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Includes editorial contributions from:

Inmaculada Rodríguez-Piñero
MEP

Henna Virkkunen
MEP

Sean Kelly
MEP

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Contents

50 Years of Science without borders

This month, the European Cooperation in Science and Technology (COST) celebrates its 50-year anniversary. The creation of COST at the Ministerial Conference of 22 and 23 November 1971 was a solution to key challenges that researchers in Europe were facing at the time. This date is generally presented as the official entry into force of COST and the moment at which the first intergovernmental agreements on research projects were signed.

COST was the first European funding programme at the pilot stage of experimental scientific and technological cooperation. COST has in practice demonstrated that cooperation between countries was possible on a far larger scale even if they did not all belong to the European Community.

50 years later, COST is the longest-running European framework for research and innovation. COST has become the leading networking instrument in the European Research Area European (ERA) where true pan-European collaborations, namely the COST Actions, are expanding globally, based on the diversity of collaborations of researchers across its 39 COST Members.

COST contributed to the successful integration of EU Member States within the European Research Area (ERA). Until this day, COST strengthens Europe's capacity to address scientific, technological, and societal challenges by providing networking opportunities for researchers and innovators.

COST implements this mission through funding excellence-driven, bottom-up interdisciplinary, open, and inclusive networks in all areas of science and technology. More than half of the running COST Actions are of an interdisciplinary nature. Over the past 50 years, COST was the only mechanism for researchers to collaborate and very unique for its time. The Programme has had lasting impact on the careers of thousands of young researchers.

"The last 50 years have seen incredible levels of innovation and knowledge growth across all areas of science and technology. I doubt that anyone in 1971 could have predicted the world we live in today, the advances we have achieved, the technology at our fingertips. In the same spirit, I doubt that anyone involved at the time could have predicted that the launch of a small programme with only 7 networks would grow into the largest community of 291 COST Actions with the involvement of half a million of researchers, conducting interdisciplinary research. In the past 50 years, COST has become crucial to the European Research Area as the leading networking instrument." Says the President of the COST Association, Prof. Alain Beretz.

COST in Horizon 2020

Last month, COST released its Final Impact Assessment under Horizon 2020, reflecting on the past seven years' activities from 2014 to 2020. The in-depth study highlights the massive role played by COST in the European research and innovation landscape and provides an overview of the networking, scientific and societal impacts of COST activities.

COST Actions have encountered a tremendous success. On average, 60 new COST Actions have been founded every year – 669 Actions in total were active under Horizon 2020 – and about 92 000 individual researchers have benefitted from the networking tools provided by the Actions (meetings, Short-Term Scientific Missions, conferences, working groups, grants etc.).

Participation in COST has led to significant impact, both in scientific and societal level. COST Actions have led the development of new research infrastructures, the adoption of common standards, and technological applications in the form of products and services. COST is a crucial asset in bridging the innovation divide and participation gaps, by offering research leadership skills and experience for less-connected researchers in Europe, making it a crucial asset in the realisation of a real European Research Area.

Prof. Alain Beretz adds: *"The power of bringing people together, to exchange ideas, to grow networks has created a pan-European landscape of science without borders, of unleashed potential".*

To keep track of these achievements and share testimonies, COST has created a dedicated website "COST 50 years" to gather an extensive overview of COST in the last half-century.

Additional information

More information about COST
www.cost.eu

Discover our 50 stories here

Foreword

Closing the COP 26 Meeting, its President Alok Sharma was "very pleased" to announce the breakthrough Glasgow Climate Pact. Much was made of "keeping 1.5 alive", but the eleventh-hour watering down of the commitment to phasing out coal surely represents a serious setback. We might be forgiven for wondering if some have paid closer attention to the rhyming soundbite than to the issues at stake.

Hard on the heels of Glasgow, this month's OEE conference offers an opportunity to demonstrate otherwise. According to Ocean Energy Europe, we could generate 2.6GW from EU ocean waters by 2030, and as much as 100 GW by 2050, or 10% of Europe's current electricity consumption. This issue explores still more opportunities to back up words with action.

Henna Virkkunen MEP assesses the need to reduce transport emissions. Reminding us that transport was responsible for 26% of EU GHG emissions in 2019, of which nearly three-quarters came from roads, she discusses sustainable biofuels, Fit for 55 and the Green Deal. She highlights the discrepancy between growing demand and sustainability, and how legislative challenges will only increase as demand from the maritime and aviation sectors grows. In concert with this theme, Seán Kelly MEP makes a welcome return to these pages with an article discussing solid biomass as a renewable solution for rural domestic heating. Pointing out the problems – heating accounts for over 60% of final energy consumption in the residential sector, while over 30 million Europeans are struggling to pay their energy bills – Kelly stresses that while both energy efficiency and renewable energy remain very important parts of the solution, so too do fairness and inclusivity. He adds that biomass boilers work in rural locations beyond the gas grid. And, he says, "they operate more like conventional oil and gas boilers... but with vastly less, and cleaner, emissions." He concludes that, while needing to address the most efficient technologies, policymakers should also keep local and regional characteristics in mind.

Inmaculada Rodríguez-Piñero Fernández MEP completes a distinguished parliamentary triumvirate as she discusses Ports, with emphasis on sustainability and digitisation. Reviewing their international significance – 75% of Europe's external trade and 400 million passengers per year, and their economic importance – tens of thousands of jobs – she says they play a fundamental role in the implementation of the Green Deal. For that reason, the Commission will be releasing substantial funding over the next three years for projects focusing on renewable fuels and IoT-mediated digitisation. Meanwhile, we feature an ECSA article examining the effects on shipping of plans to make Europe the first climate-neutral continent by 2050. While welcoming the financing of decarbonisation of the sector and endorsing the principle that "polluter pays", the ECSA nevertheless cautions that EU legislation on greener fuels may not be applicable beyond its borders, with consequences for competitiveness and carbon calculations – and therefore for climate change mitigation.

"Hot air", an English metaphor for meaningless words, has an uncomfortable resonance in the context of the climate. The words have been spoken, the commitments made. The time for action is upon us.

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

Michael Edmund, Editor

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Prologue Media Ltd
1a Shire Lane,
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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

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A “Fit for 55” label could allow for str removal of unnecessary red tape for

By Sean Kelly, MEP (pictured)

The European Union is currently undergoing an ambitious systemic change in how we produce, consume and store energy. The currently energy crisis shows the need to deploy more renewables, but permitting and licensing procedures remain one of the biggest hurdles in mass deployment of renewable technologies. I propose a “Fit for 55” label on projects that will allow the streamlining of procedures and process, removal of unnecessary red tape and granting of higher priority status to applications.

Energy transitions are nothing new; we have advanced from the muscle power of human beings and animals to the industrial revolution’s large, reliable and seemingly inexhaustible source of coal, then to the use of crude oil after the First World War and now towards the current trend of environmentally coherent renewable sources.

The motivation for our newest energy transition is of course much different, and indeed much more complicated. Instead of an evolution of energy sources that are more efficient in terms of production output, we now have to redesign our fuel and electricity systems so that we can maintain societal and economic order whilst staying within our planetary boundaries. Combined with the short time we have to make this fundamental switch, this energy transition is certainly unique.

Climate change is now rightly at the forefront of government minds across the world, and it is not hard to see why. The year 2020 tied with 2016 as the hottest year since recording started, and with storms, floods and wildfires intensifying across the world the time to act on climate change is narrowing.

It is clear that addressing sustainability challenges and climate change will be pivotal to the future growth of our economies, as the cost of inaction now will be far exceeded by the costs involved with adaptation, never mind the social and political instability this would create.

The EU needs a secure, reliable and durable energy supply as part of the transition to a low-carbon economy, yet it is also clear that we must keep the lights on as we switch to a clean energy system, otherwise we may not have a transition at all.

eamlining of procedures and positive energy projects

We cannot achieve our Green Deal targets without a massive expansion of renewable energy. In this regard, the Commission has proposed the "Fit for 55" Package, the largest single batch of legislation to tackle climate change proposed by any government, anywhere. It is designed to update EU laws to meet the new 2030 emissions reduction target of 55% below 1990 levels (hence that catchy name).

Currently, Europe is suffering from a gas price spike and a drop in the volumes of gas we receive. This becomes another key reminder that we need to deploy more renewables to shield ourselves from price shocks in international commodity markets.

By their very nature, wind and solar are intermittent. Therefore, we must plan to replace our fossil-fuel based back-up system with battery storage and demand response, as well as green hydrogen, but we also cannot hide from the fact that there still is a role to play for transitional fuels until then.

Retrofitting gas generation plants to run on hydrogen and ensuring that any new plants are designed in a way to make conversion easy will be key in this transition.

To achieve this, we must take an innovation centric approach, promoting and developing, and most importantly investing in, the technologies that bring us closer to a decarbonised economy.

However, the good news is that many of the technologies we need already exist. The not so good news is that many barriers to slow down their commercial deployment also exist. The reality is that if we are to achieve our ambitious targets we must fast track the removal of planning or market-based obstacles to ensure rapid delivery of renewable energy technologies.

Permitting and licensing procedures remain one of the biggest hurdles in achieving mass deployment of renewable technologies. Procedures for granting permits differ in Member States, and with more cross border cooperation on complex energy projects, we are likely to see more and more unnecessary time wasted in getting the required bureaucracy in order.

Let's take the example of my own country, Ireland, which is rightly viewed as a world leader in integration of renewable energy. The country has enormous offshore wind electricity generating capabilities, but unfortunately, this potential remains mostly on paper as we have been slow to develop projects.

There are a few reasons for this, but one factor that cannot be ignored are planning laws. This was highlighted most acutely recently as one of the world's leading energy companies, Equinor, decided not to continue with offshore wind development citing local regulatory uncertainty.

There is a serious need for Ireland to change its regulatory and planning system. Although action is being taken, we are not moving quickly enough to develop the offshore wind projects needed to meet targets in the governments Climate Action Plan. This leads to a lack of confidence in the industry and in the international supply chain, which must urgently be addressed.

Beyond the regulatory framework, more resources need to be allocated to planning authorities so that they can speed up planning applications for positive energy projects. This situation is not a unique to Ireland, and to put it bluntly, if we collectively do not address permitting and planning differently, then we are doomed to fail the next generation.

In this regard, I propose a "Fit for 55" label on projects that will allow the streamlining of procedures and processes, removal of unnecessary red tape and the granting of a higher priority status to positive energy projects. This label should effectively guarantee that necessary positive energy projects receive far quicker licensing and planning authorisation.

There is no value to citizens in having clean technologies available if we cannot get them deployed. We must make sure our planning and regulatory systems are fit to address the climate challenge.

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.

SCORES

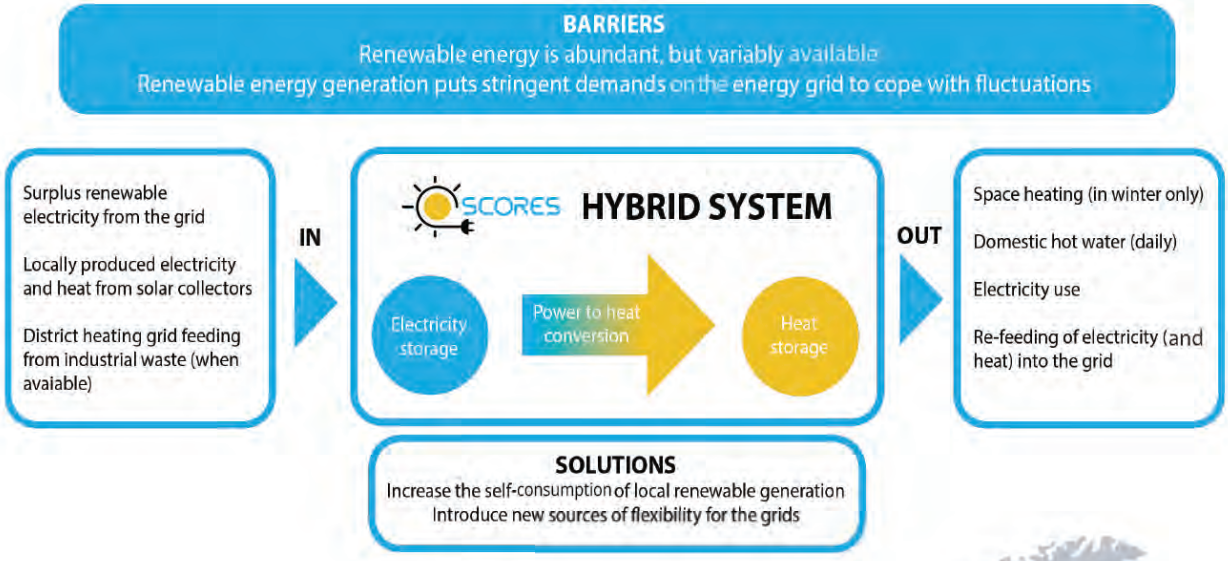
"Self-Consumption Of Renewable Energy by hybrid Storage systems"

By Ing. Zuzana Taťáková M.Sc., Fenix TNT and Dr. Erwin Giling, TNO

About SCORES

SCORES is a collaborative research project supported by the European Commission under the Horizon 2020 Programme for Research and Innovation (Call H2020-EEB-2017), with an initial duration of 48 months. The project was extended by months due to the global pandemic. The project consortium is made up of 12 partners from 7 European countries. Different technologies are developed by partners based on their specific field of business and expertise.

The overall concept of the project is based on a hybrid system effectively and efficiently combining solutions that harvest electricity and heat from the sun, store electricity, convert electricity into heat, store heat, and manage energy flows in the building.



Demonstration sites

Demonstration of the integrated hybrid energy system takes place in two real buildings representative of different climate and energy system configurations for three cases, in Central Europe (Austria) with and without a heat grid, and in Middle/Southern Europe (France) without a heat grid.

The project will finish in April 2022, follow its website and social media profiles to learn about the outcomes and results of the demonstrations.

Selected SCORES technologies

Air-to-air heat pumps with PCM storage system for space heating, CAMPA
Efficient air-source heat pump able to store heat on demand in an optimized storage core to react quickly to the behavior of renewable energy production sources. It is a mono-block heat pump, integrating all components into one piece of equipment. The system is able to generate full renewable heat inside homes, manage thermal comfort and communicate with other appliances.

PT/PVT water-to-water heat pumps, Heliopac
Optimized system for the management of hot water production based on coupling a water to water heat pump and PV/T collectors taking into account different internal variables. Photovoltaic and Thermal (PVT) collector is a solar energy technology using PV as the absorber. A PVT solar collector combines solar thermal and photovoltaic technology in a single unit, thereby, producing higher overall efficiency at less roof-space. PVT collectors provided by partner Heliopac make efficient use of the limited space on roofs and facades.

CLS – Chemical looping heat storage, TNO
Solid-state Chemical Looping Combustion as highly compact and cost-effective thermal energy storage technology for excess renewable electricity. A team of engineers and scientists from TNO are developing a Power to heat concept named REDOX HEAT based on redox reactions of metals. REDOX heat battery uses the REDuction and OXidation reactions to store heat- the metal core is oxidized using air and the heat generated is used for supplying domestic hot water and space heating. After the reaction, the core is regenerated by supplying hydrogen produced by renewable electricity. This cyclic operation enables the use of this energy storage system in a similar way as we currently use standard rechargeable batteries at home, with the difference of storing heat rather than electricity.

BEMS – Building energy management system, SIEMENS
The Building Energy Management System (BEMS), developed by world-leading multinational partner Siemens, controls and monitors the various subsystems according to technical and economic parameters, optimizing the balance between supply and demand of electricity and heat, more specifically the optimization of self-consumption and peak-shaving of the electricity grid and heat grid.

