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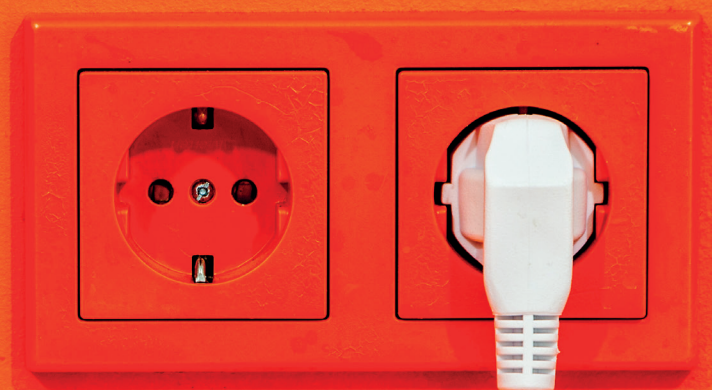
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Energy Edition

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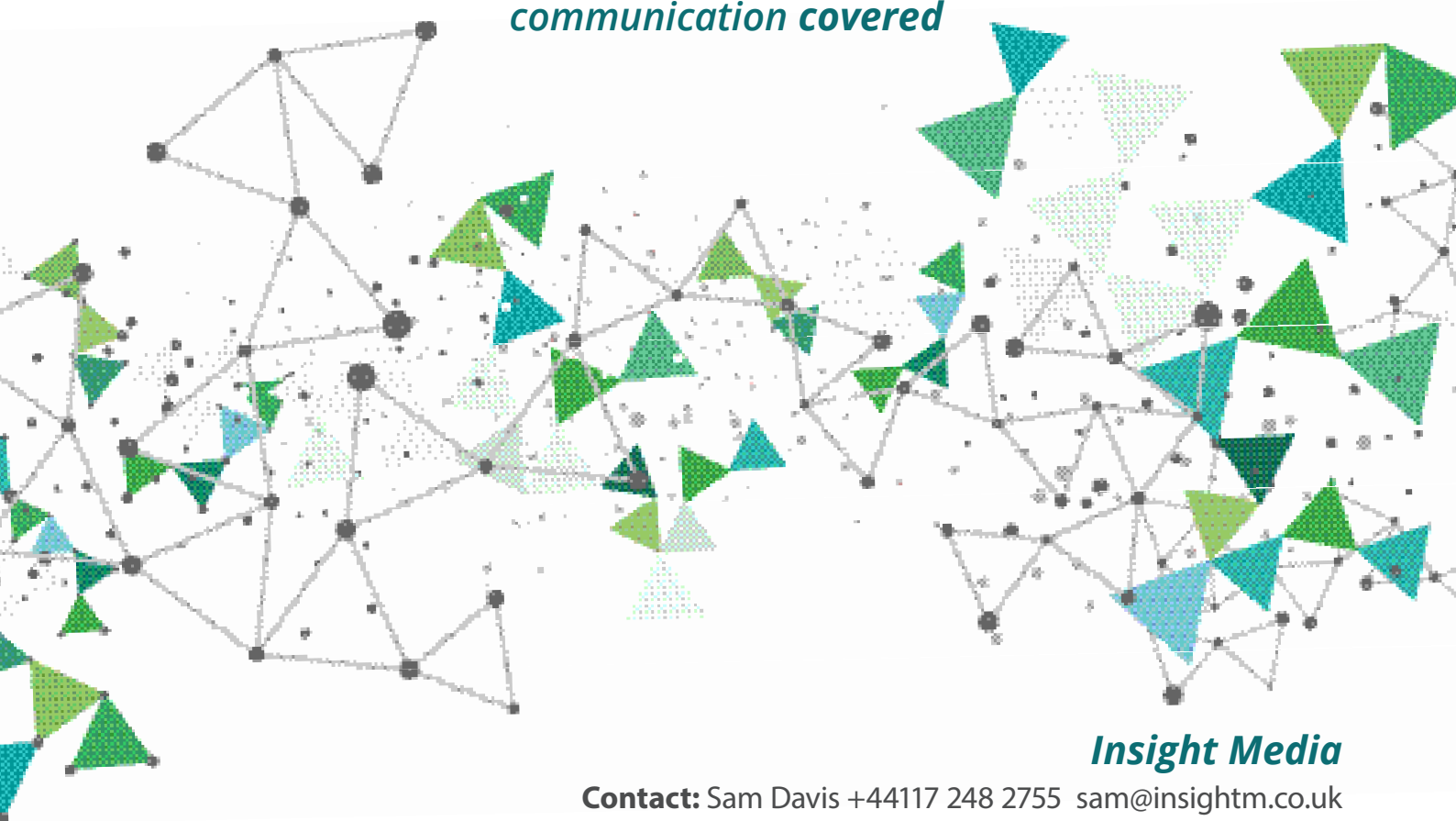
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Insight is full communication and dissemination partner to many
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Projects

