicles.

"The upcoming weeks and months will be of massive importance for the EU citizens and the planet. While the both the European Parliament and the Council of the EU have agreed on their initial position on the main features of the 'Fit for 55' package [the climate package], the 2022 second semester will be absolutely decisive to fight climate change.

Road transport has a key role to play in this regard. The last official figures provided by the European Environment Agency are non-equivoque: transport is responsible for about 25% of the overall CO_2 emissions in the EU, and it is the only sector where emissions have increased since 1990 (around 30%). And 70% of CO_2 emissions of the transport sector comes from road transport.

Given those figures, there is an urgent need to undertake concrete measures in this sector to comply with our climate objectives, carbon neutrality by 2050. This is why the European Commission, in the framework of the climate package, proposed to revise the regulation on CO_2 emissions of light-duty vehicles last year,

As chairwoman of the 'transport and tourism' committee of the European Parliament, and as Green Member of the European Parliament, my stance has always been very clear: we must phase out internal combustion engine vehicles as soon as possible. Most of the car manufacturers are ready for such a shift. Some important players have indeed planned to stop commercialising new internal combustion engine vehicles by 2030, or 2035 at the latest.

Given the fact that the average car life-expectancy is about 15 years, 2035 must be the absolute deadline for such an end. This is why the Green/EFA group in the European Parliament has been very significantly active on this file. And as rapporteur of the TRAN opinion (the 'environment' committee of the European Parliament leads the file), I have been intensively dedicated for that purpose.

Where do we stand right now?

After a long marathon, both the European Parliament and the Council of the European Union (the Member States) are ready to enter the final stage of the negotiations. The EU institutional system requires the Member States and the Members of the European Parliament to define a 'negotiating position' on their own side, before starting the so-called 'trialogues' (interinstitutional negotiations).

The 'trialogues' put together the current presidency of the Council of the EU (to represent the Member States), the representatives of the European Parliament (to represent the people) and the European Commission (to represent the EU's interests). Those meetings aim at getting an agreement between both co-legislators, the European Parliament and the Council of the EU (like in a classic bicameral system). This agreement is supposed to become the final binding text.

After both co-legislators have agreed on a negotiating position in June this year, those trialogues are supposed to start.

What concrete outcomes should we expect?

It is not unusual that the EP's and the Council's positions are very different. The interinstitutional talks could then become quite tough and tricky, with very 'EU way compromises'.

Although there are some significant differences here, the overall goal and the final objectives the EP and the Council have agreed on are quite similar. The main point is indeed to stop selling new internal combustion engine vehicles by 2035. Everyone agrees on that fact, which is pretty good news.

The mid-term targets are not the same in both negotiating positions, as some technical mechanisms differ.

The Council also aims at opening the doors for a new revision of targets in the future, which, for me, is quite unacceptable. This is then something we will try to overturn in the final and decisive talks.

Speeding to make that reform a reality as soon as possible

Since both approaches are not that different, I call on the Czech presidency of the Council of the European Union (which started on 1 July) to set up trialogues as soon as possible. The European Parliament is fully ready to deal with the final stage.

Again, the climate emergency is here, no one can deny it. We are the first generation to suffer from the consequences of climate change, as well as the last one to be able to try to reverse that trend. There is therefore no time to waste!

If we do not act right now, we will lose the whole battle. The most vulnerable people will be the first victims of climate change, while the final result for worldwide citizens is pretty clear.

It is of course up to all the stakeholders, which means policy-makers, public bodies and companies, to take drastic decision and undertake clear and massive measures. Everyone should be on board.

But when it comes to the EU institutions, our responsibility here is simple: finding a deal by the end of the year, to make this new regulation applicable as soon as possible.

I really hope we can make it. I am sure we are able to make it. And I am quite confident we will make it. We will not be forgiven if we do not take responsibility today and we need to make future generations' life possible.

About the author

Karima Delli has been elected Member of the European Parliament in 2009.

She became chairwoman of the 'transport and tourism' committee of the European Parliament in 2017.

As Green MEP, she has fought a lot to make transport more sustainable and cleaner since she has been working on this issue.

She was shadow rapporteur of the TRAN opinion on this file, before Petar Vitanov (S&D, Bulgarian) stepped back from his rapporteur position. MEP Delli then became the new rapporteur of the TRAN opinion.

Carbon savings

Detailed assessment of the carbon savings possible today by applying smart combinations of exiting solutions in the European building stock

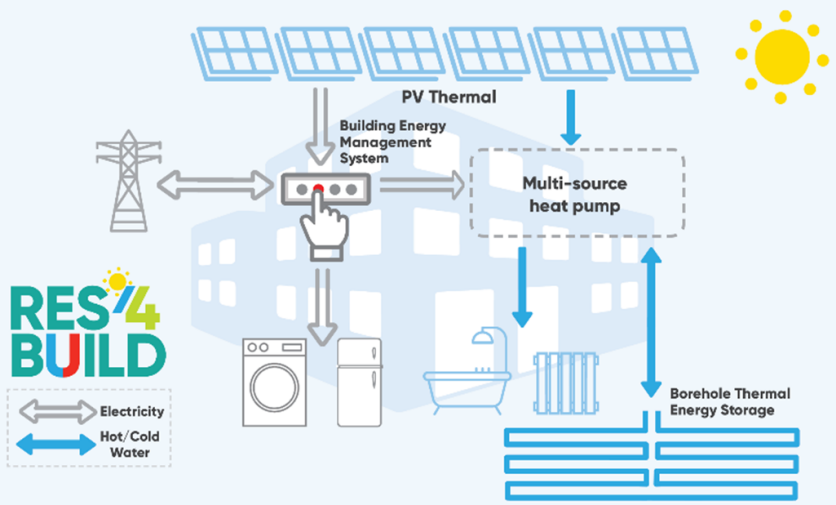
By John Smyth (Arup), Filique Nijenmanting (Arup), John Burgess (Arup) and Michael Papapetrou (WIP Renewable Energies)

Never has it been more important to ensure that Europeans can cover the energy needs of their buildings in an affordable and environmentally friendly way. Climate change acceleration, geopolitical challenges and the energy crisis make the three traditional pillars of European energy policy as relevant as ever: (i) security of supply, (ii) competitiveness, (iii) sustainability.

The RES4BUILD project started in 2019 with the aim to **decarbonise the energy consumption in buildings by developing integrated renewable-energy-based solutions.** Using onsite renewable energy with decarbonised grid electricity, the RES4BUILD integrated energy system (shown in Fig.1) incorporates heat pump and combined Solar Photovoltaic-Thermal (PV/T) technologies with thermal energy storage and smart Building Energy Management System (BEMS) to produce low to zero carbon heating and cooling for buildings. This work is particularly relevant today, because while decarbonisation has been the main objective, decoupling from fossil fuels contributes to security of supply, while using on-site generated electricity contributes to affordability and decouples the heating/cooling costs from heavily fluctuating market prices.

The project has achieved remarkable progress, developing and integrating innovative technologies which are showcased now in pilot systems in Greece, Denmark and Belgium. This article focuses on the work performed to assesses the potential impact of this RES4BUILD integrated energy system from a decarbonisation point of view.

Figure 1: Graphic representation of the Integrated Energy Solutions in the RES4BUILD concept



European Market Research

The RES4BUILD integrated renewable energy system is designed to be tailored to the needs and requirements of the users. These users are generally defined by the building typology which reflects their function and general form. Additionally, location and energy performance of such building typologies affects the RES4BUILD system design, therefore the building typologies, climate and energy performance data is collected for typical EU buildings.

Fortunately, there has been extensive research on building typologies and energy performance for Europe which we have utilised to produce the RES4BUILD blueprint of the EU building stock. Existing data bases, such as Eurostat, EU Building Stock Observatory and BPIE, were used for the initial data mining, with additional relevant research projects such as ENTRANZE, EPISCOPE – TABULA and STRATEGO reviewed to develop learnings further.

In carrying out this research, it was decided to represent the EU building market by 4 building typologies and 4 climate zones as shown in table 1. The chosen building typologies characterise approx. 86% of the total EU building stock floor area. Three locations representative of the EU climates as set out in EN14825, with an additional location (Cork, Ireland) to represent the cooler, maritime European climate. These 4 climatic regions how unique characteristics particularly in terms of peak heating and cooling requirement. The minimum energy performance required of the buildings is chosen from the local member state's national

renovation plan as required to achieve EU 2050 decarbonisation goals.

Advanced Building Energy Modelling

The 4 selected building typologies in the 4 chosen locations were modelled employing generalised simulation techniques, using the EU market research data and selected typologies. Typical building energy demand profiles were produced by Arup using a scripted open system energy modelling methodology utilising a combination of the widely available Rhino and Grasshopper software tools, operating with several open-source 'plug-ins' such as Honeybee, Open Studio and IronBug. Project partner NSCRD used test-bed, real-time, system energy simulations to model the RES4BUILD system operation and energy consumption. Based on these consumption profiles, our project partner, VITO, reviewed and optimised thermal energy demand with energy supply profiles using 'smart-buildings' control algorithms.

RES4BUILD Impact assessment

The impacts on fossil fuel reduction and environmental impact of the RES4BUILD integrated energy system is calculated for the EU market for each building type and climatic location.

Comparing the RES4BUILD system to a baseline gas-fired boiler (for heating) and electrically powered chiller (for cooling) scenario, and an alternative simple Air Source Heat Pump (ASHP) scenario, the environmental and decarbonisation benefits of the RES4BUILD system are shown.