Project ID: 766464

Funding programme: H2020

Area: Technologies enabling energy-efficient systems and energy-efficient buildings with a low environmental impact

Website: www.scores-project.eu

Start date: 1 November 2017

Duration: 48 (54 months)

Project coordinator: Dr. Erwin Giling, TNO

Contact email: info@scores-project.eu

Project partners:
NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO, Netherlands
AEE – INSTITUT FUR NACHHALTIGE TECHNOLOGIEN, Austria
ELECTRICITE DE FRANCE, France
RINA CONSULTING SPA, Italy
FENIX TNT SRO, Czech republic
KONIG METALL GMBH & CO KG, Germany INSTITUTO POLITECNICO DE SETUBAL, Portugal FORSEE POWER, France
HELIOPAC, France
CAMPA, France
SIEMENS NEDERLAND NV, Netherlands STADTWERKE GLEISDORF GMBH, Austria

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 766464..

Local governments are key to powering a community-based energ

By Arthur Hinsch and Lucy Russell, ICLEI

Climate neutrality by 2050 and – with the Fit for 55 Package – an increased target to produce 40% of energy from renewable sources by 2030: these are the EU's ambitious targets in the face of the global climate emergency. Achieving them will require a sharp increase in the deployment of renewables, which means that such technologies will need to, inevitably, become ever more present, visible and available in the daily lives of Europe's citizens. Not everyone is equally happy about this. While there is a general consensus in the EU that we need more renewable energy to tackle climate change, opposition to new infrastructure – in particular photovoltaic and wind turbine sites – is significant. Despite political commitments for more renewables, local protests lead to significant delays in siting procedures, sometimes for years on end. Too often, local communities perceive new renewable energy projects as a threat and disruption rather than an opportunity.

It does not have to be this way. All over Europe, renewable energy community projects are materializing, which involve local communities, for example by enabling citizens to invest directly, or by channeling revenue into local foundations for social projects. At the centre of all of this: municipalities with an inherent interest, not only in meeting their own renewable energy targets, but also, in promoting social inclusion. Not least fueled by the recast Renewable Energy Directive (RED II- 2018/2001/EU), renewable energy communities have been creating a sense of ownership of local renewable energy sources, ensuring that local communities benefit, all the while resulting in more citizen engagement, lower energy bills and the alleviation of energy poverty. Whether on city rooftops, fields around rural communities, or on remote islands, citizens are increasingly organizing themselves into energy communities; producing, consuming and selling their own energy. In fact, by 2050, a full half of European citizens could be producing their own electricity,

Renovated housing block with PV in Tartu / Marek Muiste

gy transition

meeting 45% of the energy demand in the EU – if citizens receive adequate support in taking this up.

In many cases, local governments are taking on key roles: by guiding citizens and SMEs in setting up energy communities, becoming shareholders, acting as energy community springboards, and more. With their political mandates and proximity to citizens, they are in the best position to make energy communities a prevalent and powerful reality. In particular, the involvement of local governments – coupled with community ownership models – often lead to higher levels of trust and identification with the projects.

Wind turbines / Bürgerwindpark Neuenkirchen (WinWind)

In the Municipality of Neuenkirchen (Germany), some citizens initially voiced their concerns about the plans for the community wind farm. However, social acceptance soon improved with opportunities for citizens to participate directly by buying shares and becoming partners in the project, as well as benefit via local tax revenue, new job openings, and the establishment of a civic non-profit association, which receives 1% of the wind farm's annual gross remuneration (funding community buses, a church renovation and more).

The municipality also obtained shares of approximately 20,000 Euros in the wind farm (the legal maximum allowed), showing its commitment to and trust in the project. Without the engagement of the local government, this project would likely never have become the best-practice example it is today.

Some European cities are also turning to energy community approaches to alleviate energy poverty. Tartu (Estonia), has made energy poverty alleviation a cornerstone of its Sustainable Energy & Climate Action Plan and is turning existing housing associations into renewable energy communities, with strong support from the Tartu Regional Energy Agency, by combining the installation of photovoltaic rooftop panels with deep housing-block renovations. As a result, home-owners are gaining access to renewable energy subsidies, improving their homes' energy efficiency and saving on energy costs. The communities are able to generate an additional income stream by selling their energy to the national grid. With paintings on the housing walls by local as well as international artists, the establishment of these energy transition projects is leading to an increased sense of identification with these local renewable energy sources, greater local awareness and more citizen engagement. The next steps within the EU-funded DECIDE project supporting this transition are to measure the energy consumption in these housing blocks, and evaluate and model the size of further photovoltaic installation.

While municipalities are increasingly active in encouraging citizens to participate in the energy transition, the EU-funded COME RES project, which aims to advance renewable energy communities as per the EU's recast Renewable Energy Directive (RED II), has highlighted that most current member state-level regulatory frameworks and relevant support schemes are not conducive enough to community energy projects.

It is important to note here that the transposition deadline for RED II – which specifically calls upon member states to build the capacity of public authorities so that they can better support the uptake of RECs – has already passed (end June 2021). Therefore, although there are clearly ways that cities and local governments can currently support energy communities, for the EU to be able to deploy renewable technologies at the scale required to achieve its ambitious targets, national legislators must act. It is essential that they swiftly and thoroughly transpose and implement RED II, create concrete targets for renewable energy communities and set up the relevant enabling frameworks and support schemes.

SINCRO.GRID – Innovative solutions for greater grid flexibility

The shared desire for a carbon-free future is also changing the energy landscape. Renewable energy sources are increasingly replacing fossil-fuel generated power. However, electricity production from renewable energy sources is not as stable.

The electricity transmission system operators, ELES in Slovenia and HOPS in Croatia, have been facing the challenges of overvoltage and lack of flexibility resources for voltage regulation in some parts of the network. In addition, they identified new challenges due to the growing share of energy produced from dispersed, renewable energy sources and the increasing need for flexibility.

Therefore, in 2014, they decided to find solutions together. They teamed up with the electricity distribution system operators in Slovenia (SODO) and Croatia (HEP ODS) and initiated the first European project to introduce digitalisation in energy infrastructure.

"SINCRO.GRID is the first international smart grid investment project of European significance."

Slovenia and Croatia decided to present the project to the European Commission (EC) as a proposal for a Project of Common Interest (PCI) in the field of smart grids. As a result, in 2015, the EC included the project on the PCI list. The contract on co-financing of the project by the EC was signed in 2017.

Innovative integration of mature technologies

The partners integrated already-established technologies – compensation devices, battery energy storage systems and the dynamic thermal rating system – into the Slovenian and Croatian electricity network in an innovative way. In addition, a virtual cross-border control centre was set up to control and regulate the voltage in both systems. Such integration has increased synergies and the economic efficiency of the investment.

ELES and HOPS installed six compensation devices – three variable shunt reactors, two static VAR compensators, and a mechanically-switched capacitor with a damping network. With the installation of those devices, they achieved the goals of voltage profile control and the possibility of voltage regulation in the electricity systems of both Slovenia and Croatia. Furthermore, this innovation by ELES and HOPS also introduces the completely-new possibility of joint regulation of both systems. As a result, compensation devices will contribute to better network stability in emergencies. Moreover, the effects

of their operation will also positively impact the networks of neighbouring countries.

Two battery energy storage systems with a total capacity of 10 MW (50 MWh) that were installed in Slovenia will increase the flexibility of active power and thus the reliability of the system operation. They will also facilitate the transition to future electricity systems where the production of electricity from dispersed renewables and the active participation of prosumers in the energy market will prevail.

In the scope of the project, the dynamic line rating (DLR) algorithms and models for the DLR system, that calculates the dynamic thermal limits of transmission lines for operation in real-time and short-term forecast, were improved.

ELES and HOPS utilise the results to improve the safety of operation and the transmission capacity of the network. This way, the existing infrastructure is used in the most efficient way. Furthermore, with the increase of cross-border transmission capacities, it is also possible to transfer larger quantities of energy from renewable sources in the south of Croatia to the markets in the region.

A common application was installed in both national control centres, forming a unique, virtual cross-border control centre. This is the first case in Europe where neighbouring transmission system operators have joined forces in regulating and optimising the voltage in their networks.

Additionally, advanced solutions were implemented at ELES' control centre, such as an IT platform for the integration of prosumers in ancillary services, a communication platform for operational data exchange between transmission and distribution system operators, an upgrade of the metering system to support modern data exchange based on the latest standards, an upgrade of the solar production forecasting tool and modernisation of the ICT infrastructure.

The SINCRO.GRID project demonstrated how distribution and transmission system operators can enable their existing infrastructure to accept larger quantities of electricity from renewable sources while ensuring a reliable electricity supply.

Joint integration of devices has increased the economic efficiency of the investment and has also had a positive impact on the networks of neighbouring countries.

Contact details:

SINCRO.GRID

Co-financed by the Connecting Europe Facility of the European Union

Web: www.sincrogrid.eu

LinkedIn: @SINCRO.GRID Project

Securing Europe's leadership in innovative renewables

By Ocean Energy Europe

That Europe is a frontrunner in so many innovative technologies is no accident – it is the product of decades of EU and national investment programmes. Historically, renewable energies have been one of these world-beating sectors, thanks in no small part to high-level policies such as the EU's Renewable Energy Directive (RED).

Wind and solar power have justifiably been the focus of most investment over the past few decades; today they are a central part of Europe's electricity supply. But, in the long term, more of the same isn't the only answer. Unless it is based on a more diverse set of renewables, the 2050 vision of a zero-carbon energy system will turn out to be little more than a mirage.

As the backbone of European economic and social life, our energy system must be extremely reliable and resilient to shocks. Decarbonising this system is a top political priority - as is keeping Europe's lights on. Fortunately, Europe is blessed with a wealth of renewable energy sources, and together these can provide decarbonised and balanced energy at any point in the day, season or year.

A combination of geothermal, wave power, concentrated solar power, sustainable bioenergy, hydropower and tidal energy can smooth out the variability of wind and solar and provide new, sustainable jobs for hundreds of thousands of Europeans. And, importantly, they can do this without perpetuating a dependence on polluting fossil fuels and expensive energy imports.

Renewables are already the cheapest option for building new generation capacity, diversifying our renewable energy portfolio will ensure low prices for EU consumers - a well-managed set of renewables can produce power at the right times, reducing the need for storage.

Impressive R&I investments...to be continued

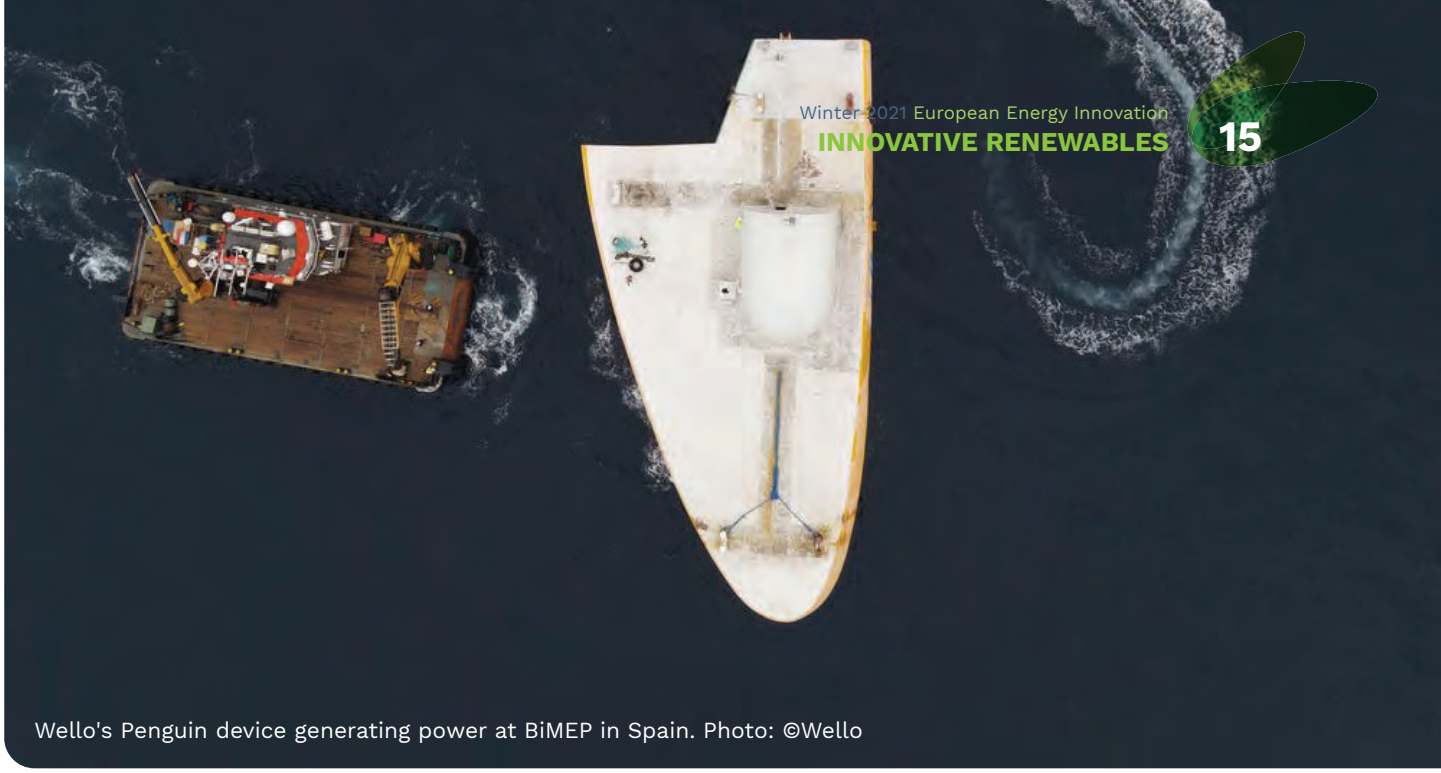
The European Commission has been proactive in creating mechanisms that push the development of innovative energy sources, including deep geothermal, concentrated solar, tidal and wave energy. This approach has secured Europe's position as a global economic champion in the field of renewable energy.

Between 2007 and 2019, total R&D expenditure on wave and tidal energy in the EU amounted to €3.84 billion, with €1.1 billion coming from public funding programmes. On average, during the same period, every €1 of public funding (EU and national) has leveraged €2.9 of private investment. This commitment to funding ocean energy R&D has undoubtedly played an instrumental role in bringing these technologies to the brink of industrialisation and stimulating new economic activity.

The upcoming 2022-23 Horizon Europe Work Programme must continue this good work and prioritise diverse renewable energy technologies with the greatest potential for innovation and scale-up.

Despite the huge progress made towards commercialisation, these technologies are hitting a wall when it comes to scaling-up. This 'Valley of Death' has been created

Mocean Energy's Blue X in operation at at EMEC. Photo: ©Colin Keldie



Wello's Penguin device generating power at BiMEP in Spain. Photo: ©Wello

by an absence of market visibility in Member States. The 27 National Energy & Climate Plans (NECPs) are completely focused on meeting 2030 targets - thus neglecting the technologies that are needed post-2030.

It is clear that R&I investment in second-generation renewables cannot stand alone – it must be coupled with market deployment to achieve a real return on investment.

RED III presents an unmissable opportunity

The latest revision of the Directive (RED III) presents Europe with an unmissable opportunity to address this shortfall and propel these up-and-coming renewables into the mainstream power supply. Two amendments can enable these technologies to cross the innovation Valley of Death.

Firstly, the EU can provide the impetus for Member States to drive market growth by creating a specific sub-target for innovative renewables in the Renewable Energy Directive. Each country would outline their plans for deploying innovative renewables via their NECPs. If the EU-wide target is not being met, the Commission would ask Member States to revise their NECPs and up their game accordingly.

Secondly, in its proposal, the European Commission requires Member States to draft joint deployment plans for offshore renewables, per sea basin. These plans offer a good opportunity to deliver the market visibility needed for the ocean energy sector. To achieve this goal, they should collectively match the EU offshore Renewable Energy Strategy's deployment targets for 2030 and 2050.