Applying these building and location specific results across the EU market, the potential impact of implementing the RES4BUILD system on European fossil fuel usage and CO_2e reduction is estimated to lead to a possible reduction of 75%.

The potential for a major reduction in building energy related CO_2 emissions is considerable but further research on the local market idiosyncrasies and regulatory drivers / barriers are required, along with the cost and social impacts of adopting these technological solutions.

Figure 2 - SFH Heating & Cooling System GWP Emissions Impact Comparison

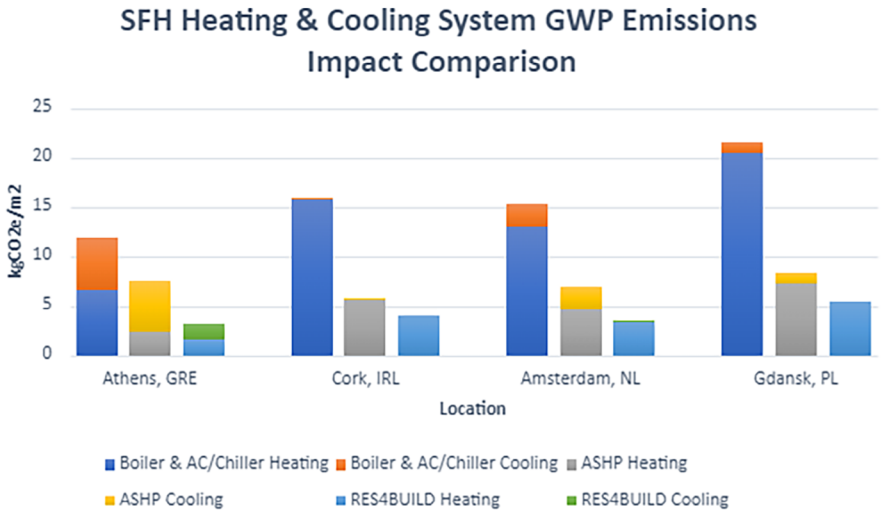


Table 1: Selected Representative EU Market Building Typologies and Climate Locations

Building Typologies	Climate Locations
Single Family Home (SFH)	Gdansk, Poland - Cold
Multi-Family Residential Building (MFRB)	Amsterdam, Netherlands - Average
Commercial Office Building	Athens, Greece - Warm
Public School Building	Cork, Ireland – Mixed Maritime

Optimal business models

The study indicates the technical potential of integrated energy systems in the European market, however the actual impact depends on the actual reach to building owners, tenants and investors. Therefore this impact study is a prelude to the wider market analysis, which is currently ongoing. This maps out the influencing policies, cultural, socio-economic and energy network aspects in various EU-countries. This will indicate the actual applicability of this approach and provides input for optimal business models to serve these end-users in their transition to decarbonisation.

Further information

For more information please visit www.res4build.eu or contact Eva Greene at eva@erinn.eu. For all project results, including the full report behind the results shown in this article please visit https://cordis.europa.eu/project/id/814865/results

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

Renewable heat: Is it rocket science

How Upper Austria is tackling the clean heat transition

By Christiane Egger and Megan Gignac, OÖ Energiesparverband, Upper Austria

The energy world has taken a profound shift. The price crisis, multiplying signs of climate change and threats to energy security urge us to act like never before. How to make the clean heat transition reality as quickly as possible is at the top of the agenda. Different from the past, when the focus was often on motivating building owners to invest in renewable heat, today we need to figure out how to cope with the soaring demand while maintaining high quality levels.

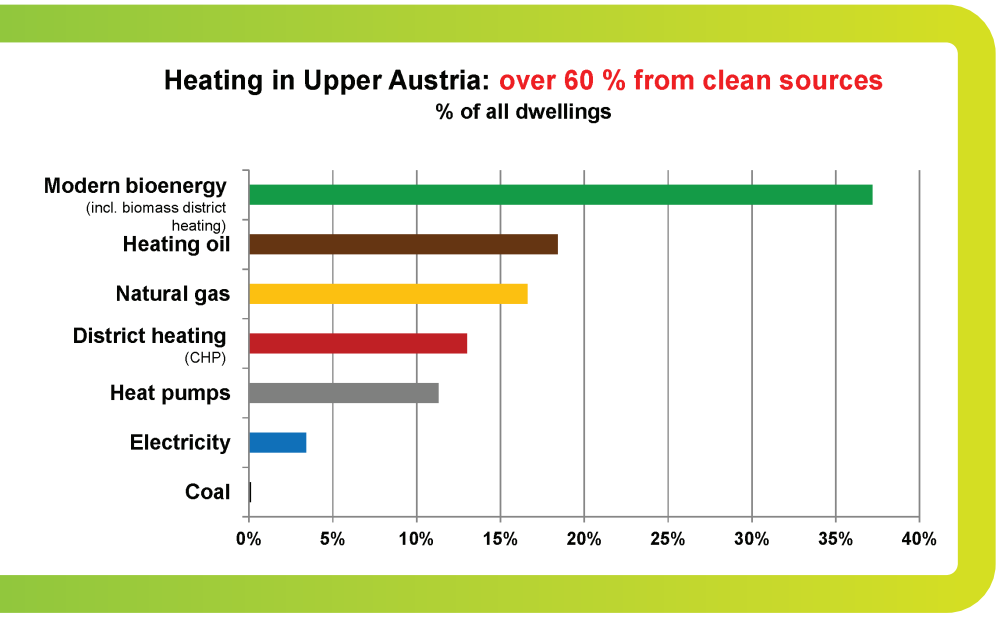
In Upper Austria, a region with 1.5 million inhabitants, over 60% of all space heating already comes from renewable and waste heat – trend strongly increasing. 37% of dwellings are heated with clean bioenergy, 13% with district heating from CHP and 11% with heat pumps. Greenhouse gas emissions from buildings were reduced by 39% in the past 10 years, bringing us closer to our goal of climate neutrality.

A head start to face the price crisis: sticks, carrots and tambourines

Over the past three decades, strategic decision-making and comprehensive actions regarding sustainable energy policies have resulted in high-performing markets for eliminating fossil fuels in the heating sector. A number of elements have contributed to these positive developments, above all:

- an effective policy structure combining regulatory measures, financial incentives and information and training activities;
- having a choice of affordable and highly efficient renewable options on the market (automatic bioenergy boilers, heat pumps, and district heating from renewables and CHP);
- the region's continuous work on developing and supporting market structures, which are now able to absorb the surging demand.

Since the 1990s, the region, supported by its regional energy agency (OÖ Energiesparverband ESV), have adopted a multi-faceted approach based on a combination of "sticks" (regulatory measures such as stringent efficiency criteria and a timetable for banning fossil fuel heating), "carrots" (attractive and stable financial incentives) and "tambourines" (information, training and awareness raising activities) for the entire heat value chain.



Quality is King

Due to Austria's federal structure, building legislation (and with this the implementation of the European Buildings Directive) are regional responsibilities. In Upper Austria, efficiency requirements for buildings, including heating systems, were progressively tightened over the years, thereby spurring innovation. Manufacturers responded to these standards by developing high-efficiency products.

The development of the bioheat market in Austria stands on these three quality pillars: sustainable forestry practices, effective fuel production and distribution, and efficient and low-emission heating equipment. Bioenergy (mostly pellets and wood chips) comes from CO_2-neutral and sustainable fuels produced from residues from sustainable forestry and by-products from the wood industry.

The quality and convenience of modern, fully automated, ultra-low emission heating equipment helped create consumer trust.

For all renewables, strict criteria assure that only highly efficient equipment is installed. For example, criteria to access funding for residential heat pumps include performance requirements based on a seasonal efficiency calculation, strict noise limits for air-source heat pumps, and a refrigerant Global Warming Potential (GWP) below 2,000 or 1,500 (depending on the situation).

Energy advice and facilitation: guiding investment decisions

Reaching relevant actors at the optimal moment and guiding them through their investment decisions is a key element of successful market development.

ESV is Upper Austria's competence centre for product-independent energy information and energy funding. It carries out over 10,000 face-to-face energy advice sessions per year for households, companies and municipalities. It also manages regional support programmes and offers funding guidance. Trainings and information events, publications on key topics, and dedicated awareness campaigns (such as the current "AdieuÖl" (Goodbye oil) and PV campaigns) are also used as pivotal communication tools.

Keeping up with demand

These strategic decisions and actions over the years are now serving Upper Austria well in face of the current price and geopolitical crises.

Well-established policies and facilitation services as well as the diversity of companies and technologies on the market are proving to be valuable assets for responding to the very high demand of the dynamic heat market. Currently, 1,000 fossil heating systems are replaced monthly in the region. We need to eliminate fossil fuel heating as quickly as possible, and although it is not easy, we are optimistic that it can be achieved!

Upper Austria's recipe for clean heat market transformation

- More than "one egg in the basket": choice of technologies for clean heat on the market (automatic bioenergy boilers, heat pumps, and district heating from renewables and CHP)
- Stringent emissions and efficiency requirements for heating systems and buildings:
  - increase customer demand for complying systems
  - drive innovation and result in a more varied product and service offer
- Attractive and stable (avoid stop-and-go) financial incentives for switching to renewables:
  - 50% funding, regardless of income level
  - up to 100% funding for low-income households
- free, product-independent energy advice for homeowners and municipalities by the ESV to guide investment decisions
- A clear phased plan for banning fossil heating:
  - 2019: no oil heating in new buildings
  - 2022: no replacement of broken boilers
  - 2025: older boilers must be replaced (step plan starting with over 45 years-old)
  - 2035: no more oil heating!
  - similar plan for gas currently in development
- Supporting market structures
  - training, awareness raising and networking along the entire heat value chain
  - "AdieuÖl" (Goodbye oil) and PV campaigns
  - Cleantech-Cluster: network of 250 energy and environmental technology companies

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

OÖENERGIESPARVERBAND

Innovative financing for building renovations using Pay-for-Performance

By Filippos Anagnostopoulos, Mara Oprea and Ivana Rogulj from the Institute for European Energy and Climate Policy (IEECP), and Johan Coolen from Factor4

In the context of REPowerEU and the renewed Energy Efficiency targets, it is important to acknowledge the role of buildings, which currently account for about 40% of Europe's final energy consumption. This demand can be significantly reduced by implementing energy efficiency (EE) measures coupled with renewables such as PV panels in buildings and automation systems that respond to the needs of the power grid. Despite the multiple benefits related to these measures, renovation rates remain low due to the difficulty of attracting investments.

Benefits for the Power System Operators

Large scale renovation programmes generate multiple benefits, including avoided capacity increase costs for Power System Operators and the achievement of energy and carbon emission reduction goals for public authorities. Power System Operators and governments can reap systemic benefits by further supporting building renovations. The resulting policies and measures further increase the bankability and attractiveness of energy efficiency and flexibility investments for third party investors.

Using Pay-for-Performance to capture system benefits

To help the market take advantage of this approach for the purpose of reducing building's energy consumption and securing the stability of the power grid, the EU-funded SENSEI project explores how to reward energy efficiency in buildings as an energy resource and/or grid service. It examines how aggregating individual renovation projects (financed through Energy Performance Contracting agreements) towards a portfolio of buildings can offer their cumulative demand reduction as a service to the grid. This is based on the **Pay-for-Performance (P4P)** approach, where indirect beneficiaries of renovation measures (e.g. TSOs) distribute payments to Aggregators of renovation projects, based on the measured reductions or shifts of energy demand at the grid level. This measurement of energy savings happens with advanced Monitoring & Verification (M&V) algorithms of tools sometimes referred to as M&V 2.0 such as CALTRACK, IPMVP, or EENSIGHT. The use of M&V 2.0 creates numerous possibilities in the field including the accurate monitoring of energy savings from public renovation programmes, the automated reporting of savings from Energy Efficiency Obligations, or the ability to set up contracts and financial products linked to achieved energy efficiency and flexibility services.

Financing for renovation projects

The opportunities offered by M&V 2.0 and P4P programmes feature as a potential improvement of current practices in the EU, where most commercial energy retrofits are financed through credit financing, leasing financing, project financing, cession and/or forfaiting on a project-by-project basis. Innovative energy efficiency contracting and financing options such as P4P may find fertile soil as more EE finance projects become 'bankable' through aggregation due to (i) the de-risking of investments through guarantees of financial payback of EE measures for investors or public subsidy providers at the programme level and (ii) the generation of income from providing benefits to the power system thereby improving the business case of energy retrofits in buildings.

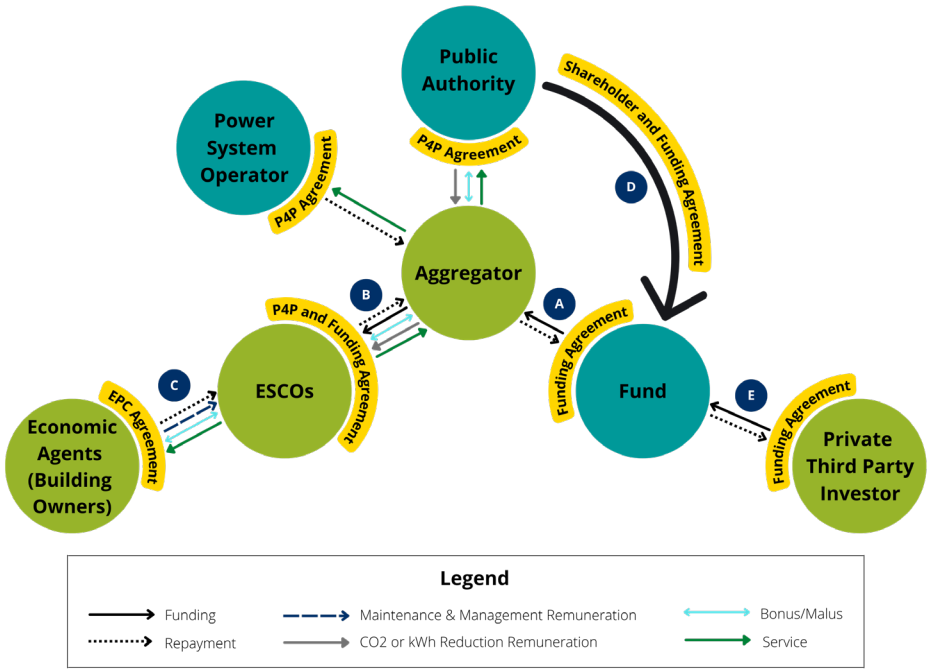
The SENSEI project has therefore developed a model based on Pay-for-Performance (P4P) depicting how renovation projects can be aggregated to attract interest from financial institutions that wish to invest in large scale projects. A P4P programme could be found in many configurations, but in essence is a multi-actor arrangement in which financial compensation is rewarded based on metered energy savings.

Detailed explanation of the P4P programme and financing model proposed by the SENSEI project

The basic European P4P model suggested by the SENSEI project, covers the main actors involved, including Aggregators, ESCOs, Economic Agents, the Public Authority, the System Operator, the Fund and the Private Third Party Investors. The configuration of actors foresees Aggregators at the center of the model, coordinating the realization of renovation projects, for which they receive an agreed remuneration (e.g. EUR/kWh or EUR/tCO_2) from the Public Authority.

The value flows as such: Aggregators receive public funds (A) following a competitive procurement and

Explanation of the P4P programme and financing model proposed by the SENSEI project



tendering procedure. The Aggregator(s) with the best offer for a sector implements the P4P programme. The Aggregator funds an ESCO's purchase in energy efficiency projects (B), and thus should conclude a funding agreement with the ESCO. The ESCO in turn concludes an energy performance contracting agreement with an Economic Agent (e.g. a building management company or the building owner) for the specific project (C). This lays out the minimum energy cost savings that the ESCO guarantees, via a bonus or malus system. The building owner does not have to fund the installation of measures and only pays the ESCO a yearly remuneration, composed of repayment, maintenance and management fees and a bonus/malus fee.

The Public Authority capitalizes the Fund at the required equity level, especially at the start of the Fund to attract Private Third-Party Investors and financial institutions at senior or subordinated debt levels. The Fund can be part of the Public Authority or can be an autonomous public entity found by the Public Authority. The Public authority acts as primary shareholder and receives a double dividend (D), namely the financial dividend and policy dividend via energy demand or CO_2 reduction. Additionally, it holds the starting equity of the Fund and possible additional debt. Private Third Party Investors finance the Fund (E) and receive repayment according to the risk level and market conditions. Lastly, Fund managers provide general corporate services to the fund such as accounting, taxes, auditing, asset and liability management, as well as tasks related to the EE projects' funding position.

Within the P4P model, there is a certain degree of flexibility in terms of funding opportunities, such as direct funding of Aggregators by Private Third Party Investors, of ESCOs by the Fund, or of Economic Agents by the Fund. The feasibility of a particular financing programme often depends on a combination of factors, from project size and anticipated payback period to utility incentives/rebates and security features.

A stepwise approach to piloting Pay-for-Performance programmes

The advancements in metered savings and energy efficiency project finance create the possibility of setting up innovative financing programmes based on the Pay-for-Performance approach. These programmes would help increase renovation rates and make buildings more responsive to the needs of the power system. Based on experience from the US, where Pay-for-Performance programmes have been running for about a decade, the SENSEI project recognises a process for establishing the first EU Pay-for-Performance pilots using a stepwise approach:

- Securing high-level commitments to pilot EE programs from actors such as ministries, public authorities and power system operators;
- Facilitating the design of a P4P programme including all market parties involved, role descriptions and contractual and financial flows in collaboration with a competent managing authority and/or a system operator;
- Selecting an existing energy efficiency programme with plentiful availability of energy performance data for which energy savings are conventionally calculated and rewarded;
- Using performance data to estimate probable energy savings if the programme had been organized as a P4P programme and analysing the results to improve the initial P4P model;
- Launching tenders for EE projects with a compensation structure bases on metered savings; and
- Setting up a first P4P pilot programme by upgrading an existing EE programme in collaboration with various stakeholders.

To learn more about the benefits and opportunities of Pay-for-Performance schemes in the EU, please visit SENSEI's website at https://senseih2020.eu/, or contact SENSEI's project coordinator Filippos Anagnostopoulos at filippos@ieecp.org.

This project has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No 847066.