Innovative renewables such as ocean energy deserve the same opportunities that were afforded to now-mature renewables and fossil fuel generation. The revision of the Renewable Energy Directive is a great opportunity to boost these new technologies and complement the impressive efforts that have already been made to bring them to market.

"Europe's early focus on wind and PV has delivered beyond anyone's wildest expectations. The recent energy price shocks are a clear signal to double down and replicate these successes with all of Europe's abundant renewable energy sources."

Rémi Gruet, CEO, Ocean Energy Europe

The emergence of Europe's ocean energy sector

By The European Marine Energy Centre (EMEC)

Ocean energy offers a new emerging industry for Europe with the advantage of world-leading indigenous technology and expertise. It is estimated that 10% of Europe's electricity demand could be generated by wave and tidal technologies offering domestic security of supply, as well as a global export market with an estimated value of £76 billion by 2050.

The industry has made significant progress in recent years – approaching 20 MW of connected devices and 43.8/GWh exported to the grid to date.

EMEC was set up in 2003 to kick start the development of the ocean energy industry. EMEC is a plug-and-play test facility enabling wave and tidal energy technologies – machines that harness the power of the sea – to test in the ocean.

EMEC's Orkney-based test sites in Scotland put ocean energy technologies to the test with waves of over 18 meters (imagine standing next to a six-storey building) and a peak tidal flow of around 8 knots (that's approximately half a billion tonnes of water passing through the tidal site an hour).

At sea experience is a vital step to commercialising the burgeoning sector, as technology developers

Magallanes Renovables ATIR installation at EMEC, 2019
Photo: ©Colin Keldie, courtesy Ocean 2G

CorPower and EMEC microgrid at EMEC Scapa Flow test site, 2018
Photo: ©Colin Keldie, courtesy of WES

learn how to install, operate and maintain devices at sea, whilst testing how they survive in extreme conditions and generate power.

Tidal stream technologies are edging closer to commercialisation. Scottish-based Orbital Marine Power is currently demonstrating its O2 tidal energy device at EMEC. Currently the world's most powerful tidal turbine, it is the third technology the company has tested at EMEC since 2011, each larger and more powerful than the last. The O2 device was developed with 80% UK supply chain content proving the national opportunities for industry development and positive economic impact. Nearby is Spanish-founded Magallanes which is also putting its floating ATIR tidal turbine through its paces at the Fall of Warness test site.

Wave energy technologies are at an earlier stage of development than tidal energy. While tidal stream technologies take learning from turbine technology, already well developed in the wind energy sector, there is little consensus so far as to the type of technology that is needed to harness the power of the waves. Thus, lots of interesting concepts are being developed and demonstrated.

Wave Energy Scotland (WES) was created in 2014 to support technologies from concept to demonstration through a stage-gated development process. Through this programme, Edinburgh-based Mocean Energy recently wrapped up testing of its Wave X converter at EMEC's Scapa Flow test site and another Scottish-based wave energy developer, AWS Ocean Energy, is gearing up to deploy. Another graduate from the WES programme is Swedish CorPower Ocean, which following tests at EMEC in 2018 is now preparing its next demonstration in Portugal.

The unprecedented activity that has taken place in Orkney has been a catalyst for economic development, with the creation of well-paid jobs and a world-leading supply chain now exporting its skills and knowledge around the globe.

With tidal energy nearing commercialisation, there is an exciting swell of activity building around the world. In Shetland, just north from Orkney, Nova Innovation hit headlines with the creation of the world's first electric vehicle charge point powered purely by the tide with power from its Shetland Tidal Array. Across the Pentland Firth, the tidal strait that separates Orkney from the UK mainland, is MeyGen. Four 1.5 MW turbines are deployed with a plan to build out to a larger 86 MW site over time. Previous iterations of the technologies operating at MeyGen were tested at EMEC. Building on the technology at MeyGen, SIMEC Atlantic have recently deployed a similar tidal turbine in Japan.

Another EMEC alumni, Sustainable Marine Energy, is gearing up to deliver Canada's first instream tidal energy in 2022; Verdant Power in New York has demonstrated the first U.S. commercially licensed tidal stream demonstration project; and Minesto have a demonstration project in the Faroe Islands.

There is approximately 10 gigawatt (GW) of predictable, tidal stream potential in European waters alone, with up to 100 GW of capacity globally, but it is still a largely unharnessed resource with just ~13 megawatt (MW) deployed globally.

Tidal energy is probably where wind energy was about ten years ago so the next challenge is to scale up. Funding remains the greatest obstacle to realising the full environmental and economic potential of wave and tidal energy however the tide may be about to turn. In November 2021, the UK Government announced that it will invest £20 million per year across the UK in tidal stream as part of its renewable energy auction scheme, Contracts for Difference. This is the market signal that the sector has been waiting for.

While the sector hasn't reached critical mass yet, it will come in time. The more wave and tidal energy technologies are demonstrated in the sea and the more data collected, the more will be learnt about what works, and just as importantly, what doesn't. Techniques and processes will improve, and costs will come down as economies of scale start of be realised.

This will take time, but the prize of a domestic market and the jobs that come with it, along with the strengthening of our energy mix, is too valuable not to keep fighting for.

One thing is certain, ocean energy has an important role in Europe reaching its net zero ambitions in the years to come.

SATH Technology. Unique solution for floating offshore wind industry. "From R&D to Deployment"

By PhD. Carlos Ariel Garrido-Mendoza, Saitec S.A., R&D Manager

The need for clean energy sources has led to a great development of wind power during last decades. Despite significant development and deployment achievements, offshore wind energy costs remain high compared to conventional forms of energy. Even with these significant achievements the sector has made, there has been limited open-sea experience, which is essential in order to fully understand the challenges in device performance, survivability and reliability prior to market take-up. Scaling-up offshore renewables technologies will be crucial for the decarbonisation of the world's energy system, in which, offshore wind has emerged as one of the most dynamic technologies.

In this context, Saitec started to work in 2013 on the idea of a new model of floating platform for wind turbines adapted to depths between 30m and beyond, and therefore, suitable for the requirements of new wind farms far from the coastline.

SATH Technology, Swinging Around Twin Hull, is an innovative and competitive concrete floating concept for offshore wind

turbines suitable for shallow and deep waters (35m depth, onwards). Represents a disruptive change over current floating solutions due to the use of different construction materials (concrete instead steel), the Single Point Mooring configuration and the versatility of the design that makes it adaptable to very different water depths. Thanks to these characteristics, it will allow a reduction in LCoE not only over the current floating technology but also over the fixed bottom offshore wind solutions.

SATH floating platform key elements are: the use of concrete, the geometry of the floats, the arrangement of the structure and the mooring system, that presents the following significant competitive improvements compared to existing solutions in the market:

- The use of concrete instead of steel to reduce the construction, operation and maintenance costs as well as to extend its operational lifetime.
- The construction and assembly are made entirely onshore which reduces both investment costs and potential risks (e. g. labour, HSE, and weather windows), finally towing the assembly floating to site.
- Platform draught is reduced (draught <10 meters), which makes it suitable for both shallow and deep waters.
- It provides a Plug & Play solution, with easy connection process, so the platform can be easily installed or disconnected and taken ashore for major part repairs.
- It includes a single point mooring system, which allows the platform to rotate like a weathervane facing the wind. This helps the yaw control system of the wind turbine and reduces the stresses on the mooring lines.

Saitec Offshore Technologies (SOT) has the ambition to establish itself as a player in the wind energy sector, as developer and provider of an IP-protected technology, and therefore, will benefit significantly benefit from this project. SOT expects to play the role of an engineering company, selling the right to use its design based on royalties and with a fee depending on the depth.

SATH 1:35 scaled prototype versions were tested and validated in the Hydraulic Institute of Cantabria and in IFREMER (France) with the assistance of an international certification company (DNV) in order to explore the combined effects of wind, waves and currents.

In December 2018, Saitec Offshore received the notification from the European Commission confirming the award of the grant for **BlueSATH** project (849307), inside the H2020 call's SME Instrument Phase 2. BlueSATH, is a €2.7m project (with a contribution by the European Commission of €1.9m) targeting the commercialisation of +10 MW floaters. First phase of the project comprised the deployment of the first prototype using SATH floating technology in the open sea waters of Santander (Spain). The 1:6 scale floater was commissioned in Q2 2020 and tested for a few months.

The purpose of BlueSATH project

Self-stable
Easily transportable

Concrete
Durable material and local content enabler

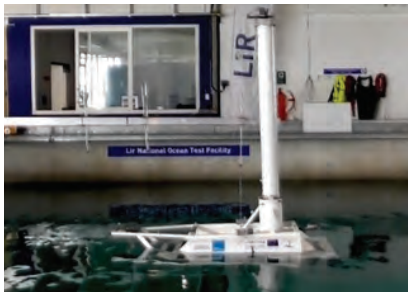
Low draft
Adaptability to shallow and deep waters

Cost competitive
Reduced construction, operation and maintenance costs

was dual. On one hand, to de-risk DemoSATH 2 MW demonstrator and on the other hand, to accelerate the industrialization and commercialisation of the +10 MW floaters.

At the end of 2019, **DemoSATH** project was notified, with a co-financing national grant to develop the demonstration project with the purpose of validate the technology in real operating conditions, by building a 2 MW prototype and being the first company internationally to have such a prototype, due to the cost involved, but which in turn brings significant competitive advantages for the company and for the area where it will be installed. DemoSATH project will be the first multi-megawatt floating offshore wind turbine connected to the Spanish grid. For the execution of this project, SAITEC has joined forces with one of the major players in offshore wind, RWE Renewables, which will finance part of the project costs and contribute with its extensive experience as the second largest player in offshore wind globally.

Other funded projects that can help to accelerate the market introduction of SATH technology are **ArcWind** (EAPA_344), **MooringSense** (851703) and **SATHScale** (958938) Projects. **ArcWind** is a European Collaboration project from the European Regional Development Fund (Interreg, Atlantic Area). This project is currently ongoing and consists on the development of SATH-



10MW FOWT adapted to the DTU Reference Wind Turbine. The project includes numerical and experimental validation of the technology. The numerical basis analysis is being validated at CENER (Centro Nacional de Energías Renovables). The experimental analysis is being conducted at LIR-BASIN (UCC-CORK, Ireland). **MooringSense** project aims at reducing FOW operational costs through the development of more efficient strategies and tools for mooring system integrity management. MooringSense will take advantage of mooring systems' updated condition information to reduce OPEX and increase energy production of FOW farms. **SATHScale** project aims to address the challenge of bringing to market SATH technology through scaling-up the prototype from the technology validated and demonstrated in a relevant environment to Technology Readiness Levels (TRLs) required for commercial products in the relevant markets, i.e., to industrial readiness and maturity for market introduction, exploiting real experiences of the ongoing open-sea 2MW demonstrator that will be deployed at BiMEP (Biscay Marine Energy Platform) in Biscay (Spain).

Others:
Predicarg project aims to develop, implement, test and validate of a reliable, durable and low-cost mooring system load prediction system through indirect measurements.

LEAF is a R&D project aiming for the optimization of the different Spanish floating platforms by developing new tools to allow the optimization of the hydrodynamic behaviour of the platforms, the transport and installation logistics, the control-oriented strategies and the mooring systems.

FLOAT&M project focuses on the development of an "integral solution of O&M for the floating wind industry". Project is based on the contribution of specific research and developments from three ways:

(1) new equipment for O&M, drones, ROVs, connectors.
(2) Digital solutions, twins and models.
(3) new materials and coating.

This will allow the definition of new disruptive O&M strategies specifically adapted to the floating market, an emerging market with a particularly high technological complexity.

Orkney: Leading the way in green hydrogen innovation

By The European Marine Energy Centre (EMEC)

The Orkney Islands, off the north coast of Scotland, are pioneers when it comes to innovation. This is where novel sustainable technologies are tried and tested, from demonstrating wave and tidal energy technologies to undertaking green hydrogen research and development to decarbonise the wider energy system,

Orkney is often described as a "living laboratory" for the clean energy sector; learning by doing and exchanging ideas and knowledge between local and international partners.

Orkney has an abundance of natural resources which has enabled rapid growth in the generation of electricity from renewable resources. Since 2013, Orkney has generated over 100% of its electricity demand from renewable power, mostly from wind energy to date.

However, the current grid infrastructure, which was designed to bring electricity to the islands, rather than export it to the UK mainland, has resulted in some wind turbines being curtailed, and is a key barrier to Orkney reaching its full renewable energy export potential. This has led to the exploration of how best to store and use renewable power in different ways, and that's how Orkney's journey into hydrogen began.

EMEC maintenance technician with hydrogen trailer. Photo: ©EMEC

The European Marine Energy Centre (EMEC) started developing its hydrogen infrastructure in 2016 with the installation of an electrolyser at the onshore facilities at its tidal test site on the northern island of Eday. The project was supported by the Scottish Government to demonstrate how hydrogen could be generated using tidal and wind energy.

In 2017, EMEC achieved a world first in using tidal energy to generate hydrogen.

Once generated, hydrogen can then be stored, transported and distributed to end uses across the islands. Orkney is now a hotbed for hydrogen R&D activity, demonstrating the use of hydrogen in decarbonising power, heat and transport applications. Research projects are exploring how to use hydrogen to power ferries and planes, and for heating in the airport building.

Maritime Innovation

There are significant opportunities in maritime innovation with hydrogen and hydrogen derivative fuels expected to play a vital role in decarbonising the sector. As an archipelago, ferries are a lifeline service for Orkney, providing

Innovation is a journey of discovery, bringing people, ideas and networks together to make things happen. You might not end where you intended to, but you will end somewhere, and most importantly, you will have moved. The lessons learnt are key to developing a sector as novel as hydrogen, creating a knowledge economy that benefits future projects.

Neil Kermode, EMEC Managing Director

connectivity between island communities and to the Scottish mainland but they also represent a significant proportion of the islands' overall carbon footprint due to reliance on fossil fuels. One of the projects looking to tackle this issue is the HIMET (Hydrogen in an Integrated Maritime Energy Transition) project, funded by the Department for Transport's flagship Clean Maritime Demonstration Competition.

Led by EMEC, HIMET will progress an ambitious programme of activities centred on the decarbonisation of two key local maritime sectors: ferry services and cruise terminal operations. Various solutions will be designed and demonstrated including hydrogen storage specifically intended for use on board a vessel, and the supply of on-board auxiliary power using a hydrogen fuel cell. A conventional ferry propulsion engine will also be tested running on pure hydrogen. A hydrogen engine will be deployed to power crew welfare facilities at the cruise terminal to develop resilient shore-side power, and microgrid solutions will be explored to consider future power requirements for ferry terminals.

International collaboration

Through interconnected pilot projects on Orkney, EMEC has built collective hydrogen knowledge across the entire value chain, from production through to storage, transport, supply and end use. The knowledge garnered is helping to drive hydrogen innovation at an international level as well, creating partnerships to support scale up and replication of similar hydrogen ecosystems elsewhere and identify export opportunities.

At European level, EMEC is supporting several projects aimed at replicating aspects of the Orkney hydrogen story. The HEAVENN project is building a hydrogen valley in the northern Netherlands, and Green Hysland is developing a hydrogen ecosystem in Mallorca.

For the hydrogen economy to scale up, developing robust supply chains is vital. A Franco-Scottish report produced for The Scottish Government explored the technical innovation status of both floating wind and hydrogen supply chains in Scotland and in France. As a result of constructive engagement with French organisations in the Brittany and Occitanie regions, the report recommends establishing a research and development platform involving organisations in Scotland, Brittany and Occitanie to support collaborative innovation activity to help resolve the shared technical challenges identified.

Local impact

Hydrogen R&D projects in Orkney have instigated significant private sector interest with a major consortium looking at how to repurpose the local Flotta oil terminal to create a green hydrogen hub.

Powered by offshore wind, the plans would contribute significantly to the UK's low carbon ambitions, create long-term skilled jobs and place Scotland front and centre of the evolving global hydrogen revolution.

The key factor at the core of Orkney's hydrogen economy is the local community. Local organisations within and outside the energy sphere, public bodies at local, regional and national levels and civil society in Orkney are engaged and open to trial and error in order to achieve positive change.

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Wind Power capacity installations continue growing rapidly. It is clearly seen since in 2016, wind overtook coal as the second power generation capacity in Europe. Additionally, EU plans for energy decarbonisation set a path especially relevant and interesting for offshore wind. In this line, Floating Offshore Wind (FOW) presents a large potential which is unexploited up to now, due to a large amount of wind resource existing in deep waters (<60m).

One of the main drawbacks which is hindering floating offshore wind advent is the cost. Such technology is much more expensive than any existing other (currently, its average LCOE is above 100€/MWh); thus, a reduction of the cost is a need to ensure floating wind technology establishment.

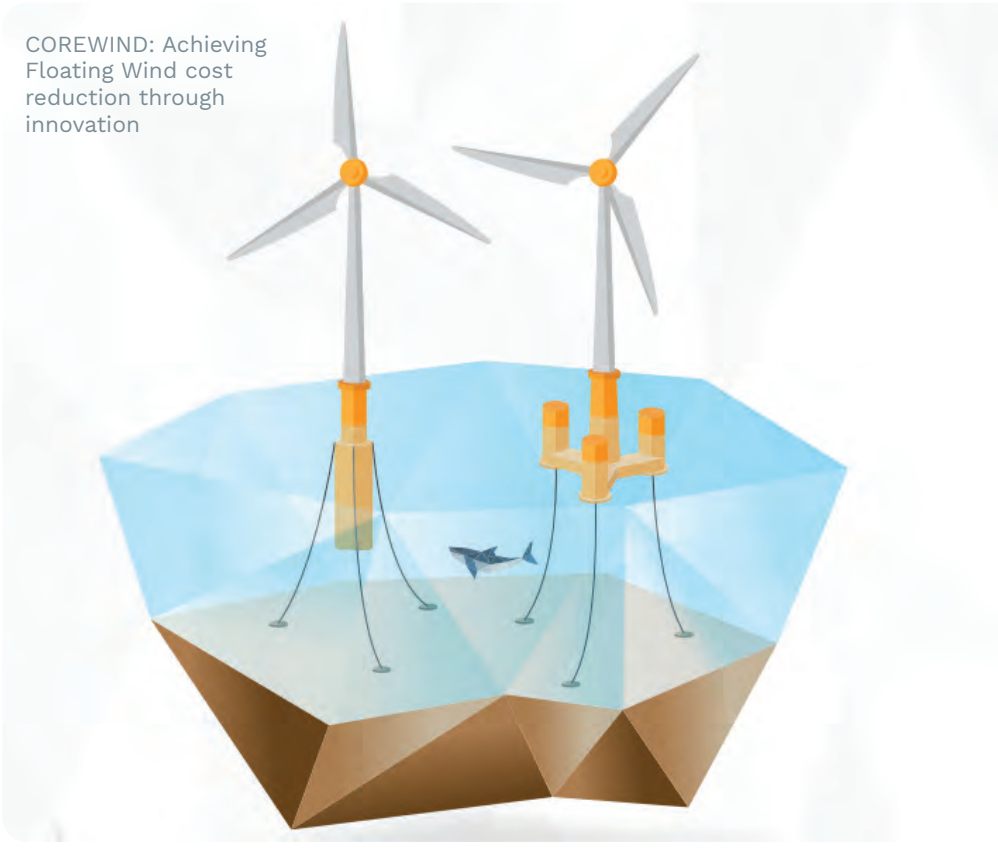
In this regard, COREWIND looks beyond the state of the art of the floating technology with the aim of accelerating the path towards its commercial deployment by developing and validating innovative and cost-effective solutions that allows to solve the most critical barrier of floating offshore wind technology, the cost. The project will achieve at least a 15% LCOE reduction by the end of the project (i.e. 100€/MWh approximately) through disruptive technologies and procedures for floating wind sector; paving the way for achieving future cost objectives earlier (i.e. ≈ 80 €/MWh by 2040, 10 years ahead expectations).

COREWIND project main objective is to achieve significant cost reductions and enhance performance of floating wind technology by concentrating the research and optimization efforts on two essential components, the mooring and anchoring systems and power dynamic cables. The development of key cost-effective and reliable innovative solutions are applied to two different concrete-based floating substructures designs (semi-submersible and spar) supporting very large wind turbines (15 MW). Special focus is given to develop and validate integrated solutions that significantly improve installation techniques and operation and maintenance (O&M) activities. Such innovations aim to not only reduce costs from new concepts but also through technology standardization and market uptake (i.e. the same components may be used under different floater concepts) and digitalization for both better design process and enhanced operation and maintenance. The project is coordinated by the Institut de Recerca en Energia de Catalunya (IREC), in collaboration with key academia as DTU Wind, UPC, POLIMI, University of Stuttgart, IHC and key industrial partners as Innosea, JDR, Ramboll, UL, COBRA, EQUINOR and WindEurope.

COREWIND is a still ongoing project which is already providing value to the floating community by leading innovative solutions and making them available as some 15MW floater models (which can be found at the ZENODO page of the project).

The project is working on innovative solutions including the dynamic analysis of shared mooring and anchors, innovative solutions for O&M including vessel analysis and modelling, advanced and coordinated wind farm control and Machine Learning for floating wind turbine monitoring. In addition, lab experimental tests for validation are being performed and an innovative LCOE and LCA evaluation tool (FOWAPP) has been developed. ●

The COREWIND project has received funding from the European Union's H2020 Programme under Grant Agreement nº 815083



COREWIND: Achieving Floating Wind cost reduction through innovation

Sustainable and digitised European ports

By Inmaculada Rodríguez-Piñero, Member of European Parlament in INTA and TRAN Committees and member of the council of the port of Valencia

The European Union has more than 1,400 inland and seaports, 329 of which are part of the trans-European transport network. These infrastructures allow the safe passage of 75% of the EU's external trade and 400 million passengers per year.

Climate change and decarbonisation are the big challenges that European ports are facing now.

A competitive and sustainable port means becoming a landing point on land for renewable energy generated offshore and its logistics, playing a key role in the entire life cycle of maritime assets. Access to this energy, led by green hydrogen, will contribute to the greening of port operations and the maritime sector as a whole.

Ports not only play a fundamental role in international connections, but also are economic and industrial centres that generate tens of thousands of jobs. For this reason, the European Union considers that they have a fundamental role to play in the implementation of the European Green Deal, in particular in the reduction of greenhouse gas emissions and in the fight against the proliferation of plastic waste in our seas and oceans.

In 2019, Directive (EU) 2019/883 on port facilities entered into force, which aims to reduce ship waste discharges at sea and ensure efficient maritime operations in ports to reduce pollution.

From 1 January 2020, the EU limit for sulphur emitted by ships from the combustion of fuel oil was reduced from 3.5 % to 0.5 %. This is a real relief for the cities that host commercial ports and whose air is now cleaner.

However, despite these important measures, we have not yet done enough.

The Sustainable and Intelligent Mobility Strategy, launched last February by the European Commission, proposes a whole raft of measures to combat global warming in the maritime sector, which is responsible for 2.9% of global greenhouse gas emissions.

The European Commission proposes to enact measures for the development of alternative fuels for shipping, the connection of ships to the electricity grid while operating in ports or the digitalisation of processes thanks to the global exchange of data. It also encourages the automation of container management and the connection of port bases to the rail network.

Over the next three years, the European Union will release a huge amount of funds for innovative projects such as Fuel EU Maritime, to boost the demand for renewable fuels; Port of the Future, for innovation in port developments; or iTerminals 4.0, which will implement port solutions with the internet of things.

Undoubtedly, the European Commission has to do much more to support Europe's seaports, by including the ports in the funds that the European Union will release in the coming years. The funding of the Reconstruction and Resilience Facility and the future Connecting Europe Facility Digital programmes, will be crucial to improve port infrastructures and turn them into real poles of clean energy generation and distribution.

With regard to Connecting Europe Facility Digital, it will be necessary to increase the scope and type of projects of common interest in the trans-European transport networks. We are making progress on this in the Mediterranean ports with their rail connection to the Mediterranean Corridor.

Member States and European ports must seize this historic opportunity for decarbonisation. It is essential that ports be connected to the trans-European rail networks. All the containers we move by rail are millions of tonnes of CO2 that we will take out of our atmosphere and will therefore be a step towards global warming.

It is also necessary for the sector to adapt to the European strategy for reducing emissions, but it must do

so without losing its international competitiveness. Therefore, the European Green Pact package should include incentives for fleet innovation, fiscal measures to reward those who comply with environmental standards and compensation instruments for mitigating pollution.

Emissions trading (ETS) can be a good tool to facilitate the transition to cleaner shipping, but always taking into account the specificities of the international market. Investing in the fight against global warming is an obligation for the industry, but a level playing field must be ensured. The measures should not only apply to European-flagged ships, but to all those working in our ports. To this end, the dialogue and negotiation processes of the International Maritime Organisation must be strengthened.

It is essential that ports commit to large batteries powered by renewable sources so that ships can plug in. At present, ships and cruise ships docking in most of our ports remain with their engines running while loading or unloading materials or people.

Another interesting proposal is to turn ports into energy autonomous entities. Wind turbines, offshore solar panels and wave energy can make European ports self-sufficient. Port of Valencia plans to be 98% electrified by 2030.

The route is marked, we know it and we must continue to navigate it.

Fit for 55: four ingredients to success

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

On 14 July this year we did not only commemorate the French Revolution with the Storming of the Bastille in 1789, but we witnessed rather a green revolution. On that day the Commission launched an ambitious package of twelve proposals to make Europe fit for the 55% emission reduction in 2030, as an intermediate step towards reaching the overarching ambition for Europe to be the first carbon neutral continent by 2050.

Four of these proposals will be affecting ports directly. First there is the so called "Fuel EU Maritime" proposal which aims at stimulating the demand for clean energy in shipping by setting reduction targets in greenhouse gas intensity for marine fuels and by foreseeing requirements for the use of onshore power supply at berth. A second proposal reviews the current Alternative Fuel Infrastructure Directive. The "AFIR" proposal for a regulation aims at enhancing the availability of fuel infrastructure and technology for clean energies. For maritime, the proposal sets out requirements for LNG refuelling facilities and proposes strict requirements for onshore power supply in all TEN-T ports. The package also includes a review of Europe's Energy Taxation Directive, including a proposal to start taxing conventional marine fuels as from 2023. Last but not least there is a proposal to bring the maritime sector under the emission trading scheme (EU ETS).

Ports in Europe fully realise that reaching the Climate goals put forward requires full engagement of the whole economy and society based on an ambitious policy. In that sense we are supportive of the initiatives on the table that enhance the take up and use of clean fuels and technologies for shipping, we support a review of the taxation of energy which will incentivise the use of clean fuels and we see for the same reason benefit in including maritime in an emission trading system.

But for Europe's ports, the way these different proposals will be designed is crucial. Some elements are important to take into consideration to make these proposals work for ports. And let me in that context refer to the 4 "C's" ESPO's Chair, Annaleena Mäkilä recently used, in her speech on the occasion of the ESPO award ceremony on 9 November: Coherence, Cooperation Competitiveness, and Co-funding. These four "ingredients" are essential to make the Fit for 55 package work.

Coherence. For the first time, the strict requirements on what ports need to do in terms of providing infrastructure for clean fuels and technologies for shipping are accompanied by requirements on the side of the users: vessels will have to use the shore-side electricity infrastructure at berth. For years we have been discussing the chicken and the egg problem as a barrier for making real progress in greening of shipping. It is now time to work together with all policy makers and stakeholders to move forward towards investing in technologies that are effectively being used and that lead to effectively reducing the emissions of shipping, both at berth and during navigation. But it will be extremely challenging to keep this coherence all along the process. Different working parties in the Council and key players in the European Parliament as well as different timings for both files could jeopardise the coherence.

But there is not only a need for coherence between AFIR and Fuel EU. To be coherent, the taxation policy should also be brought in line with this strict regulatory framework on onshore power supply. If Europe's wants to see emissions at berth being reduced, if they want to boost the use of the electricity on shore, an EU-wide total tax exemption is needed. We see that the energy taxation proposal is not ambitious enough in this regard, since Member States can opt for an exemption and can choose a partial or total one.

Moreover, in general we miss an overall impact assessment of all fit for 55 proposals affecting the maritime and port sector. What will be the impact of all these proposals together both in terms of achieving the well needed emission reductions and in terms of competitiveness of the European port sector? We do not know.

Competitiveness. The competitiveness of Europe's ports should not be jeopardised. And there the Fit for 55 proposals as formulated now contain a serious risk. The Commission proposal for a European maritime ETS covers the emissions from intra-EU voyages and emissions at berth, alongside half of the emissions from extra-EU voyages (both incoming and

outgoing voyages). With such a scope, ships can find ways to avoid falling in the scope of the EU ETS and thus avoiding the emission price tag that comes with the EU ETS. If evasion through rerouting of business happens, it creates not only carbon leakage but also business leakage for Europe's ports and the port ecosystem. Equally, while ideologically correct, starting to tax conventional marine fuels that are being bunkered in the EU, without having enough energy alternatives for shipping available at the moment, might take away the bunkering business of certain European ports without any added value in terms of emissions. We must find ways to limit these risks of carbon and business evasion based on a realistic and comprehensive impact assessment of these proposals. We should seriously look at possibilities to widen the scope to the neighbouring countries and, if at all possible, push further for a global solution.

Cooperation. The legislative framework in itself will not be enough to achieve the Climate goals. There is no silver bullet for greening the shipping sector. Different greening pathways are under development. It will more than ever be important for stakeholders to coordinate and work together. Ports face huge investments and must be able to optimise these investments, where it makes most sense. Shipping operators can help by clearly indicating their intentions and needs to the port and/or the responsible investing body, thereby avoiding stranded assets in the port. Looking at onshore power investments, ports need to know as soon as possible if their customers intend to use onshore power supply or will rather go for one of the other alternative technologies allowed for in the legislation. Moreover, ports should know what power needs a certain vessel will need when at berth, in order to plan for sufficient power during a call.

Co-funding. Ports can only become fit for 55 if the EU is ready to "fund for 55". Many of the investments that will have to be made and facilitated by ports to green the shipping sector will have only a very slow and low return on investment for the port. The port authority is in this case not the polluter, but is taking up its responsibility as a mission driven entity. It will therefore be important for ports to be able to rely on public funding and support to comply with the upcoming requirements for alternative fuel infrastructure in ports. On top of the existing funding mechanisms such as the Connecting Europe Facility, revenues from the maritime EU Emission Trading System (EU ETS) and the penalties levied under the FuelEU Maritime should be used to promote the distribution and use of renewable and low-carbon fuels and technologies in the maritime sector.

The Commission has showed a high level of ambition in preparing these twelve Fit for 55 proposals. It is now important for both the Commission, the Parliament and the Council to work on these proposals with the same ambition to make them as a final package fit for purpose. This will require a lot of dialogue with stakeholders, gathering additional knowledge on possible impacts and being open to adapt these proposals in view of reaching emission reductions in the most effective way. There is a sense of urgency, but optimising the effectiveness of the policy measures will save us a lot of time.

"Ports in Europe fully realise that reaching the Climate goals put forward requires full engagement of the whole economy and society based on an ambitious policy."

CHEK: deCarbonising sHipping by Ena real vessel concept designs

CHEK is a European Union Horizon 2020 funded project that proposes to reach zero emission shipping by disrupting the way ships are designed and operated today. The project will develop and demonstrate two bespoke vessel designs – a wind energy optimised bulk carrier and a hydrogen powered cruise ship – equipped with an interdisciplinary combination of innovative technologies working in symbiosis to reduce greenhouse gas emissions by 99%, reducing energy use by 50%.