Enabling Europe's energy transition – solving the critical raw materials challenge

By Harry Boyd-Carpenter (pictured), Managing Director, Climate Strategy and Delivery, EBRD

The scale of Europe's energy transition is extraordinary. The bloc is embarking on a transformation of its energy sector that is unprecedented in economic history. In less than a decade markets and networks built over more than a century to consume coal, oil and gas will have been transformed: fuelled overwhelmingly by electricity, generated in turn from renewables, especially wind and solar. The urgency of the climate crisis, starkly visible across Europe this summer, is driving this shift but it has been given extra impetus by Russia's invasion of Ukraine and the consequent focus on reducing reliance on hydrocarbons.

That energy revolution is also a manufacturing revolution, turbocharging demand for a host of products such as wind turbines, solar panels, batteries, heat pumps, electric vehicles and batteries. In turn this prompts a dramatic increase in the need for the critical raw materials, so called because of their economic importance and high risk of supply shortage, that those products require.

According to the European Technology and Innovation Platform on Batteries, Europe is forecast to account for a 16 per cent share of the 2,550 GWh global battery market by 2029, compared with just less than 6 per cent of today's 450 GWh. The inevitable result will be much higher demand for the raw materials required in the battery value chain, especially cobalt (+585 per cent by 2050), lithium (+965 per cent by 2050) and graphite (+383 per cent by 2050).

Similarly, according to a recent IEA report, a typical electric car requires six times the mineral input of a conventional car; an onshore wind plant requires nine times more mineral resources than a gas-fired plant of the same capacity; and generating 1 TWh of electricity from solar and wind power could consume, respectively, 300 per cent and 200 percent more metals than generating the same amount from a gas-fired power plant. Being green today goes hand in hand with supporting exploration for and the extraction of those minerals.

Consequently global concerns are growing over the availability and reliability of access to certain minerals and metals. Promoting an increase in the scale and security of the supply of critical raw materials is accordingly a key concern for the European Union (EU) economy and the European Bank for Reconstruction and Development (EBRD).

The latest EU list of critical raw materials contains 30 minerals and metals, the supply of which is often highly concentrated in specific countries. For example, China processes 98 per cent of the EU's rare earth element supply.

At the EBRD, we are very aware of the critical raw material risk and believe that extra effort is needed to facilitate the financing of exploration and production. There is a lack of funding for early mining and exploration projects in the EU, as these are high-risk transactions. The financing of mining projects is complex, but the rewards for society and the returns for investors can be significant, as the EBRD has demonstrated. The EBRD has been investing in mining projects for more than 20 years, with an existing portfolio of €2 billion in more than 30 mining projects. These are investments not only in critical raw materials, but other minerals essential to our daily lives, such as copper, nickel, iron ore and chromium. As a result, the Bank has the skills and expertise to manage the kind of complex transactions that raw-material mining requires.

For example, we invested €5 million in the shares of Euro Manganese, a Czech company that is cleaning up mining tailings and converting them into high-purity manganese, a key component of electric batteries which is currently supplied almost entirely by China. We also provided €25 million to the Elemental Recycling project in Poland, which includes a facility for recycling lithium-ion batteries for electric vehicles and platinum-group metals. This facility is the first of its kind in the EU and the EBRD regions and is expected to achieve a recycling rate of 90 per cent of the lithium-ion

batteries it receives, a step above current technologies.

In addition, the Bank is active in policy and training. We are a member of the European Raw Materials Association (ERMA), which aims to foster innovation, attract investment to the raw materials value chain and help advance the best framework for raw materials and the circular economy.

We are also active in mining project promotion; we are regularly consulted by the European Commission units for critical raw materials on project development opportunities, given our long-standing experience in financing mining projects.

The Bank is also a supervisory board member of the Certification of Raw Materials (CERA) initiative, which aims to develop a certification scheme throughout the battery chain that meets the highest sustainability standards.

We believe that, in order to promote more environmentally sustainable mining and reduce supply risk within the EU, key actions should include: promoting the use of secondary raw materials, improving recycling rates of electronic waste, developing the recovery of accompanying elements contained in the raw materials imported to the EU, assessing waste sources (old slags and dams) for the recovery of CRMs, and securing CRMs supply from non-EU European countries.

We have a stakeholder network across our regions, which we are leveraging in order to promote sustainable practices and secure the necessary financing to do this. We are bringing stakeholders together to understand the barriers in each country and then ensure access to finance at the early-stage development of mining projects.

I am confident that the EBRD and the EU will continue to work closely together to build a more sustainable mining sector and develop more secure and diversified raw-material production.

The energy revolution requires a manufacturing revolution, which in turn requires a revolution in how we produce, process and recycle the raw materials which manufacturing needs. EBRD is determined to play its part in this vital effort.

Using the European Parliament's recent support of innovative renewables to transform the energy industry

By Wolfram Sparber (pictured)

Wolfram Sparber is the Vice President of EUREC, The Association of European Renewable Energy Research Centres, and the head of institute for renewable energy at Eurac Research (Bolzano-Italy) since its foundation in 2005. Since 2011 he has been involved as chairman of the executive board and later member of the advisory board of one of the leading renewable energy utilities in Italy (Alperia, formerly SEL). On the EU level Wolfram was Vice President of the ETIP-RHC from 2011 to 2019 and has been a member of the Clean Energy Industrial Forum since 2021.

I'm glad many renewable energy associations joined EUREC in hailing the European Parliament's Committee on Industry, Research and Energy (ITRE) adoption of vital amendments to support the development of innovative renewable energy technologies on 13 July.

In these pages a year ago, EUREC's Secretary General presented a proposal to correct the lack of attention to R&I in EU energy policy. Skyrocketing energy prices in wake of Russia's invasion of Ukraine, rising costs of living and record heat extremes have since made action all the more urgent.

We need bold approaches to scale up next-generation renewable technologies, bring them to market quickly and reap the economic benefits that can come from renewables businesses thriving from the installation and manufacture of technology.

The ITRE Committee's vote

ITRE pushed the energy innovation agenda forward by:

- setting a new indicative target for innovative renewables of 5% in each Member State of all renewable energy capacity installed between the entry into force of the revision to the Directive and 2030;
- establishing the need for a target for storage technologies and suggesting another for demand-side flexibility
- clearing the path for National Energy and Climate Plans (NECPs) to be the vehicle for Member States to set out the policies to deliver innovative renewables;

Operationalising ITRE's "innovative renewables" amendments

How, concretely, could this indicative target be made to help industry? It would need to push Member States to create new measures that ensure they reach it.

Measures to support innovative renewables

Favourable financing

The hesitant attitude of financial institutions when presented with a project carrying technology risk must be overcome. Public guarantees from Member States could underwrite financing offers, accelerating and improving deals.

Capital grants

Renewable energy technology is generally "high-CAPEX low-OPEX" and capital grants have been identified as the best way to support some technologies, e.g. solar thermal for industry.

Revenue support

Countries could specify tenders specifically for the innovative renewables technologies supporting a national strategy.

R&D support

R&I support can indirectly lead to tomorrow's benchmark-setting technology. However, as "5% by 2030" implies 10s of GW across the EU, "innovative renewable energy technologies" will on average have to survive on aid intensities far less than typical R&D projects.

Regulatory support

Cleantech for Europe has sought

streamlined permitting processes and regulatory sandboxes encouraging (for example) the combination of technologies with complementary characteristics.

Keep the measures trained on the right technologies

What is "innovative" today will likely not be innovative in 3 years. A process is needed to periodically revisit the list of specific technologies falling under the definition of "innovative" (see Box 1).

We envisage the Member States consulting on a first draft of their list, i.e. considering comments from the renewable energy community (or wider) and accepting valid ones. Evaluation by peers is the tried-and-tested means to judge the innovative quality of proposals in major EU programmes like Horizon Europe and ETS Innovation Fund. A final version of the list would then be published and soon after measures implemented.

A 3-year revision cycle seems like the right balance between ensuring the list is up-to-date and the administrative burden of running the consultation process and tailoring supporting measures. The preparation of lists or updates could be made to fit the 5-year National Energy and Climate Plan cycle or a new process under the Strategic Energy Technology (SET) Plan (see Box 2). NECPs require Member States to detail their planned deployments of renewable energy technology and the policies for realisation. They can make a special effort to do this for advanced technology, too, for example under the R&I dimension, which the European Commission wrote in 2020 was neglected.

[Improve] in a least one way comparable state-of-the-art renewable energy technologies or [make] exploitable a largely untapped renewable energy resource and involves a clear degree of risk, in technological, market or financial terms, which is higher than the risk generally associated with comparable non-innovative technologies or activities

Box 1: ITRE's definition of an "innovative renewable energy technology" borrowing language from the Guidelines on State aid for climate, environmental protection and energy 2022. It combines three notions. The third of these is "risk", including "market risk" which differs from country to country and would allow a country not considered "innovative" in one country to be considered "innovative" in another.

The SET Plan (Strategic Energy Technology Plan) is a framework in which energy sectors cooperate with each other and with Member States to define priority technologies to develop in given timeframes, with the European Commission facilitating the discussion in working groups of experts.

Box 2: The SET Plan is due to be updated this year with new tasks or with a potential new structure in 2023.

Everyone contributes

An important feature of ITRE's amendment is that the indicative target of 5% is one that all countries individually must try to reach. I'm sure every country large or small can find some innovative technologies of particular relevance to them in the strategically important field of renewable energy. At worst, they can help a company developing novel technology in other EU country grow by installing on their land to access the wind, solar, hydro, geothermal or bioenergy resources they have available.

The EU should be helpful and proactive to ensure that the path to reaching the 5% target is smooth. This can be accomplished by providing Member States with the process to identify innovative technologies (through the NECPs and SET Plan) as well as the instruments to reach the target through funding programmes including Horizon Europe, the Innovation Fund and the Clean Energy Transition Partnership and possibly in the latter part of the decade the Renewable Energy Financing Mechanism.

Conclusion

The new 5% target for innovative renewables will translate into direct policy support for the manufacturing of high-performance technologies and provide new opportunities for research centres to help companies with innovative product development.

It will furthermore allow these companies to scale up innovative technologies to make them market-ready and ensure Europe remains at the frontier of renewable energy innovation. Innovative technologies to guarantee energy security are available in Europe but require an extra boost to clear risk hurdles. ITRE's amendments must find their way into the final legislation and be followed up with a mechanism to keep deployment support for innovative technologies squarely in the sights of Member States.

EUREC
The Association of European Renewable Energy Research Centres

EUREC has extensive experience in the management of European co-funded projects, as well as in communication, dissemination and training activities:

EUREC is the voice of renewable energy research in Europe, representing European Research Centres active in renewable energy.

EUREC promotes and supports the development of innovative technologies and human resources to enable a prompt transition to a sustainable energy system.

EUREC has two Masters programmes, run by a network of eight European Universities and research centres who are leading the way in renewable energy research, development and demonstration.

TRACER Transition in Coal-intensive Regions

RES4LIVE ENERGY SMART LIVESTOCK FARMING TOWARDS ZERO FOSSIL FUEL CONSUMPTION

SHIP2FAIR

PhotoVoltaic EUROPEAN TECHNOLOGY & INNOVATION PLATFORM

ETIP Bioenergy European Technology and Innovation Platform

4RES

EUROPEAN MASTER IN SUSTAINABLE ENERGY SYSTEM MANAGEMENT Coordinated by EUREC

EUROPEAN MASTER IN RENEWABLE ENERGY Coordinated by EUREC

RHC Renewable Heating & Cooling European Technology and Innovation Platform

POLYPHEM, a promising concept of co-generation technology of heat and electricity

After more than four years of collaborative research on Concentrated Solar Power (CSP), and particularly through the development of a solar-driven micro gas-turbine technology, the POLYPHEM project had come to an end in August 2022.

POLYPHEM: Small-Scale Solar Thermal Combined Cycle

POLYPHEM is a Horizon 2020 project funded under the Energy programme. Coordinated by CNRS-PROMES, this project was implemented by nine partners from four EU countries.

The particularity of this consortium, which is also its strength, is that it is a public and private partnership. Partners come from both the academic world such as CEA-LITEN, CIEMAT-PSA, and Fraunhofer ISE, but also business world such as ARRAELA, KAEFER SE, ORCAN ENERGY, AALBORG CSP, and EURONOVIA.

The main objectives of the POLYPHEM project were to improve on the one hand, the performance of small-scale Concentrated Solar Power (CSP) plants and, in the other hand, their flexibility to generate power on demand.

To this end, a new technology was proposed: **a solar-driven combined cycle with integrated thermal energy storage**. More detail information can be found on the project website.

Impact & applications

Initially, the main expected impact of this project was to enhance the competitiveness of low-carbon energy production systems through the technology developed. The expected progress is a better fitting of electricity generation to variable local needs, an overall conversion efficiency of solar energy into electricity of 18% for an investment cost of less than 5 €/W and a low environmental impact. By 2030, the cost of electricity production targeted by the POLYPHEM technology is 165 €/MWh for an annual direct normal irradiation of 2600 kWh/m2/year (North Africa and Middle East) and 209 €/MWh under 2050 kWh/m^2/year (Southern Europe).

In addition to decentralized power generation, other applications are considered for the deployment of this technology used in poly-generation: solar heating and cooling of multi-family buildings, water desalination for small communities, industrial heat production, desalination of seawater or brackish water, etc.

Main results

POLYPHEM partners succeeded in having many specific results despite a major technical issue on the solar receiver. The main achievements are the selection of 2 alloys for the tailor made design of the air-solar receiver, the development and erection of an original TES (Thermal Energy Storage) made of concrete bricks and walls with oil as heat transfer fluid, the assessment of performance with creation of simulation models for each component such as the air/oil RHX (Recovery Heat exchanger) or the ORC (Organic Rankine Cycle), and the testing of the solarised micro-gas turbine. Finally, the project could bring the technology from TRL3 to TRL4 or TRL5!

As Andreas Poppinghaus from KAEFER SE, member of the Consortium, said “The multinational team of POLYPHEM faced many challenges, among not the least, the global pandemic COVID. However, key targets were reached, and the results are very promising.”

POLYPHEM, a promising concept of co-generation technology of heat and electricity

Therefore, the deployment of the technology is strongly considered. Indeed, due to the simplicity of the concept and implementation, large parts of the plant can be produced and erected in the target country as local content. Also, maintenance can be done locally by trained personnel. So large parts of rural areas without proper energy infrastructure can gain power independence without harming the environment by transporting diesel over long distances.

Outcomes of the POLYPHEM project will allow in the short term to reinforce the competitiveness of this new low carbon energy technology, favour its integration in the medium term in the worldwide energy mix and contribute to the mitigation of climate change.

As a way of conclusion of this fruitful collaborative research, relevant reports, deliverables, webinars and scientific publications are available on the official website (https://www.polyphem-project.eu/). Join the POLYPHEM community by following us on social media LinkedIn (https://www.linkedin.com/company/polyphem/) or Twitter (https://twitter.com/H2020CSP) to stay tuned!

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement N° 764048.

Energy Efficient Mortgages to fund the hope for a better future

By Luca Bertalot, Secretary General – European Mortgage Federation – European Covered Bond Council (EMF-ECBC) & EEMI Consortium Coordinator

At this unprecedented time of crisis, we need to transform challenges into opportunities, looking the next generation in the eyes. Our homes, the place where we raise our children, are at the heart of ou r lives and interests. Exactly like the word Home, οἶκος (oikos) -at the heart of the Ancient Greek word oikonomia-'. A sustainable economy has to be built on around the concept of Home, the cornerstone of citizens interest. A financial sector centred on an ESG (Environment, Social and Governance) 'ecosystem' that promotes green values and raises environmental awareness can play a major role. By bringing together lenders, investors, SMEs and utilities, the Energy Efficient Mortgage Initiative not only aims to boost consumer demand for building energy renovation but also to align strategies for the financial sector to become a cornerstone of the energy transition.

More than 100,000 homes every day – half a million per week – must be renovated until 2030 for the EU to reach its climate objectives. Taking into account that European buildings account for 40% of greenhouse gas emissions in Europe, an effective home retrofit can bring up to 70% reduction of energy consumption, therefore improving families' quality of life, benefitting to the environment and the real-economy by stimulating job creation and driving wealth creation.

Indeed, the scale of investment needed to improve the energy performance of more than 220 million residential dwellings in order to achieve the EU's energy savings targets is huge and cannot be met by the public sector alone. The EU financial sector will play a central role in the transition to a more sustainable economy, reducing energy poverty for households, safeguarding consumer wealth in terms of disposable income and asset value and supporting economic growth and job creation.

Against this background, the value of aligning the interests of lenders, investors, SMEs, utilities and, most importantly, consumers in multi-service European-wide platforms is strategic. The significance of these efforts is perhaps even more relevant today than ever before in light of the recently announced Joint REPowerEU Action – supporting consumers in improving the energy performance of their homes will be crucial in securing the EU's energy independence.

The "RePowerEU" plan, technically ambitious and politically revolutionary, envisages diversifying supplies, increasing production and importing volumes of biomethane and renewable hydrogen, creating a European platform for joint gas purchases and storage, and tripling supplies by next winter. In addition, a new temporary framework of state aid to businesses is envisaged.

In this sense, the plan represents an ideological turning point, reorienting the legislative paradigm developed in recent years in the finance and energy fields. This turning point is already profoundly influencing the current political and legislative debates on the EU Taxonomy, the Energy Performance of Buildings Directive, the implementation of the final Basel III Reforms and, more generally, across the board, all issues related to digitalisation and sustainability.

The real breakthrough of a net-zero Europe will come through the large-scale use of green mortgages. Today, the mortgage market is equivalent to

around 46% of the EU's GDP. Facilitating the transition to green mortgages is crucial to achieving a climate neutral economy, there is therefore a need for in-depth energy upgrading.

In this respect, it is important to ask how much it costs each owner, individual or family, to make the necessary jump in energy class: the answer is at least 25-30 thousand euros of investment.

There are not many who can afford these sums without systemic help/ stimulus.

The problem is that if the necessary "green" improvements are not made, there will inevitably be a net and tangible loss in energy consumption.

A family can save up to 70% on its energy bills with an investment that achieves two jumps in energy class, which today translates concretely into defending the purchasing power of families by mitigating the effect of inflation on disposable income.

So where can these amounts come from?

From public subsidies, at local, regional or state level or from private finance markets, based on a wide range of product offerings which meet consumer needs and support the climate transition in the process?

Member States cannot fully assume this huge burden on public debt, which would mean shifting the cost to future generations, so we have to build a mechanism which brings together public and private stakeholders, working in coordination and leveraging each other's contributions and actions.