The challenge of decarbonising long-distance shipping

Over two thirds of the greenhouse gas (GHG) emissions from ships sailing to or from European ports in 2018 came from long-distance ships like bulk carriers, container ships, tankers and passenger vessels. If nothing changes, the IMO expects global shipping emissions to increase by 50-250% between 2008 and 2050[1]. Whilst the contribution of long-distance shipping to the EU and global economy is undisputed, it is clear that the sector needs to address a number of challenges.

Policymakers have increasingly directed their attention to waterborne transport in recent years. Firstly, there was the historic goal set by IMO's Initial IMO Strategy on Reduction of GHG Emissions from Ships at MEPC 72, in 2018. This set the goal of reducing the global fleet emissions by 50% by 2050 as compared to 2008. Secondly, there was the EU Green Deal initiative adopted in December 2019, aiming at turning Europe into the first climate-neutral continent by 2050. Tools for implementing decarbonisation of international shipping in the EU are approaching in the form of inclusion of shipping in the EU Emissions Trading Scheme (EU ETS) supported by the EU MRV (EU Regulation 2015/757), and the proposed Fuel EU Maritime directive which introduces the life-cycle aspect into shipping. Shipping is expected to deliver a serious contribution to the goal of turning the EU into a climate-neutral continent by 2050.

No existing or emerging "silver bullet" technology is single-handedly able to decarbonise long-distance shipping. If future shipping is to connect the world reliably, cost-effectively and quickly – and do so in line with the IMO's 2050 goals – it must use a combination of future technologies working in symbiosis.

CHEK: decarbonising long-distance shipping

Funded under the EU Horizon 2020 programme, CHEK is coordinated by the University of Vaasa and includes the trend-setting marine equipment manufacturer Wärtsilä, two of the largest ship owners/charterers worldwide (MSC Cruises, Cargill International), four clean technology providers (Climeon, Hasytec, Silverstream Technologies, BAR Technologies), the world's first marine classification society (Lloyd's Register), leading ship designers Deltamarin and the IMO-founded World Maritime University. The project runs from June 2021 to May 2024 with a 10 M euros grant over these 3 years.

CHEK is proposing to decarbonise long-distance shipping by disrupting the traditional way ships are designed and operated today.
Rather than "stacking" novel technologies onto existing vessel designs, the consortium proposes to develop a unique **Future-Proof Vessel (FPV) design platform**.
The platform will allow the CHEK consortium to accomplish the main project objective of designing, developing and demonstrating (at full scale) **two first-of-a-kind vessel concepts** that:

(i) are based on **real operational profiles** rather than design parameters tailored to pass sea trials only;

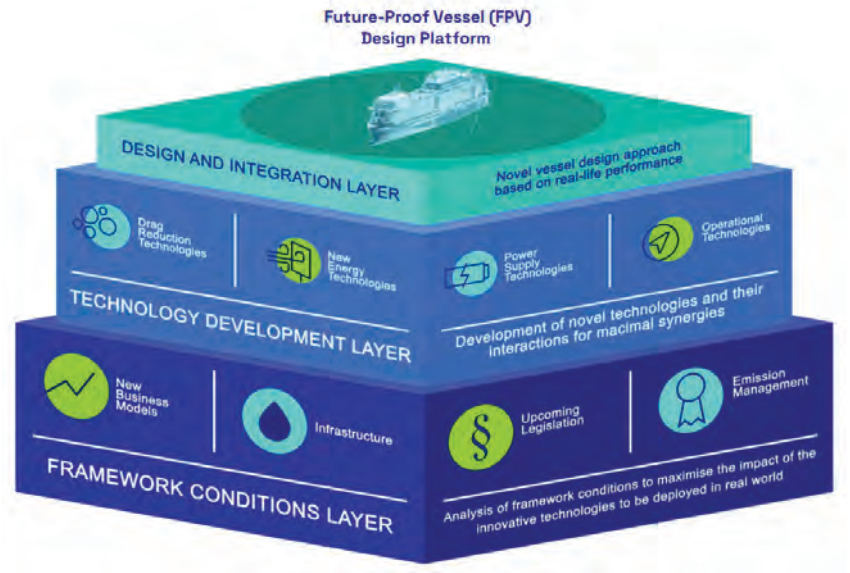
(ii) fully integrate cutting edge technologies within the vessel design, thus maximising the symbiosis between technologies and ultimately helping to achieve radical emission reductions not seen up to date;

abling Key technology symbiosis on

(iii) offer their benefits at **acceptable cost** to ship owners, operators and society;

(iv) are future-proof, i.e. designed with **resilience against most probable future challenges** such as tightening regulations, changing fuel prices, but also capable of adopting to emerging opportunities.

The FPV Platform will also serve as a basis for replicating the CHEK approach towards other vessel types such as tankers, container ships, general cargo ships and ferries as these jointly cover over 93% of the global shipping tonnage and are responsible for 85% of global GHG emissions from shipping.



Expected impacts and results

The expected impacts of CHEK are directly linked to the UN Sustainable Development Goals 13 (Take urgent action to combat climate change and its impacts) 7 (Ensure access to affordable, reliable, sustainable and modern energy for all) and 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) as well as the IMO 2050 goals and the EU Green Deal:

- **Reduce climate change and health related cost to society**. The deployment of CHEK technologies on an average Kamsarmax bulker or a Meraviglia class cruise vessel is expected to reduce the lifetime GHG emissions of each vessel by 99%. Combined with the health benefit costs to society of the NO_x, SO_x and PM emission reductions, this translates into almost €2.1 billion of benefit to society for the two vessels combined, calculated by attaching a price tag to each ton of emissions CHEK technologies help to avoid, that would otherwise cause additional health and climate change damages. Assuming only 1% of all 3453 bulk carriers that called at EU ports in 2019 would be CHEK vessels, this would translate into EUR 18B of benefits to society in terms of health and climate damages avoided.

- **Radically reduce the nitrogen oxides (NO_x), sulphur oxides (SO_x) and particulate matter (PM) from shipping**. CHEK technologies are anticipated to reduce NO_x, SO_x, PM emissions by over 90% as compared to the baseline Kamsarmax bulker and Meraviglia cruise vessel.

- **Pave the way for next generation global environmental standards underpinned by technological development**. The commercialisation of the CHEK solutions as environmentally ambitious, but also affordable technologies, is expected to pave the way for further regulatory amendments, as part of internal EU regulations, and later on the IMO-level.

- **Lower need for expensive sustainable fuel in the energy transition towards IMO's 2050 goals**. Whilst sustainable fuels are considered an important enabler of the energy transition of the long-distance shipping sector, they also constitute a major cost factor. Yet, their role will be smaller within CHEK-powered vessels due to the radical efficiency gains offered by CHEK. Consequently, lower fuel reliance will constitute a unique selling point for cost-aware ship owners and operators.

[1] IMO GHG Study

CHEK

https://www.projectchek.eu/

EU plans for cutting emissions: Sailing the shipping industry towards emissions reduction?

While preferring an international approach for shipping at the IMO level, European shipowners acknowledge their essential contribution to address the climate crisis also at EU level, but identify certain inconsistencies among the proposals of the EU 2050 emissions reductions plans that can undemine the EU's environmental objectives and the sector's competitiveness.

It has been an intense summer and start of autumn for ECSA, the European Community Shipowners' Associations, representing the voice of European shipowners, because of the workload related to the implementation of the European Green Deal and the EU's ambition to make Europe the first climate-neutral continent by 2050. Last July, our response to the 'Fit for 55' package was published, followed by a tailored analysis of the FuelEU Maritime proposal and finally by a position paper on the proposal and a policy paper dedicated to the EU ETS proposal in October.

Our engagement in in the EU environmental policy – by many considered a turning point for the EU's climate agenda – however did not start in July 2021. In 2020, ECSA commissioned a study with the International Chamber of Shipping to explore the implications of application of the EU Emissions Trading System (ETS) to international shipping and made public its position on the EU ETS proposal, the 'Framework Conditions for an EU MBM', which have been updated twice since then.

European shipowners welcome the increased climate ambition of the 'Fit for 55' package, recognising that the climate crisis is one of the greatest economic and environmental challenges our societies have ever faced. ECSA is nevertheless concerned by the lack of consistency among some of the proposals of 'Fit for 55' which may undermine their environmental objectives.

As regards to the EU ETS proposal, ECSA advocates for a dedicated fund to be set-up and for the revenues to be earmarked to support the sector's decarbonisation. The Fund should stabilise the carbon price and reinvest in R&D to foster the deployment of cleaner fuels.

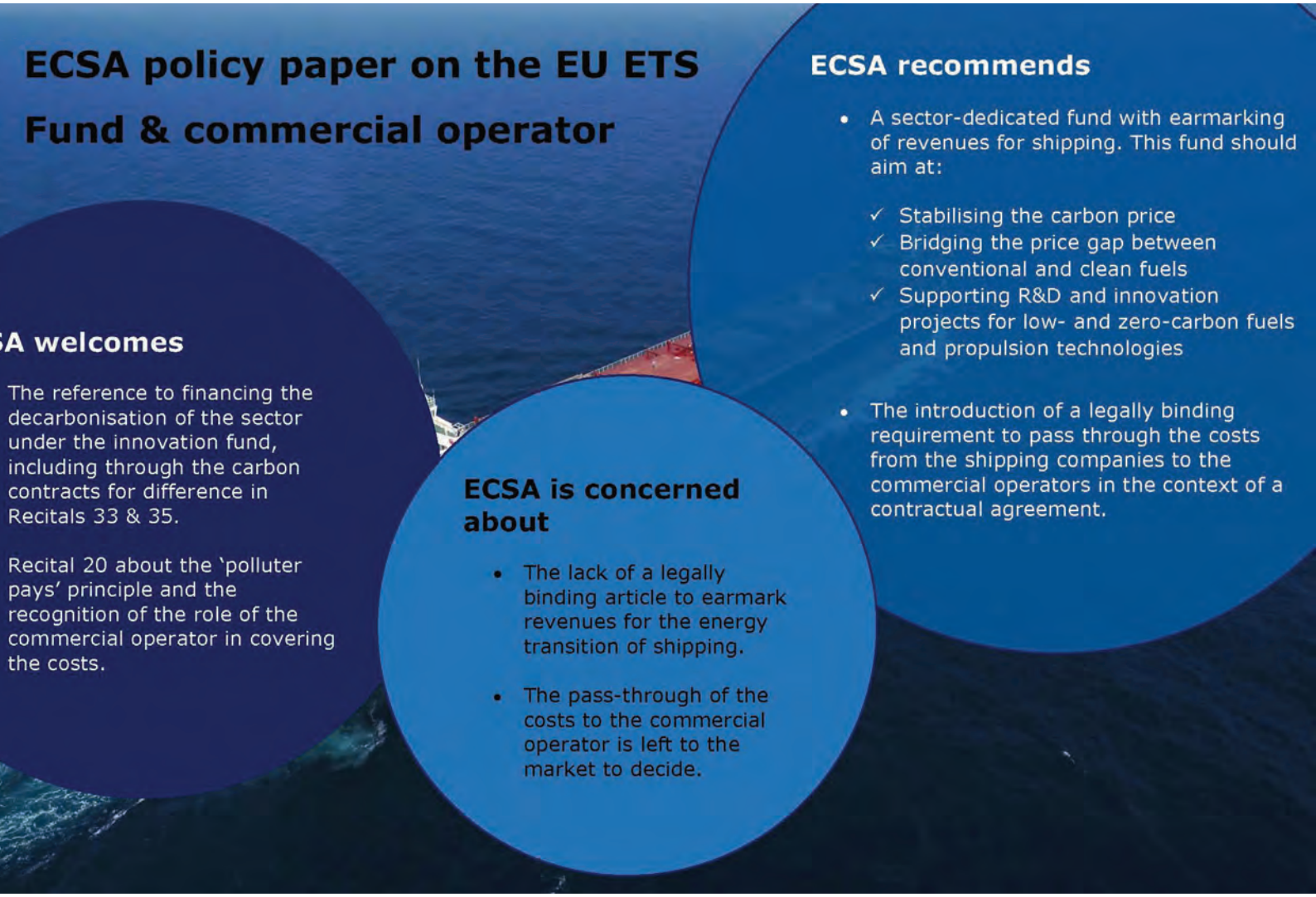
Above all, ECSA considers it extremely important that the commercial operator should bear the costs of the ETS and welcomed the recognition of the role of the commercial operator in the proposal. This should now be translated into a legally binding article requiring the passing through of the costs of the EU ETS from the shipowners to the commercial operators.

A member-based association, ECSA is fully aware of the financial needs of our sector – particularly SMEs – to stay competitive and supports a phase-in period under which an increasing percentage of the emissions of the sector is subject to the ETS. A flexible and realistic approach includes granting sufficient time for the gradual inclusion of the sector's emissions in order to create investment signals and to identify potential errors in the system design.

European shipowners have very well received the objective of the 'FuelEU Maritime' initiative to boost the utilisation of 'greener' fuels, but this proposal does not seem to be consistent either with other provisions of the 'Fit for 55' package or with the increased EU climate ambitions. If its shortcomings are not addressed, it will result in a missed opportunity for the entire European shipping.

ECSA has warned long before the proposal was published about its unintended negative consequences in a study commissioned with the International Chamber of Shipping. This study explains that standards would equally apply to ships purchasing fuel blends in non-EU States, where law enforcement may be weaker and businesses are not directly bound by the EU law.

Enforcement is especially an issue for biofuel blends purchased outside the EU, as it will rely only on paper documentation provided by non-EU fuel suppliers. These paper documents provided by overseas fuel suppliers will ultimately be used to calculate carbon savings contributing to the EU climate targets. Thus, one of the main conclusions of our study is that the EU should ensure that the



principal obligation for compliance with any new standards rests with the EU fuel suppliers. It is a matter of consistency that FuelEU Maritime works together without friction with the other proposals of the 'Fit for 55' climate package, including the EU ETS and RED.

In addition, fostering demand for cleaner fuels is key. The price differential between 'green' and traditional fuels can be bridged through the use of the EU ETS revenues, the carbon contracts for difference under the ETS innovation fund and a higher multiplier for fuels used in the shipping sector under the Renewable Energy Directive.

On the Energy Tax Directive, finally, we consider that removing the current tax exemption for fuel is not a consistent way forward and we will advocate for the Directive to exempt all sources of energy delivered to ships from taxation as the international nature of shipping creates difficulties to enforce a tax on any energy source.

ECSA
European Community Shipowners' Associations

About ECSA
ECSA represents 19 national shipowners' associations based in the EU and Norway. European shipowners control 39.5% of the global commercial fleet, contribute 149 billion euros per year to the EU GDP and provide 2 million Europeans with careers both on board and ashore. ECSA strives for a regulatory environment that fosters the international competitiveness of European shipping, to the benefit of the EU.

Driving Private Investments for a Climate Neutral Europe

By Livia Miethke Morais, Senior Sustainable Energy Finance Specialist, BASE (Basel Agency for Sustainable Energies)

The European Green Deal aims at delivering the EU vision of a climate neutral continent by 2050 and sets clear targets for emission reductions, renewable energy production and energy efficiency. This will require not only the mobilisation of financial resources from public actors, but also and most importantly from the private sector.

An innovative model: the Energy Savings Insurance

Investments in Energy Efficiency (EE), especially by Small and Medium-sized enterprises (SMEs), face barriers such as high upfront costs, lack of access to finance, high perceived risk, lack of trust in new technologies, competing investment priorities among others.

Many of these barriers can be overcome with business models such as the Energy Savings Insurance (ESI) model. It helps to build trust in EE solutions in which companies can rely on the returns on their investment, as the future energy savings are guaranteed in contract and covered by an insurance. A technical validation process lead by an independent entity creates additional trust in the EE project.