The contribution of financial markets, if combined with public intervention and structured in the right way, can give life and impetus to a genuine green renaissance, capable of giving an economic boost not only to the mortgage, construction, and real estate industries but to the entire economy.

The positive repercussions would be felt not only from an environmental point of view, but also in terms of employment, research and development, certification, and the professional skills involved in this work.

This is precisely the role of the Energy Efficient Mortgages Initiative (EEMI). EEMI aims to boost consumer demand for building energy renovation. Bringing together a wide range of relevant market players, including lenders, investors, SMEs and utilities, the EEMI is aligning strategies and actions through a new, innovative market mechanism focussed on a green 'fulcrum' of products, services and data, delivered by way of a 'one stop shop'.

The Initiative also proposes macroprudential measures to support, through legislation, consumer demand, lending institutions' ESG financing capabilities and investor ESG due diligence, as private capital cornerstones of the Renovation Wave Strategy and NextGenerationEU.

With the overall objectives of optimising the end-to-end customer journey and experience, deploying market interventions and partnerships that support delivery and therefore maximising benefits for consumers, the EEMI is concretely building an open source platform at the centre of the 'ecosystem', which will:

- Provide access to and guide consumers towards the most efficient and cost effective, integrated technical and financial products, services and advice, whilst ensuring commercial neutrality and offering a European approach to delivering market-specific actions.
- Deliver a continuous flow of material data for lending institutions, investors and SMEs on building energy performance (improved EPCs, primary energy demand), EU Taxonomy alignment and ESG counterparty assessment and ratings.
- Favour the implementation of market best practices to secure gradual but continuous market transition and alignment with EU legislative requirements.

The EEMI will build a constellation of national platforms focussed on local characteristics and implementation needs but with a European footprint, combining efforts of the public and private market sectors.

There is also another very important aspect to this new green ecosystem narrative.

As pointed out earlier, the home is a very special place where people spend at least one third to more than half of their lives. This makes it an ideal focal point for financial education for citizens as consumers by embedding a new culture with greener microeconomic decisions in support of a transition economy.

Such an exercise should not be seen as 'just' a philanthropic decision taken by already environmentally conscious people who also tend to be more affluent. It will be a win-win solution especially for those families for whom it is more difficult to make ends meet and who are more likely to live in less energy-efficient homes and for whom running and living costs represent a larger share of their budget.

Over the past years, we have realised more than ever that sustainability is the new reality.

We are stronger when acting collectively, and cooperation at global level will help us move towards more sustainable houses, bringing the hope to all generations for a greener future.

Luca Bertalot is a digital ambassador of the European Sustainable Energy Week (EUSEW) of which European Energy Innovation is a media partner. Registrations for this hybrid event are now open – on-site spots are limited.

Breaking down silos to unlock the en

By Dr Vicky Stratigaki of Ghent University in Belgium; Professor João Murta Pina, from NOVA University of Lisbo

With 2050 targets ahead, Europe aims to become the world's first climate neutral continent and a climate-resilient society. Fostering connectivity amongst researchers and innovators is key to tackle the many challenges related to energy efficiency and decarbonization. COST Actions are the perfect platforms where interdisciplinary collaborations can occur and enable new solutions in a wide diversity of fields such as renewable energy, materials improvement, and regenerative economy.

POWER

COST Action 'A pan-European Network for Marine Renewable Energy' (WECANet) aims to promote the large-scale deployment of Wave Energy Converters (WECs).

Wind and solar power have made major advances and are widely implemented across Europe. However, the potential of other energy resources such as wave energy is still to be tapped.

"For the large-scale deployment of marine renewable energy technologies, an interdisciplinary approach is necessary," says the Action Chair, Dr Vicky Stratigaki of Ghent University in Belgium.

The network pools together diverse sources of expertise cross cutting the environmental, social, and economic dimensions of marine energy projects. "A major issue is to increase confidence of potential investors by reducing (non-) technological risks and related uncertainties. Significant bottlenecks need to be addressed such as installation practices and procedures. The development of arrays is a key factor to achieve an optimal installation size that is attractive to the energy sector." Dr Stratigaki adds. "Research needs to re-focus on techno-economic perspectives, which considers the full life cycle costs of the technology."

During 2021 WECANet has been moving ahead with around 30 Short Term Scientific Missions (STSM) and a Round-Robin (*) testing campaign was completed. "Different laboratories from across the WECANet network tested the same WEC device to assess experimental reproducibility," explains Dr Stratigaki. This will develop a reliable database for validating advanced numerical models.

SUPERCONDUCTIVITY

"Increasing distributed renewable generation, changing transportation paradigms, and improving energy efficiency are some of the foundations for the Energy Transition. A multitude of challenges requires a variety of solutions. High Temperature Superconductivity (HTS) based technologies can address all these major challenges, and thus, have a role in the solutions." says Professor João Murta Pina, from NOVA University of Lisbon, who chairs the COST Action High-Temperature SuperConductivity for AcceLerating the Energy Transition.

High-temperature superconducting (HTS) materials are able to enter the superconducting state above the

ergy transition

n, Portugal and Mr Carlo Battisti, Living Future Europe, Italy

temperature of (cheap and abundant) liquid nitrogen.

These properties enable the development of technologies and devices that are more efficient with smaller footprints and reduced weight and/or offer unique and potentially disruptive solutions.

These can be integrated into all aspects of the electric power systems – from generation to transmission and distribution, energy storage and end-use – to improve their safety, security, reliability, and sustainability and to accelerate decarbonization efforts.

However, despite all the potential benefits and successful demonstrators of numerous HTS technologies, they still lack mass penetration in the power system. This COST Action aims at developing systematic approaches to create pathways between materials research and real-world devices and foster improved modelling and advanced computation paradigms. Methodologies and demonstrators will be provided to address industrial challenges and applications, as well as tools for the economic and sustainability assessment of HTS technologies.

RESEARCH AND ACADEMIA FOR SUSTAINABLE BUILT ENVIRONMENT

COST Action networks also provide a safe and fruitful space where Academia and Industry can meet to work together and successfully address the range of challenges facing our society. In particular Small or Medium Sized Enterprises (SMEs) have the capacity to deliver innovative results by themselves and research organisations get the chance to fully test their results in 'real world' applications. COST Action 'REthinking Sustainability TOwards a Regenerative Economy' (RESTORE), which ended in 2021, was ahead of the field with 28 SMEs involved. RESTORE strived to cover all sustainability aspects of the built environment including environmental, economic, and social angles.

"It is one of the first COST Action to research sustainability in the built environment," claims Action Chair Carlo Battisti." And the first Action to engage with a process to offset its CO_2 emissions, reducing and completely offsetting them in the end.

(*) A round robin test is an interlaboratory test (measurement, analysis, or experiment) performed independently several times.

Mr Carlo Battisti

"With so many partners from different disciplines and cultures our first challenge was to find a common language for sustainability," says Carlo Battisti. "And we took a holistic approach: not just achieving carbon neutrality, but also covering issues such as loss of biodiversity too. We looked to provide a paradigm shift to deliver built environments that are environmentally positive across multiple indicators." The knowledge gained in RESTORE is being continued through the activities of the Living Future Europe association and the Action's members.

"The Action has helped close the gap between research and the practitioners on the ground. There is now a huge network of professionals that can take advantage of the results." says Mr Carlo Battisti.

"The academic side has better understanding of the relevance of their research to the market, while the commercial side has better understanding of the technologies that are available and the current research that may become commercially relevant," he concludes.

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

View the Action websites

COST Action: A pan-European Network for Marine Renewable Energy

COST Action: High-Temperature SuperConductivity for AcceLerating the Energy Transition.

COST Action: REthinking Sustainability TOwards a Regenerative Economy

CO_2 Capture and Utilization (CCU) Matters

Positioning in the Sustainable Transition Landscape

Seven years ago, the Intergovernmental Panel for Climate Change (IPCC) proposed a pathway for the global reduction of CO_2 emissions, to limit the expected temperature increase to an anomaly of 2, ideally 1.5°C, by the end of this century. The CO_2 emissions originate from the burning of fossil fuel, industry and land-use[1] and should be rapidly reduced (>350 Mton CO_2/year), while 'negative' CO_2 emissions are gradually introduced, starting from 2030. This last strategy consists of the capture of CO_2 from the air and its permanent storage under the ground or in materials, for which an 'eternal' lifetime can be assumed.

Which CO_2 reduction strategies exist? The International Energy Agency (IEA) investigated possible strategies, e.g. the more efficient use of fossil-based feedstocks and fuels in our industry and energy sector, which represents the 'low-hanging fruit'. They described their contribution in the CO_2 reduction pathway towards a net-zero CO_2 emission in 2070[2]. In parallel, the IEA elaborated a more stringent roadmap, to achieve a net-zero emission by 2050. Important examples of such strategies are electrification, green hydrogen production, the use of renewable feedstocks and CCUS (incl. storage of captured CO_2). Together, they lead to a cumulative yearly reduction of CO_2 emissions by 35 Gt in 2070.

On which CO2 reduction strategy should we focus? Part of the proposed sustainable strategies rely on the use of renewable electricity. If we take into account a local scarcity of renewable electricity today and in the future, strategies should be prioritized. A first fair set of criteria would simply consist of the 'MWh of renewable electricity' or 'the EURO's' invested in a strategy, in order to reduce the yearly emission by given ton of CO_2. In addition, the anticipated potential for CO_2 reduction, related to the market size of given CO_2-based fuel, chemical or other products, should be included in the screening. Last but not least, the corresponding renewable electricity required to supply such a market could even become the most important criterium.