The ESI model combines financial and non-financial elements designed to work together to create trust and credibility among key actors (e.g. technology providers, enterprises, financial institutions), reducing the perceived risk of energy efficiency investments.

Implementation of ESI Europe: GoSafe with ESI

BASE and partners are implementing the ESI model in Europe. It is brought to the market under the GoSafe with ESI brand. A standardised contract and a validation process have been developed and insurance companies and financial institutions have been engaged in Italy, Portugal and Spain. Furthermore, GoSafe with ESI counts with an online platform that allows the smooth and traceable exchange of information, documentation and savings reporting. Developed in blockchain, the platform contributes to creating trust in the process. From September 2021, the ESI Europe 2.0 is expanding the implementation of GoSafe with ESI to Croatia, Greece and Slovakia.

The implementation of the ESI Europe included the training on the GoSafe with ESI elements of more than 1,000 individuals ranging from technology providers, SMEs and financial institutions within Italy, Portugal and Spain. In addition, almost 1,000 individuals from a European-wide audience also had the opportunity to learn about ESI Europe and GoSafe with ESI through events and webinars.

The ESI Europe toolkit contains the Business Model Canvas for GoSafe with ESI. It describes the steps for implementing the innovative business model, that go from an initial market assessment, the engagement of key partners (e.g. insurance providers, validation entity and financial institutions), capacity building and building a pipeline of initial projects. Templates for the key resources to be adapted to local market, such as the GoSafe with ESI contract, the validation process, energy savings insurance and financing structure as well as marketing material samples are also included in the toolkit.

Innovative business models such as GoSafe with ESI are important drivers of private investments in energy efficiency and renewable energies, aligning with the EU taxonomy and therefore contributing to the delivery of the European Green Deal.

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The MOSES project: Automated technologies for efficient and green Short Sea Shipping

By Nikolaos P. Ventikos[1], Konstantinos Louzis[1], Christos Pollalis[1], Alex Grasman[2]

The EU's objective to minimize the environmental footprint of transportation by creating a sustainable and efficient network by 2050, depends on shifting cargo from carbon-intensive, land-based modes to more efficient ones and on a more integrated supply chain. Short Sea Shipping (SSS) can play a key role in achieving the EU targets by exploiting economies of scale for transporting cargo in a cost-effective and environmentally friendly way. However, road and rail are preferred in many cases due to barriers related to infrastructure availability, lack of door-to-door delivery, integration with other transportation modes, complex cost structure, and delays related to logistics planning. In addition, SSS serves many small ports that are not integrated into the supply chain due to limited or no cargo-handling infrastructure, irregular demand, and the unavailability of 24/7 port services.

The MOSES (Automated Vessels and Supply Chain Optimisation for Sustainable Short Sea Shipping) project is a 3-year, EC-funded project that was launched in July 2020 by a Consortium of 17 partners from north and south Europe and is coordinated by the National Technical University of Athens (NTUA), Greece. Its main objective is to create sustainable SSS feeder services to small ports with an expected 10% modal shift to SSS in designated areas. To attain this target, MOSES proposes a combination of automated/autonomous technologies and supply and demand matching optimisation (Figure 1).

Figure 1: MOSES Concept and Innovations for the container supply chain

As for efficiency, MOSES aims to decrease docking and manoeuvring times, by 20% and 70% respectively, for containerships in large terminals with the MOSES AutoDock system. This intelligent system consists of the MOSES Autonomous tugboat swarm, supported by the MOSES Shore Tugboat Control Station, and the MOSES automated docking scheme. Furthermore, loading times for feeder vessels in large and small ports are expected to decrease by 20% from the operation of the MOSES Robotic Container Handling System outfitted on the MOSES Innovative Feeder.

Supply chain optimisation, implemented through the MOSES Matchmaking Platform, aims at increasing the attractiveness of SSS routes by: 1) increasing the cost-effectiveness of partial cargo loads, 2) effective handling of changing freight flows, and 3) boosting last-mile/just-in-time connections among the transport modes and backhaul traffic.

In terms of environmental friendliness, the MOSES Innovative Feeder will be designed for a net reduction of GHG emissions more than 90%, surpassing the EU target for 55%, by exploiting Multi-Criteria Analysis and minimising energy loss. The MOSES Autonomous tugboats are envisioned as fully electric, supported by an automated shore-based power station (MOSES Recharging Station). Finally, the MOSES Matchmaking Platform will contribute to the feeder services' sustainability by informing about the environmental footprint of transportation alternatives and promote routes with lower emissions throughout the supply chain.

The combined MOSES approach is expected to contribute towards creating a comprehensive EU TEN-T network by 2050. The MOSES solution will attract stakeholders to SSS for a more sustainable EU container supply chain from the environmental, cost, and societal perspectives.

MOSES project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861678. Content reflects only the authors' view and the Agency is not responsible for any use that may be made of the information it contains.

[1] School of Naval Architecture & Marine Engineering, National Technical University of Athens (NTUA), Greece
[2] Maritime Research Institute Netherlands (MARIN)

Decarbonising shipping – sustainably

By Andreea Miu, Head of Decarbonisation, Sustainable Shipping Initiative; Elizabeth Petit Gonzalez, Head of Communications & Partnerships, Sustainable Shipping Initiative

The decarbonisation of the shipping industry is critical to enabling a broader energy transition. Decarbonising the maritime sector would result in a drastic reduction in supply chain emissions, benefiting all industries that rely on ships to transport materials and products.

However, shipping has long been a complex industry due to its global nature. From a regulatory perspective, it is governed by the International Maritime Organization (IMO), though regulation has been implemented at regional (e.g. EU) level with the goal of speeding up the energy transition.

Current IMO ambition is driven by the 2018 initial greenhouse gas (GHG) strategy which aims to reduce shipping's total GHG emissions by at least 50% by 2050, and to reduce carbon intensity by 70% by 2050 compared to 2008 levels. A revised strategy is due to be adopted in 2023. The UN Race to Zero emission Breakthroughs set a goal of 100% zero emission fuels by 2050. At the EU level, a strategy was set out in 2013 for reducing GHG emissions from the shipping sector.

2021 also saw the European Commission present the Fit for 55 package, which committed the EU to cutting emissions by at least 55% by 2030 and saw, among others: shipping's inclusion in the EU Emissions Trading Scheme (ETS); the FuelEU Maritime proposal, which calls for a 75% decrease in carbon intensity by 2050 compared by 2020 levels and consideration of full lifecycle emissions for marine fuels; the revision of Directive on the Deployment of Alternative Fuels Infrastructure which set targets for major ports to serve vessels with onshore power.

What are the options?

Reducing shipping emissions will include a combination of measures,

including those that increase technical and operational energy efficiency, improvements to resource use, alternative propulsion methods, and the widespread adoption of sustainable, zero and low carbon fuels and technologies. The wide range of options currently under consideration emphasises that there is no one-size-fits-all approach, and the course taken by individual companies will depend on, among other factors, vessel type and journey length to name a few.

Among the options being considered, much of the industry's focus has been on the development of alternative fuels such as hydrogen, ammonia, biofuels, methanol, and others. These fuels need to be commercially viable and scalable, reducing costs and ensuring port and bunkering infrastructure is in place. At the same time, they must be evaluated based on their sustainability alongside their emission reduction potential.

Sustainable fuels for shipping

Reducing GHG emissions and carbon intensity are key steps in the industry's transition to zero. However, low GHG emissions and carbon intensity only cover a fraction of the issues that need to be addressed as shipping decarbonises. Other environmental, as well as social and economic sustainability issues should be considered alongside cost, availability and technical feasibility when evaluating fuels for shipping.

The past year has seen the Sustainable Shipping Initiative (SSI) develop a set of sustainability criteria that can be applied to all zero and low carbon fuels under consideration for shipping's decarbonisation alongside members including Lloyd's Register, A.P. Moller – Maersk, Swire Shipping, and WWF, as well as academic partner Copenhagen Business School (CBS) Maritime. The work identified a set of fifteen issues, principles and criteria across environmental, social and economic factors to provide clarity and facilitate discussions around sustainability concerns. The fifteen issues can be seen in the illustration on the previous page..

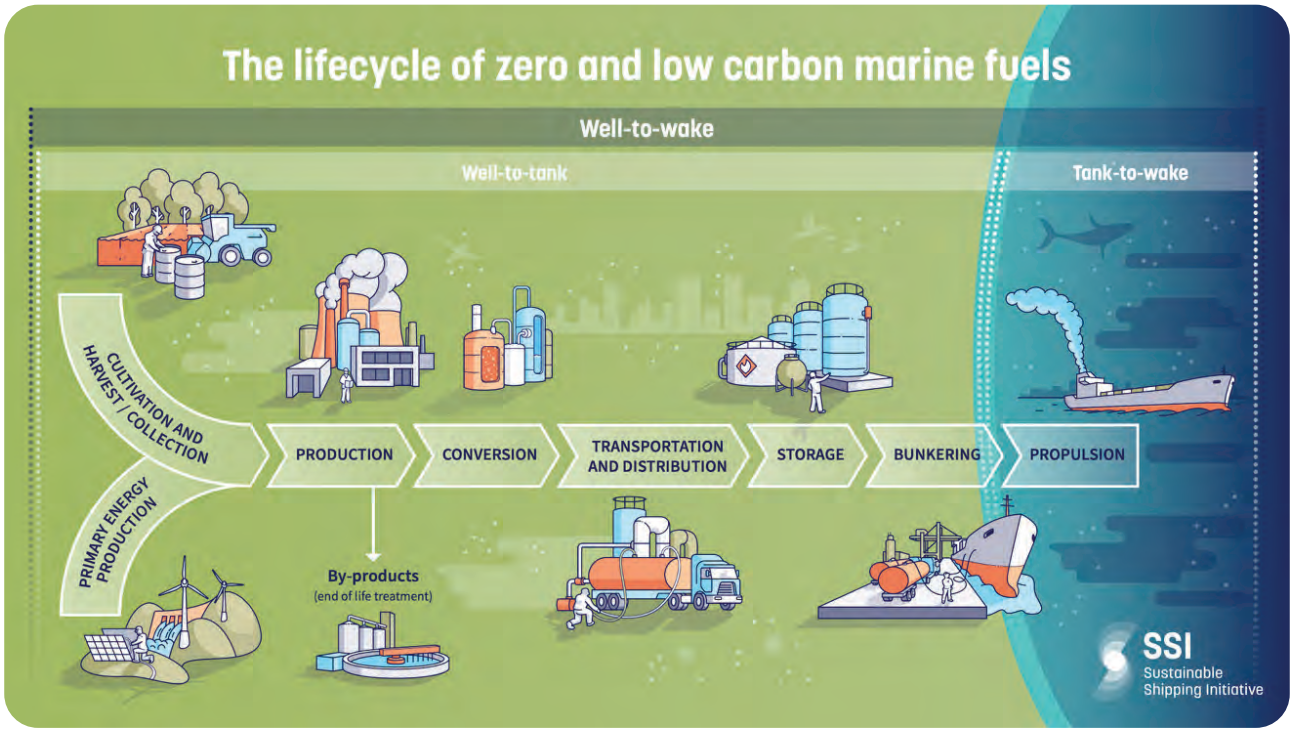
Taking a full lifecycle approach

The FuelEU Maritime proposal refers to the need to consider lifecycle emissions for marine fuels, beyond the emissions at the point of combustion. This approach is also adopted for sustainability criteria, which seeks to provide a more complete picture of sustainability concerns over the full lifecycle of the fuel – from its source (e.g. feedstock), to production processes, transportation, and eventual combustion or propulsion. This is typically referred to as "well-to-wake" and illustrated below.

Understanding sustainability issues from a lifecycle perspective allows for informed decision-making concerning value chain risks and helps direct choices for investment, purchase and consumption, and it can ensure that negative impacts are not externalised or transferred upstream or downstream to parts of the value chain that the shipping sector does not typically account for.

Developing common principles and criteria against which to evaluate the sustainability of different fuel options can further aid in their selection and increase demand across the shipping sector, thus guiding investment and research for scalability and resulting in a more sustainable shipping industry.

To find out more about the Sustainable Shipping Initiative's work on developing sustainability criteria for marine fuels, visit our website.



All sustainable means to cut transpo

By Henna Virkkunen, MEP (pictured)

Many of the Fit for 55 package proposals will bring substantial direct and indirect consequences for the mobility sector as a whole. In the year 2019 transport sector was responsible for 26% of the total EU greenhouse gas emissions and road transport accounted for 71% of those emissions. Road transport is therefore rightfully at the very core of the European Green Deal.

Sustainable biofuels are one of the solutions already available to tackle road transport emissions. As the renewal of the car fleet takes time, sustainable biofuels compatible with existing fleet have an important role to play, especially in the short and medium-term. While in many of the Fit for 55 proposals there is a push for direct electrification and hydrogen, the potential of biofuels is also well recognized in many of the proposed texts. In general, the ambitious EU climate targets are good news for the sustainable biofuels industry.

However, the package brings also challenges to the sector. Many have raised concerns about the interlinking and overlapping features of the different proposals. The European Commission impact assessments have not sufficiently taken into consideration all the complex crossover impacts the different proposals may bring. A clear example of such inconsistency is the discrepancy between the increasing demand for biofuels on one hand, and the urge to revise sustainability criteria for biofuels on the other. Here co-legislators have much work to do, to ensure that all different elements of the package support the same technology-neutral approach.

For example, the revision of the Renewable Energy Directive should continue to support the use of all sustainably sources biofuels in road transport. We need to reduce transport emissions quickly and to do this we will need all available means, to deliver emission cuts as soon as possible and as cost-efficiently as possible. We as politicians should focus on setting the emission reduction targets and let the industry find the most efficient ways to reach them.

The challenges increase while the demand for sustainable biofuels expands from road to other transport modes. While we introduce new requirements for sustainable fuels used at EU airports and ports, we must simultaneously make sure that the European aviation and maritime sectors stay competitive. Regulatory certainty is needed to encourage market uptake of both biofuels and synthetic fuels. The upcoming legislation should both encourage the market uptake of existing solutions, as well as remain as future-proof as possible, leaving room for innovation and development.

In the aviation industry, it is essential to find solutions to cut emissions but the transition needs to be gradual. The COVID-19 pandemic has placed airlines in economically difficult situation. In addition, costs for airlines will heavily increase as the removal of free allocation of emission allowances, demands on the use of sustainable fuels, and the taxation on fossil kerosene all come into force at the same time. The European aviation industry needs sufficient time to adapt to the transformation. Overall, it is vital to find a balance between policy support and market-based developments.

The maritime industry has also an important role to play as today's maritime traffic still relies almost entirely on fossil fuels. We need policies supporting the emergence of sustainable maritime industry as a whole. Also here the Renewable Energy Directive should not overly


Photo: Mikko Mäntyniemi

ort emissions are needed

limit the sustainably sourced raw materials available for renewable fuels. Simultaneously we should avoid increasing the regulatory burden that could harm the competitiveness of European shipping companies. In addition, owing to the international nature of the maritime industry, the EU should actively co-operate with IMO and other stakeholders to ensure that any new regulation will not lead to disrupted trade flows.

To transit to a climate-neutral and competitive economy as proposed by the Commission's Green Deal, many industries need encouragement to invest in clean energy and low carbon solutions. Therefore, it is crucial that the Fit for 55 policy decision must be for the long-term, to ensure a predictable investment environment that is required to scale up sustainable fuels production facilities. ●

Biofuels in transport research – the

By Ferenc Pekar & Marcin Stepniak, researchers at the European Commission's Joint Research Centre (JRC)

In the European Green Deal, the Commission set the ambition of becoming climate-neutral by 2050 – and reducing our greenhouse gas emissions (GHG) by 55% by 2030. Indeed, earlier this year, with the adoption of the European Climate Law, this figure was written into EU legislation. The challenge for the EU is how to achieve this 55% reduction in the coming decade. In July 2021, the Commission published a package of proposals for delivering the European Green Deal, outlining concrete ways of pursuing this objective for 2030. As one quarter of the EU's GHG emissions come from the transport sector, it is clear that transport needs to contribute significantly to this reduction. This is reflected in the Commission proposals.