However, the former criteria may not suffice and other factors should be taken into consideration in such a decision-making framework: the application's 'readiness level', with regards to the technology development, its deployment in the market, compatibility with the existing energy and industrial system, amongst others. Also, possible local synergies between stakeholders, legislative frameworks to close possible financial gaps in the business case, availability of infrastructure, geography for deployment should not be overseen. To conclude such screening, the strategies should be ranked not only within, but also between different sectors, such as energy production, buildings, mobility and industry. As internationally active research institute, the Flemish Institute for Technological Research (VITO) combines its competences to tackle these cross-border, cross-sector and cross-vector challenges, within the field of CCU.

How to evaluate value chains, that rely on CO_2 feedstock, in practice? Three CCU-based value chains were assessed by VITO. They all start from the capture of fossil-based, post-combustion CO_2 from chimneys. It is used as feedstock in the production of CO_2-based products, alongside the application of zero-carbon energy to fulfill the process' electricity need. In a next step, they are replacing a fossil-based product in one or more use cases:

1. CO_2-to-fuel route: To deliver an equal amount of energy 2.25 ton CO_2-based methanol can replace 1 ton diesel or 1.07 ton bunker fuel in the marine fuel combustion.

2. CO_2-to-chemicals: the production of 1 ton grey methanol is replaced by 1 ton CO_2-based methanol in the chemical industry.

3. CO_2-to-building material: the production is based on the spontaneous reaction of stainless steel slags or other alkaline (waste) material with the CO_2 gas, forming an alternative for the classical cement binder. This implies a permanent CO_2 fixation. The resulting product replaces concrete-based building materials, which are based on cement. The process of cement production emits significant quantities of CO_2.

The following conclusions can be drawn from resp. Figure 1 and 2:

1. In the marine fuel and chemical use cases, the replacement by CO_2-based methanol results in a factor 15 higher CO_2 reduction potential than in the building material case. However, the production of methanol requires large amounts of electricity. Conversely, the corresponding CO_2 reduction potential per unit of renewable electricity, applied in the CO_2-to-methanol conversion process, is significantly lower.

2. The total replacement of European marine fuel results in a CO_2 reduction potential in the range of 100 Mton CO_2/year. This is a factor 15 higher than in the smaller chemical

use case, related to the European methanol production capacity. The building material use case also shows a significant potential, based on the availability of alkaline waste material in Europe. As a yearly renewable energy production of 3400 TWh is anticipated in Europe by 2050[4], the European marine fuel use case becomes restricted by its yearly renewable electricity need of 1000 TWh.

It is clear that no unambiguous selection of a viable scenario can be made in this exercise, focusing on only the CO_2 reduction potential and one use case, in extremis. A balanced combination of different CCU strategies is preferable. It starts from the current and future availabilities of renewable electricity as conditio sine qua non, with deployments spread over time. The production of CO_2-based fuels with electrified systems can support the renewable energy transition in an energy storage strategy. The production of CO_2-based building materials is a feasible short-term pathway, if proper supply chains for alkaline waste feedstock can be guaranteed. In the meantime, opportunities arise in the field of energy import, which influences the boundary conditions for CCU: Renewable electricity can be produced in an economic feasible way, at far locations in the world, where solar and wind energy are abundant. In such scenarios, CCU not only serves as a storage strategy for the low-carbon and low-cost energy, but also facilitates its transport towards Europe, in the form of molecules with a high energy density.

Figure 1: Illustration of ton CO_2 avoided per ton product replaced in given use case (blue bars) and corresponding ton CO_2 avoided per MWh renewable electricity in the production of the renewable alternative [3, 4, 5, 6, 7, 8]

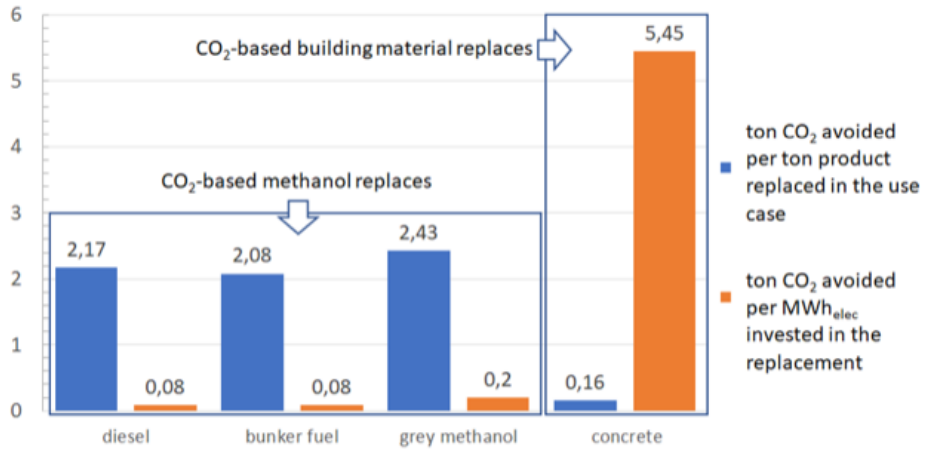
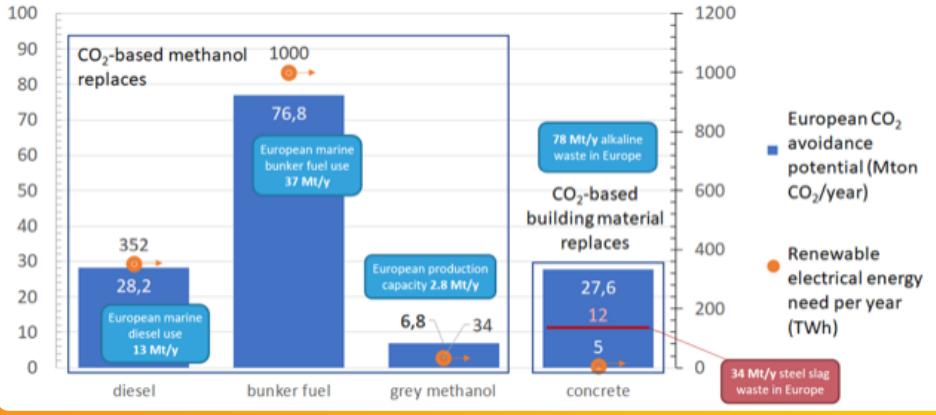


Figure 2: Illustration of the European CO_2 avoidance potential (Mt/y) and corresponding renewable electricity use (TWh) [9, 10, 11, 12]



Indeed, the role of methanol as fuel or platform chemical could then be extended to an 'easy-to-transport' liquid energy carrier. Therefore, VITO concludes that the positioning of CCU within the Sustainable Transition Landscape not only rests on many, different pillars, but also on global trends and the dynamic nature of its boundary conditions. ●

1) Anderson, K.; Peters, G., Science 354 (6309), 2016, 182–183.
2) https://iea.blob.core.windows.net/assets/181b48b4-323f-454d-96fb-0bb1889d96a9/CCUS_in_clean_energy_transitions.pdf
3) CRI process with 75% H_2 prod. efficiency: 11.8 MWh/t MeOH and 1.38 t CO_2/t methanol [see (5)], incl. capture: heat use = 1178 MWh/t CO_2 → 0.44 t/t methanol @ 0.27 t CO_2/MWh, elec. use = 196 kWh/t CO_2, DSP = 0.33 t CO2/t methanol
4) Dechema Technology study (2017): Low carbon energy and feedstock for the European chemical industry
5(per t Carbstone: 480 kg SSS, 480 kg sand, 107 kg water, 92 kg CO_2, drying 63 kWh heat, mixing electricity 27 kWh, curing electricity 2 kWh , footprint extracted from LNE study see below
6) https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf, from CO2 emission factor list
7) https://www.egcsa.com/wp-content/uploads/CO_2-and-sulphur-emissions-from-the-shipping-industry.pdf, https://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html
8) LNE study (2016): Onderzoek naar mogelijk ondersteuningsbeleid m.b.t. nieuwe toepassingsmogelijkheden van CO2 als grondstof
9) https://www.concawe.eu/wp-content/uploads/2017/01/marine_factsheet_web.pdf
10) https://www.icis.com/explore/resources/news/2019/01/31/10313703/chemical-profile-europe-methanol , 2019 data.
11) https://www.eurofer.eu/assets/Uploads/European-Steel-in-Figures-2020.pdf , total slag utilization 34.1 Mt in 2019
12) https://www.science.org/content/article/industrial-waste-can-turn-planet-warming-carbon-dioxide-stone , extrapolation of 43.5% steel slag contribution on global level to European market of alkaline waste materials (fly ash, cement waste, ...) and taking into account a similar stoichiometry of alkaline waste/CO_2 in building material, as for the Carbstone building material

From smart city innovator to climate pioneer: what makes Rotterdam a N

By Schuyler Cowan, Communications Officer, ICLEI Europe

The much anticipated announcement of the EU Mission for 100 Climate Neutral and Smart Cities (NetZeroCities) has spread swiftly across Europe. From a competitive pool of 377 applicants, how did the 100 cities – with 12 more from countries associated with the European Union – find their way to the top?

Glasgow (Scotland), Rotterdam (Netherlands) and Umeå (Sweden) find themselves part of this exclusive list; they are among the 112 cities selected to take part in the Mission. As part of the Mission, cities will pursue innovative avenues to achieve climate neutrality by 2030 and position Europe to become the world's first climate-neutral continent. But Glasgow, Rotterdam and Umeå's path to a sustainable, resilient and climate-neutral future began long before they answered the NetZeroCities call.

The three cities have evolved from smart city innovators to climate-neutrality pioneers. Their cumulative work on energy, climate and sustainability provides a replicable example for other European towns and cities hoping to follow in the NetZeroCities' footsteps.

Energy innovators

In fact, replication of Glasgow, Rotterdam and Umeå's projects and policies related to smart energy management and climate innovation has already begun: cutting-edge solutions are being reproduced through the EU RUGGEDISED project the cities are participating in. The project implements ICT, e-mobility and energy solutions in the three cities and engages Parma (Italy) (also selected to take part in the Cities Mission), Brno (Czech Republic) and Gdańsk (Poland) to learn from them. The knowledge and experience shared through the project is also available for others to consult at this year's **European Sustainable Energy Week (EUSEW) during the networking fair from 26–30 September**.

Whether in Umeå, where a smart system combining different building energy outputs – including lighting, air flow and climate – is shaving off 25% of energy during peak demand periods across the University Campus or in Glasgow, where simple smart meters save residents money on energy and increase their quality of life: concrete steps toward energy efficiency, sustainable energy management and reducing emissions are a key part of these cities' success in joining NetZeroCities.

Integrating solutions

Meanwhile, in the City of Rotterdam a legacy of innovative leadership continues as the City builds on the implementation of ambitious energy initiatives to advance climate-neutrality. One such initiative – the Smart Energy Community and Thermal Grid in the Hart van Zuid neighbourhood – is producing tangible energy and emissions savings, while catering to local businesses' and residents' energy needs.

The project mixes advanced solutions with available sensor technology to ensure a smart, sustainable deployment of local energy collection

and distribution, and to demonstrate – locally, nationally and on a European level – that the large-scale integration of clean energy solutions with stakeholders across sectors is possible, profitable and effective. Technical solutions are being combined in a first-of-its-kind Smart Thermal Grid. The grid uses energy generated with the help of residents, businesses and local buildings to fulfil the neighbourhood's energy demands; energy is extracted from wastewater, pavements and more.

The Smart Grid centres on thermal based solutions, which are connected to the grid via pipes that transport energy from wells underground. Depending on the season, the Smart Grid is capable of providing heating and cooling and is able to instantly redistribute energy or store it for later use below ground. The grid is unique as it connects several energy sources, while integrated monitoring ensures top performance. At the time of implementation, this integration of energy generation, storage and reduction was new to the Netherlands.

Meeting climate targets through smart energy management

The Heart of South (Hart van Zuid) is already experiencing positive impacts as a result of the Smart Thermal Grid. The project is expected to continue lowering CO_2 emissions, in addition to creating substantial energy savings, generating renewable energy and strengthening the local economy. The grid's ability to integrate a multitude of solutions to ensure energy stability, security and efficiency for the local community is helping the City of Rotterdam, and Europe, meet its ambitious energy and climate targets.

The geothermal heat-cold storage and heat pumps reduce energy consumption by 924,000 kWh per year, which results in a CO_2 emission reduction of 70 tonnes per year. The capacity of the geothermal aquifer storage (ATES) is 155m³ of water pumped per hour; alongside this, the district heating network supplies just over one million kWh per year, resulting in a CO_2 reduction of 146 tonnes per year.

At the same time, energy derived from local wastewater is able to reduce consumption by 136.000 kWh per year, resulting in a CO_2 reduction of 28 tonnes per year. A heat-cold collector installed in a section of the neighborhood's pavement is decreasing local energy consumption by 109,000 kWh per year. This amounts to a CO_2 reduction of 52 tonnes per year.

Finally, the grid's sophisticated overarching energy management system is estimated to save 139,000 kWh/year or a 56 tonne reduction of CO_2 emissions per year.

The City also collaborates with local stakeholders so that they can benefit from, and contribute to, the Smart Thermal Grid. Heart of South is home to many large buildings, including the Ahoy Convention Centre, which can host 16,500 people. To boost these buildings' clean energy production, more than 18,000m² of solar panels are being installed on rooftops in the area – many are already installed on the Ahoy Centre and Congress Centre roofs. These smart solutions attach the Congress and Ahoy centres to the grid and are expected to be upscaled at a local cinema, hotel, shopping mall, apartment complex and hospital.

The benefits for local businesses are evident: energy bills are steadily declining with the implementation of the grid and many jobs will continue to be created for energy infrastructure companies to carry out the initiative. As a result of its connection to the grid, the Ahoy Complex is now independent from fossil fuel based energy sources; a large share of its energy and electricity is produced locally, on site or extracted from underground.

Climate-neutral starts with smart cities

Rotterdam's ambitious energy action, demonstrated through initiatives like the 'Heart of South Smart Thermal Grid' helped prepare it for the NetZeroCities call: to take part in an challenging endeavour to achieve climate neutrality by 2030 and lead the way for other European towns and cities.

A closer look at Rotterdam's energy project is but one small example of the useful blueprints that cities – like Rotterdam, Glasgow and Umeå – have to offer. Their experiences can help others avoid pitfalls and further exploit successes.

The path to climate neutrality and a smart, resilient city is demanding. However, many of the cities selected as part of the 100 Climate Neutral and Smart Cities began their journeys long ago with a focus on smart energy solutions. It's now up to others to take advantage of this knowledge and to position themselves as environmental and climate leaders, alongside their peers.

18 TO 20 OCT 2022 | Bruges Belgium

17TH Antwerp-Bruges 2022 GREENPORT Congress & Cruise

Host Port: Port of Antwerp Bruges

Book your place now

Join the world's leading conference on balancing environmental challenges with economic demands in Bruges, Belgium.
Keynote addresses by: Isabelle Ryckbost, Secretary General, ESPO
Capt Sameer Bhatnagar, Sr Decarbonisation Integration Manager A.P. Moller - Maersk

Learn from sessions on:

- Fuel & energy provision for shipping & cruising
- Green Corridors - A pathway to net zero
- What's next for the cruise industry – taking a look at the latest in sustainable cruise ships
- Powering ports - On-shore power supply panel discussion
- Working Group – Achieving and demonstrating Sustainable Development in the port sector
- Ports/Terminals: Transitioning to Clean Fuels – The key Steps

Sign up and benefit from:

Choice of conferences streams for Greenport Cruise on day 1
- Two day conference attendence at Greenport Congress
- Full documentation in electronic format
- Lunch and refreshments throughout
- Welcome Reception; Lunch; Refreshments throughout; Conference Dinner & Port Tour

Sponsored by: SIEMENS

Supported by: ESPO, ECOPORTS, IWSA International Windship Association, FEPORT, IAPH International Association of Ports and Harbors, BPO BALTIC PORTS ORGANIZATION

Meet and network with over 200 attendees representing port authorities, terminal operators and shipping lines.

For more information on attending, sponsoring or speaking contact the events team

visit: **portstrategy.com/GPBOOK**
contact: **+44 1329 825335**
or email: **congress@greenport.com**

#GPCongress

mercatormedia magazines|events|online

Media Partners:

PORTSTRATEGY INSIGHT FOR PORT EXECUTIVES

GREENPORT INSIGHT FOR PORT EXECUTIVES

Gastech | Hydrogen

EXHIBITION & CONFERENCE
SINGAPORE EXPO | SINGAPORE | 11–14 SEPTEMBER 2023

Gastech Singapore 2023

Shaping the Future of Energy

40,000+	750+	300+	4,000+
Attendees	Exhibitors	Ministers, CEOs and strategic speakers	Delegates

Be part of the largest global natural gas, LNG, hydrogen, low-carbon solutions and climate technologies exhibition and conference to take place in Asia in 2023.

Book your stand gastechevent.com/exhibit
Call +44 (0) 203 615 5916 or visit the dmg sales stand

Made Possible With
SG Singapore Passion Made Possible

Supported by
Enterprise Singapore
Singapore Exhibition & Convention Bureau

Organised by
dmg::events

@gastechevent #Gastech

8th WORLD CONFERENCE
ON PHOTOVOLTAIC ENERGY CONVERSION

SAVE THE DATE

26 – 30 SEPT. 2022

MILANO CONVENTION CENTRE MILAN · ITALY

The largest scientific PV event in 2022, the WCPEC-8, will take place from 26 – 30 September in Milan, Italy. It combines the three biggest conferences from Europe, the Americas and Asia:

39th EU PVSEC, IEEE PVSEC-51, PVSEC-32

In line with the international character of the event and to ensure that all content is globally accessible, WCPEC-8 offers a sophisticated online platform with interactive virtual features on top of a classic on-site event.

Access all presentations whenever and wherever you want!

The online platform offers access to all sessions for 3 months after the event, including plenaries, posters and all additional presentations, let's you get in touch with participants online and much more! If you cannot travel to Milan, secure your online ticket now and be part of the WCPEC-8! We are looking forward to connecting with you in September!

Find more information at

www.WCPEC-8.com

39th EU PVSEC | PVSEC-32 | IEEE PVSC-50

European Photovoltaic Solar Energy Conference and Exhibition | International PV Science and Engineering Conference | Photovoltaic Specialists Conference

WCPEC-8 is hosted by EU PVSEC