Under the existing Renewable Energy Directive (Directive 2018/2001), the EU agreed that 14% of transport energy should be produced from renewable sources by 2030. However, the new proposal from July 2021 to revise the Renewables Directive – part of the July package – is looking to double this ambition, setting a new target for reducing the greenhouse gas intensity of transport fuels by 13% by 2030 (equivalent to an energy-based target of 28% using the previous methodology).

In addition to electrification, one of the main contributions of the EU's strategy for decreasing emission levels in transport is to boost the supply of sustainable alternative transport fuels, such as advanced biofuels, hydrogen or synthetic fuels as a replacement for fossil fuels. The Commission proposal includes specific sub-targets for advanced biofuels and hydrogen. Biofuels and synthetic fuels are considered as one of the primary ways to decarbonise those transport modes where zero-emission solutions are not yet market-ready, in particularly shipping and aviation. For this reason, as part of the July package, the Commission presented RefuelEU Aviation and FuelEU Maritime proposals intensify transition of these two transport modes by progressively increasing blending mandates (reaching 63% by 2050) for aviation, and targets for carbon intensity (reaching 75% by 2050) in case of Maritimes transport.

In this context, low-emission alternative energy for transport is one of the seven roadmaps of the Strategic Transport Research and Innovation Agenda (STRIA) published by the Commission in 2017, as part of the 'Europe on the Move' package. (Transport electrification, which remains key to the gradual switch to zero-emission vehicles in road transport, is covered by a separate roadmap.) This particular roadmap covers various types of alternative fuels: propane and butane based fuels (including BioLPG) can be used by road transport, as a way to accelerate decarbonisation of existing internal combustion vehicles, complementing the switch to zero-emission vehicles; methane-based fuels (including biomethane) as well as alcohols, ethers and esters can be used by all transport modes, except aviation; and hydrogen, as well as synthetic paraffinic and aromatic fuel, can be used by all modes. These distinct types of alternative fuels are reflected as main sub-themes in the research and innovation topics assessed in the recently published JRC Science for Policy Report "Research and innovation in low-emission alternative energy for transport in Europe", developed within the Transport Research and Innovation Monitoring and Information System.

The report comprehensively analyses the results of 157 research and innovation projects, supported by the Horizon 2020 and Connecting Europe Facility (CEF) programmes and 12 other projects, including 9 financed by Member States. All projects are split according to the types of fuel being researched, providing information about the level of funding, main achievements and challenges (Figure 1).

Methane-based fuels have been studied through 60 projects, attracting €944 million in research funding. Biomethane is the most promising type and it gets the largest share of research funds delivered. It has a potential to reduce CO2 emissions by 100%, however further research is needed to develop and implement climate-neutral production methods. The research challenges are also related to the storage methods, in particular in relation to the risk of methane leakage during the supply chain. The development of new powertrains for vessels is necessary to accelerate the shift towards the use of higher blends of biomethane and e-gas in waterborne transport.

Only 7 research projects on propane and butane based fuels were identified and none of them is specifically focusing on BioLPG. Most of the research focused on fuels, which are based on fossil energy sources, thus their potential to reduce lifecycle emissions is very limited. Nevertheless, it is worth noting ongoing research, which aims to develop a method to produce sustainable biofuel using only CO2, electricity and water. However, the progress made so far is not yet applicable at industrial scale.

Alcohols and ethers are in the scope of 31 research projects of the total value nearly €242 million. In the short term, the advantage of these technologies is that after blending with fossil fuels, they require only small engine modification to be applied in conventional engines. The identified research focuses on production of alcohols, in particular bioethanol. However, the production of such fuels extensively uses food crops, competing on land-use with food production. More sustainable and efficient production methods

perspective of EU-funded research

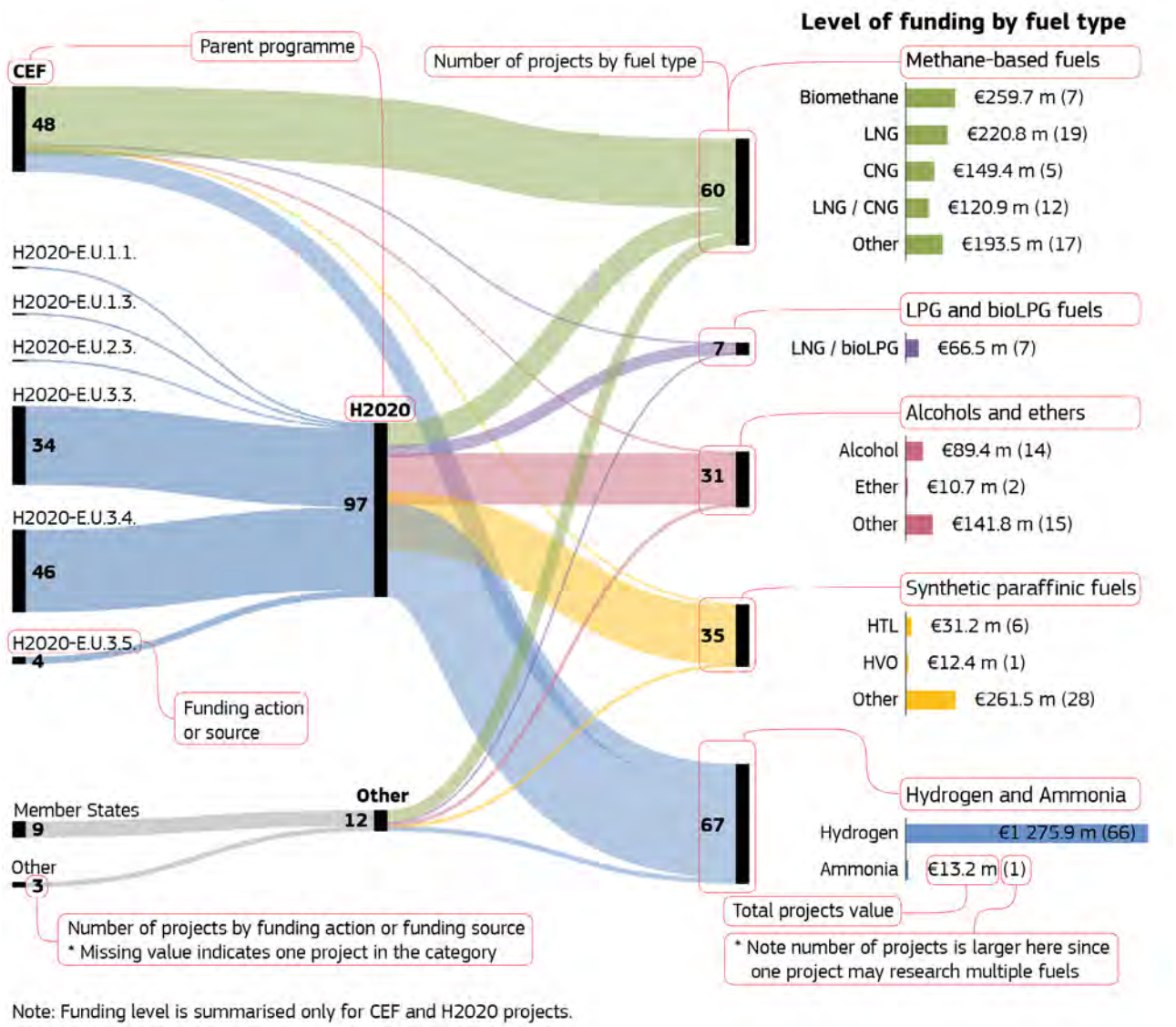
are also under research, e.g. biofuel production methods using non-food related biomass. These are still at the early stages of development and they require further research support and/or subsidy to make them competitive.

The high energy density of synthetic paraffinic fuels make them the most promising fuel for the aviation sector with some expectations also for the heavy-duty sector. In total, €305 million was invested through 35 research projects. The current research is focusing on a new generation of transport fuels produced from vegetable oils or animal fats. The challenge for future research is related to the implementation of new pathways for biokerosene production, as well as for the production of e-fuels and the relevant certification process for the use of these fuels in aviation. This may require policy support, in order to successfully compete with conventional fossil-fuels production.

Hydrogen attracts the highest value of funding. It is relatively mature technology, which has particular potential for decarbonising those transport sectors which are particularly hard to abate, e.g. heavy-duty vehicles as well as the aviation and maritime sectors - and both of these applications are currently being explored. Current research is focused on large-scale implementation and testing vehicles in a real-life environment. This would also require the development of infrastructure, which would support fast and efficient refuelling.

The complexity and variety of investigated types of alternative fuels, suggests that there is no single solution to decarbonising the transport sector: solutions need to be tailored to the specific needs of each transport mode. Further financial and political support is likely to be required to achieve ambitious aims of emissions reduction.

Figure. Alternative fuels in European transport research – summary
Division of projects by funding source and fuel type



Note: Funding level is summarised only for CEF and H2020 projects.

Hydrogen & Fuel Cells Energy Summit

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* An Overview of H_2 Production
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Advanced biofuels are key to achieving climate neutrality by 2050

Fighting climate change is one of the European Union's most urgent goals. With the European Climate Law as part of the European Green Deal, the EU has set itself the ambitious objective of becoming climate neutral by 2050. As the transport sector is responsible for 25% of the EU's total greenhouse gas emissions (GHG), it has to make a major contribution and reduce its GHG emissions by 90% by this date. Undoubtedly, electrification will play a major role in decarbonizing the transport sector. Even though the sales of electric vehicles are constantly growing in the EU, petrol-driven cars were still accounting for more than 50% of new passenger vehicle sales in August 2021[1]. Therefore, to deliver results quickly, a broad portfolio of sustainable solutions and advanced technologies is necessary to make these petrol-driven cars greener.

Sunliquid® – competitive and sustainable cellulosic ethanol

Clariant's sunliquid® technology is such a solution. It turns agricultural residues such as cereal straw, corn stover or sugarcane bagasse into cellulosic ethanol. Cellulosic ethanol is an advanced, truly sustainable biofuel that contributes to a climate-neutral Europe based on sustainability and circularity. Today, cellulosic ethanol is used as a drop-in in conventional fuels in cars and in heavy road transport. It offers further downstream application opportunities for sustainable aviation fuel, an area that is difficult to electrify in the short term.

"There is no one single solution for the transport sector to substantial CO_2 emission reductions. Carbon neutral solutions like sustainable, advanced biofuels do exist for the fueling infrastructure. What we need are long-term policy continuity and regulatory predictability for investors to make Europe's vision of a climate neutral environment a reality," said Christian Librera, Vice President and Head of Business Line Biofuels & Derivatives at Clariant.

Swiss company Clariant, a leading producer of specialty chemicals, has recently completed the construction of the first commercial-scale plant for the production of cellulosic ethanol based on the sunliquid® technology. The plant is located in Podari near Craiova in the south-west of Romania. 250,000 tons of straw will be processed annually in the plant to produce 50,000 tons of cellulosic ethanol. The use of agricultural residues in the immediate vicinity promotes local fuel production and maximizes GHG reduction. Co-products resulting from the process will be used for the generation of renewable energy, making the plant highly sustainable and energetically neutral. The production of sunliquid® cellulosic ethanol leads to a CO_2 reduction of up to 95% compared to fossil fuels. Furthermore, it creates green jobs and economic growth in predominantly rural areas. There are currently 75 staff members employed in the plant, and contracts with more than 300 local farmers have been signed to ensure the supply of the necessary feedstock.


Photo: ©Clariant

Clariant is investing more than €100 million in its first-of-its-kind cellulosic ethanol plant. The project receives a funding of €48 million from the European Union. So far, five sunliquid® technology licenses have been sold in Europe and China.

Contact details
Dr. Christian Librera
Vice President and Head of Business Line Biofuels & Derivatives
Clariant Produkte (Deutschland) GmbH
T: +49 (0)89 710 661 0
E: contact@lignoflag-project.eu
www.lignoflag-project.eu

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[1] ePURE. New study shows Europeans still buy mostly petrol cars, www.epure.org/news/new-study-shows-europeans-still-buy-mostly-petrol-cars/

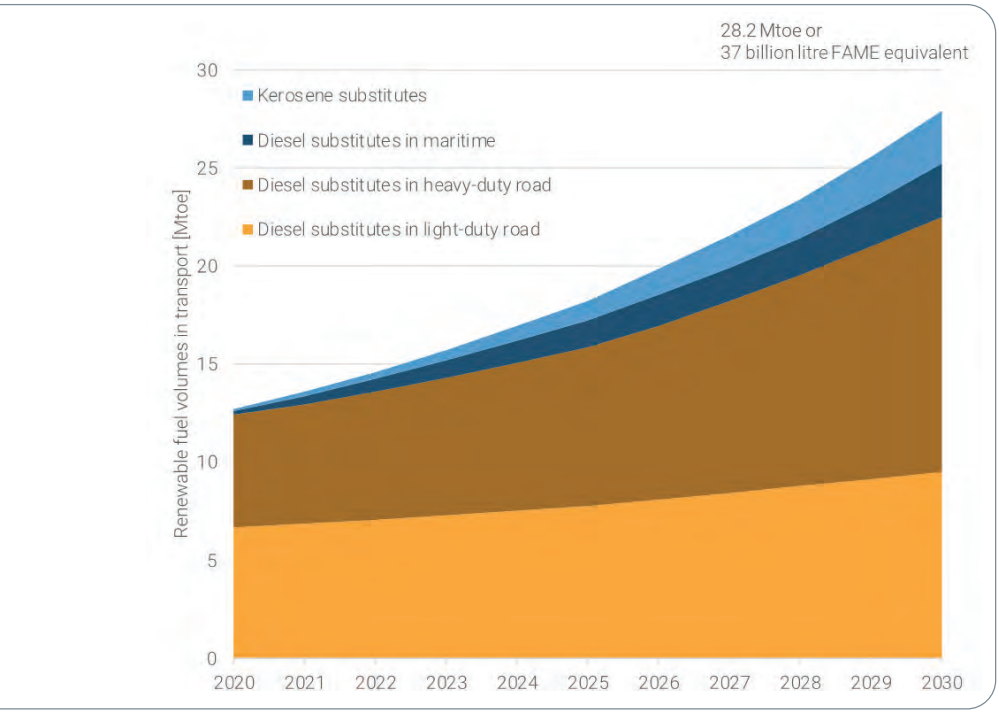
What does Fit for 55 mean for European biodiesel?

By Xavier Noyon (pictured), Secretary General of the European Biodiesel Board (EBB)

This summer, the European Commission unveiled its "Fit for 55" (FF55) package: a sweeping set of proposals that put Europe at the forefront of global climate action. It is hard to overstate the scale and importance of the FF55 package. Balancing many competing concerns, it represents a historic attempt to address an existential threat. From its earliest days, the European biodiesel industry has been shaped by EU legislation, and so it was with great interest it examined the FF55 proposals. It did not disappoint. Biodiesel is at its heart and underpins the entire legislative package. While it does have limits, the proposals acknowledge the need for sustainable renewable liquid fuels to 2050. But there are questions. What does it mean for European biodiesel demand? Are there shortcomings that need addressing? To answer them, the European Biodiesel Board, the trade association representing Europe's biodiesel industry, commissioned studio Gear Up to study the demand for sustainable biodiesel fuels up to 2030 and beyond.

The European biodiesel industry

First, some background. Biodiesel production directly supports about 25.000 of the 220.000 jobs in the broader EU biofuels industry and indirectly supports many others. Biodiesel is primarily used as a substitute for fossil fuels in transport. It is used in road, marine and air transport, with its production generating valuable co-products used in a wide variety of fields. Using more than fourteen million tonnes of biodiesel every year, the EU is the world leader in producing and using biodiesel. This helps reduce the EU's significant diesel deficit while providing an important source of revenue for European farmers. Every tonne of biodiesel produced from European crops also generates two of vegetable proteins, reducing EU protein imports. A significant share of EU biodiesel is made from wastes, residues, and animal fats, helping build Europe's circular economy while reducing GHG emissions up to 90%.



To 2030 and beyond: demand for renewable fuels

So, what does future demand for biodiesel look like? We must look at the expected renewable fuel demand in the EU reference scenarios and the fleets and efficiencies given in the Smart and Sustainable Mobility Strategy. These predict an EU fleet of 30 million EVs in 2030, with no internal combustion engine passenger car sales after 2035.

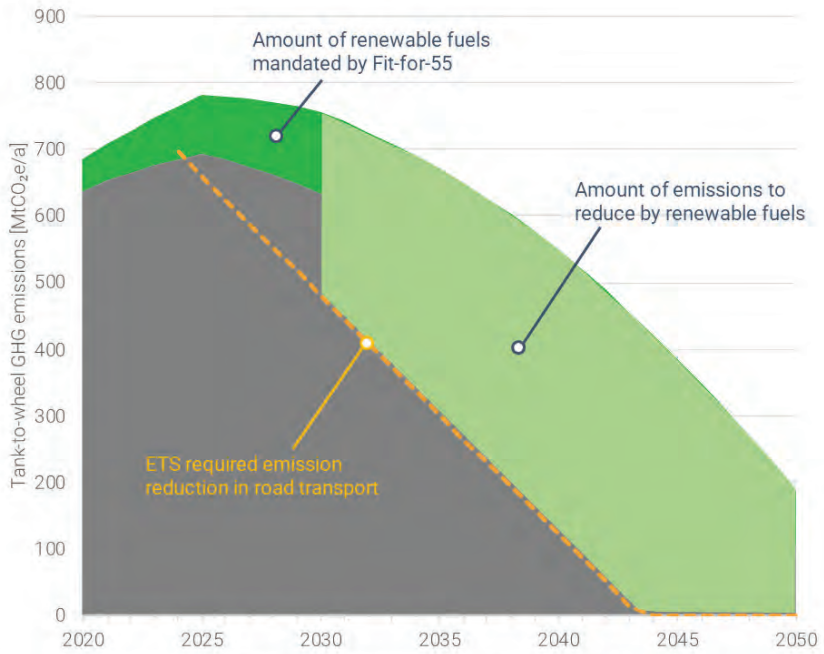
Using these numbers, the mandates of the RED III, FuelEU Maritime, and ReFuelEU Aviation proposals – the parts of the FF55 package most focused on renewable fuels – require annual sales of 42 Mtoe of

renewable fuels by 2030. Equivalent to 55 billion litres of conventional biodiesel, this is more than double current renewable fuel use. Most of this will be used in road transport where, as electrification reduces petrol demand, most will be needed in sectors like heavy-duty road transport. These sectors mainly use diesel and kerosene and are very hard to decarbonise.

Having examined the fuel mandates, we must consider the EU Emissions Trading System (ETS). The ETS works by capping the emissions allowed each year; when this limit is lowered, participants must reduce their carbon footprint or buy increasingly scarce emissions permits.

The ETS revision is one of the simplest proposals and one of the most demanding. By 2030, it needs more emissions reductions than RED III, FuelEU, and ReFuelEU proposals put together, with an extra 48 Mtoe of renewable fuels required to close the gap between the renewable fuel mandates and the ETS-required emissions reductions.

As shown, sectors that mainly use diesel and kerosene will need the most renewable fuel. Demand more broadly is expected to increase sharply until the early 2040s, peaking in 2043. At this peak, the demand is predicted to be equivalent to 212 billion litres of conventional biodiesel, more than eight times the amount used today.



Linear path assumes a pro rata reduction in road transport and buildings. In reality the dashed line may have to reduce faster, or stay horizontal for a while. But the end-point for both sectors combined with proposed linear reduction rate, zero end-use emissions in 2045.

An exciting future*

So, an exciting future for the biodiesel industry? It appears so. Any industry with potential for more than 800% market growth in two decades is one most would invest in. Nonetheless, the FF55 package presents the industry with tasks and opportunities; tasks it does not always help with.

Take feedstocks. While biodiesel demand will likely surge, the treatment of feedstocks may prevent industry from meeting the demand. Crop-based feedstocks are limited by a cap linked to their 2020 volumes, rather than a simple and dynamic one linked to the transport sector's gross energy consumption. Incentives for feedstocks in Part B of Annex IX have also been reduced, even though using these difficult-to-process feedstocks is more expensive than crop-based alternatives; emissions reductions of non-Annex IX wastes and residues are ignored.

Finally, parts of the FuelEU Maritime and ReFuelEU Aviation proposals create uncertainty, barring sustainable biodiesel made from certain feedstocks while leaving others untouched. The revised Energy Taxation Directive has similar inconsistencies, treating some sustainable sustainable biodiesel the same as fossil diesel. Hard to decarbonise sectors like maritime and aviation transport need special support, but that should grow the renewable fuel supply, not just displace it from one sector to another. These issues would be addressed by establishing coherent and unified sustainability criteria, a difficult but necessary task.

If passed in its current form, the FF55 package would be the EU's crowning achievement. But it is not perfect. While exciting, it creates uncertainties and has inconsistencies that need addressing. If they are not, Europe's biodiesel industry may struggle when Europe needs it most. The climate crisis is creating enough uncertainty and hardship. We do not need more. ●

Contact details

Xavier Noyon
Secretary General of the
European Biodiesel Board (EBB)

E: xavier.noyon@ebb-eu.org

How to make the EU's 'Fit for 55' package fit for purpose

By Emmanuel Desplechin (pictured), Secretary-General, European Renewable Ethanol Association (ePURE)

The European Union has set important new goals for decarbonising transport, a sector in which emissions have kept increasing but where failure is not an option in the drive to carbon neutrality.

The legislative proposals in the European Commission's so-called 'Fit for 55' package – touching on everything from EU renewable energy policy to car emissions standards to energy taxation – are certainly wide-ranging. But unfortunately they do not always give enough of a role to a proven decarbonisation solution: renewable liquid fuels such as European ethanol.

Fully enabling biofuels in the drive to carbon-neutrality is just common sense. Even under a scenario in which electric vehicles make rapid gains in market share and the sale of internal combustion engines is phased out, the EU car fleet will consist predominantly of vehicles that run fully or partly on liquid fuel in 2030 and beyond.

For these petrol and hybrid cars, the EU has a ready-made, homegrown solution: renewable ethanol is the most immediate, cost-effective, sustainable and socially inclusive way to reduce emissions. Europe cannot afford to ignore this important part of the Fit for 55 equation.

International organisations agree that achieving carbon-neutrality by 2050 will require a massive uptake of sustainable biofuels. To that end, the EU should fully maximise the tools it has on hand to move beyond fossil fuel – starting with the Renewable Energy Directive but also including other key Fit for 55 legislative priorities.

As one of the best such tools, European ethanol must be considered more than just a 'transition fuel' or 'stopgap solution' in the EU's planning. It is a proven solution that is already delivering results for decarbonisation but could do a lot more even in the years to come.

Ethanol is immediate

Europe should not have to wait for new technologies to mature. Renewable ethanol reduces emissions from today's vehicles – more than 75% on average, compared to fossil petrol – and from the vehicles that Europeans keep buying and driving.

Ethanol is cost-effective

The increased use of ethanol to decarbonise transport requires no

expensive new infrastructure; it can be scaled up easily in a way that also benefits the EU economy and food security.

Ethanol is sustainable

The European Commission regularly confirms the sustainability of EU crop-based biofuel production, finding no correlation between food prices and biofuel demand and low adverse environmental impact of feedstock production.

Ethanol is socially inclusive

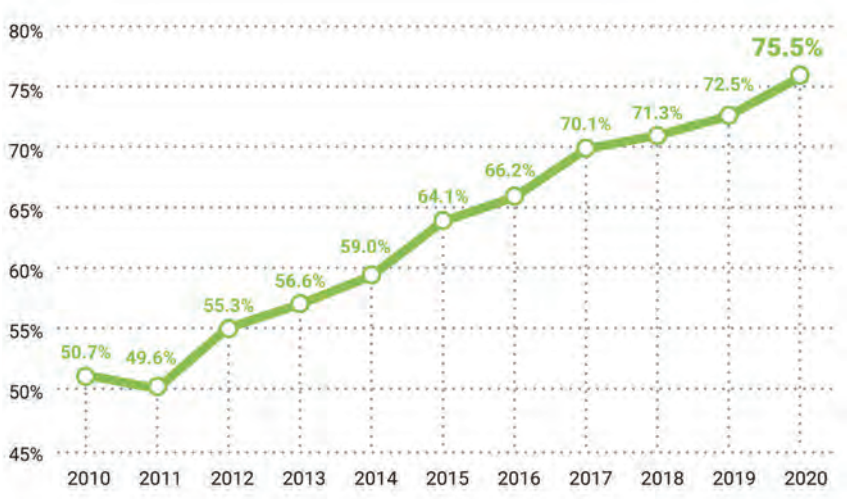
By embracing all sustainable solutions to decarbonisation, the EU would empower more people to contribute positively to carbon-neutrality and avoid a potential backlash from mandating new technologies before they are economically viable.

The urgency of the need to decarbonise EU transport is unquestioned. Simply put, when it comes to reducing transport emissions, Europe cannot afford to wait.

The new, higher ambitions under Fit for 55 make it even more important for EU to unleash ethanol's potential to contribute to this effort. But the European Commission keeps finding ways to hamstring the ability of Member States to achieve those goals – for example by relying on outdated sustainability arguments to justify capping the contribution of

Average certified GHC emmission savings in %

Since 2011 the average certified greenhouse gas emission savings of renewable ethanol against fossil fuel have increased continuously, reaching 75.5% in 2020.



Source: Aggregated and audited data of ePURE members under RED I methodology, compared to a fossil fuel comparator of 83.8 gCO2eq/MJ

crop-based biofuels and excluding them from decarbonisation efforts in the maritime and aviation transport modes.

The main questions about the sustainability of biofuels were settled after the EU adopted the last revision of its Renewable Energy Directive in 2018 by phasing out high ILUC-risk biofuels, namely palm-based biofuels. It is now firmly established that deforestation and outdated 'food vs. fuel' arguments do not apply to EU renewable ethanol produced from European crops.

Now that sustainability issues have been settled, the EU should unleash the potential of truly sustainable crop-based biofuels and encourage the wider deployment of advanced biofuels.

EU leaders have highlighted the importance of making sure that all Europeans can participate in the drive to carbon-neutrality – not just those who can afford certain technological solutions such as electric vehicles. That means empowering them to take advantage of a variety of solutions.

For example, the CO_2 standards for cars and vans Regulation should recognise the benefits of using renewable fuels such as ethanol to reduce the carbon-footprint of vehicles on the road. The Energy Taxation Directive should incentivise renewable fuels, with prices at the pump encouraging renewable fuel over fossil.

Boosting renewable ethanol use generally would also maximise the contribution of EU agriculture and industry to achieving climate and energy objectives in several ways.

It would ensure a socially just decarbonisation of transport energy, by maximising renewable ethanol GHG savings and improving urban air quality. It would bolster energy security by replacing imported fossil petrol with EU domestic ethanol.

Importantly, increase use of renewable ethanol would also support agricultural production and rural development by sustaining more than 50,000 EU jobs, most of which are in rural areas. It would help diversify farmer incomes.

It would also support Europe's food independence by reducing the EU's protein deficit thanks to the production of GMO-free protein-rich feed co-products. And it would support innovation and the transition towards the circular bioeconomy with biorefineries in Europe.

Making Fit for 55 fit for purpose requires using proven, sustainable solutions such as renewable ethanol – especially as the need to reduce road transport emissions becomes more urgent. ●

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Rebuilding transparency: The building and data community in collaboration

By Ulrich Filippi Oberegger, EURAC, and Laura Schubert & Emilie Doran, ICLEI Europe

This summer, the European Commission unveiled its plan to reduce greenhouse gas emissions by 55% by 2030. Recognised as a first step towards reaching its goal of carbon neutrality by 2050, the plan has set the EU on a path defined by fair and cost-effective targets.

Building renovation and construction targets proposed by the EU would require Member States to increase the use of renewable energy in heating and cooling by 1.1% annually until 2030, and to renovate at least 3% of the total floor area of all public buildings annually. Meeting these targets would ensure the renovation of 35 million buildings by 2030.

Recognising the financial investment required by Member States to meet these goals, the EU recently launched its New European Bauhaus initiative, which provides possibilities for renovation and building funding through a series of EU programmes.

With a clear destination and means to get there, as well as the momentum behind a COVID-19 economic recovery, there has never been a better time to make significant change in the building and energy sectors.

Despite the figurative wind in our sails, our progress is hindered by two factors.

First, a lack of knowledge and the structure needed to manage such knowledge. With a greater understanding of the current state of the building stock, the European Commission and EU28 countries could craft more effective policies and incentive schemes to turn the tide away from buildings with a large climate footprint. Comprehensive and reliable EU building stock data is therefore integral should we wish to make any real progress towards a more sustainable building stock.

Second, EU building stock decarbonisation is moving at a lethargically slow pace. Nearly 85-95% of the existing building stock will still be in use in 2050. Approximately 75% of said stock is energy inefficient. Among EU28 countries, the annual amount of deep renovation - in which the full potential of a buildings' economic energy efficiency is met – remains around 0.2%. This rate of renovation is too slow to meet the EU's decarbonisation goals.

Advancing the pace of building stock decarbonisation goes hand-in-hand with a solid understanding of the current building stock. Knowledge is, after all, power. The challenge however, is that currently available building stock data is either fragmented, underrepresented, or not granular enough to allow for meaningful analysis.

Knowing the features, and how it evolves, is the basis for being able to improve the European building stock. The EU-funded BuiltHub project aims to change the way data relating to building energy performance, operation and physical characteristics is developed and shared. The project subscribes to the ethos that publicly collected, processed and organised building stock data will lead to increased transparency and, ultimately, improvements in the energy efficiency and sustainability of buildings.

Providing decision-makers with the knowledge to develop sustainably minded building policy is not an entirely new endeavour however, as demonstrated by the launch of the EU Building Stock Observatory (BSO) in 2016. Included as a part of the "Clean Energy for all Europeans package", the BSO uses a centralised repository of information of the EU building stock to inform policy-making and capture year-to-year change. Although it has adapted in recent years, BSO potential has somewhat stagnated, particularly in relation to boosting data transparency and strengthening/enhancing structure.

The BuiltHub project recognizes the value of the BSO database and related analytics, but also sees room for advancement; particularly in relation to the ease, safety and resiliency of data flow. Data gaps and the lack of a roadmap towards more comprehensive data provision are the BSOs key limitations, as well as missing spatial and temporal data. Insufficient amounts of data for some indicators, like smart metering and financing, is also an issue.

According to BuiltHub analysis, there is a clear path forward. By defining a data provision roadmap and a community-minded vision for a durable dataflow, BuiltHub will bolster the characterisation of the EU building stock.

The project fulfils a gap in the current market, by ensuring that the public sector (if mandated) can pursue directives that help transform their data infrastructure and processes, and that the private sector can access high quality and reliable data relevant to the entire building lifecycle. A web-based hub will host a repository for the data, as well as an information platform.

Utilising big data in this way will provide the incentive necessary to develop a reliable and active community of data providers and users. In doing it can enable the design of more effective sustainable building and renovation policies, programmes, projects and financing schemes; ultimately, bringing us one step closer to achieving the climate ambitions that hinge on detailed knowledge of building stock properties and behaviour.

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