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The Sustainable Places conference brings together the brightest minds in Europe each year to talk about how we can improve our built environments. Sustainability targets and climate change objectives cannot be met without addressing buildings, so we need to think about designing, building and retrofitting the places in which we live and work in a more sustainable way. We at Insight Media are excited to be attending the event for the first time this year in Cagliari, Italy, and we hope to speak to many of you over the course of the three days.



This edition of Projects is all about energy which, as you will discover as you read through the publication, is a broad topic of conversation. On one side of the room we have projects such as DryFiciency (page 12), which uses heat pumps to turn industrial waste heat into high temperature streams that can then be used for industrial drying. This helps to improve energy efficiency and reduces reliance on fossil fuels. Then, on a completely different note, we have projects like VIRT-EU (page 36), which is creating tools to help Internet of Things developers (who make up a large part of the Smart Home ecosystem) bring ethics into their conversations.

There is a consensus among experts that the quality of our built environment has a positive impact on the quality of our lives. But are modern urban planning and badly-designed buildings tipping the balance of quality the wrong way? Georg Pendl, president of the Architects' Council of Europe (page 32), is optimistic about our future, particularly if architects are able to play a more central and holistic role in planning.

Europe's building stock is old and inefficient, which is bad for energy targets and detrimental to mortgage portfolios. In a bid to make radical changes, the Energy Efficient Mortgages Action Plan (page 30) aims to create, with the support of all stakeholders, a standardised energy-efficient mortgage as a significant economic incentive to transform the damaging risks from inefficient buildings into a rewarding, low carbon-built environment.

Tim Rotheray is the Director of the Association for Decentralised Energy, a leading trade association that works with industry, the government and energy providers towards an efficient and low-carbon energy system. We spoke to him about the increasingly important role of demand response and aggregators, and how he expects the entire energy ecosystem to evolve over the coming decades. Read the full interview on page 52.

Finally, included in this edition are two EU projects that Insight Media (publishers of Projects) are partners in. Sim4Blocks (page 23) is developing innovative demand response services for residential and commercial applications at the blocks-of-buildings scale, while Rehap (page 15) is creating new materials from agricultural and forestry waste for the green building sector. We have been working alongside these researchers for a number of years now, and it has been fantastic to see results being published after all of the hard work from everyone involved.

Harry O'Neill
Editor-in-chief, Insight Media

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DIGITISED DSR IN FINLAND

Siemens Finland has created a new business to expand its virtual power plant (VPP) activity. Vibeco (Virtual Buildings Ecosystems) is an innovative approach to increase the benefits of increasingly decentralised energy systems. The VPP is a digitised demand-response system which uses a Siemens-operated software platform to balance electrical loads from buildings that have been connected in a microgrid, incorporating renewable energy and energy storage.

"Together with the State of Finland, we are pioneering a model for decentralised energy systems to benefit utilities, business and society," explained Cedrik Neike, chief executive officer Siemens smart infrastructure. The new VPP service will help balance power consumption to decrease the need for reserve power and consequently cut carbon dioxide emissions.

Siemens has two pilot customers for its VPP approach: Finnish Railways will connect the iconic Helsinki Central Station as well as two train depots in a microgrid to create a VPP.





An new intelligent platform is being developed by UKPN to connect renewable energy to the UK network cheaper and faster than ever

UK Power Networks (UKPN) has unveiled plans to create what it claims will be the most advanced electricity network control system in the world, allowing renewables to connect to the network “cheaper and faster”. It is investing £15 million in the Active Network Management (ANM) project, which includes an intelligent software platform from Smart Grid Solutions that will be integrated into its control system.

Sotiris Georgiopoulos, head of smart grid development at UKPN explains, “It’s going to function a bit like your smart phone and apps. The fact it acts as a platform, as opposed to a

solution to a problem, means it will be able to take advantage of emerging technologies around big data, machine learning at AI.”

UKPN’s network currently hosts more than 165,000 electricity producers – the ANM system will process vast amounts of data to run its network and autonomously make complex decisions to optimise the flow of power. This means that the need for building or upgrading existing infrastructure will be reduced, speeding up of new connections, enable markets and flexibility services and reduce costs in the long run. The new system will also enable UKPN’s Active Response project to demonstrate how spare electricity could be moved more efficiently around the network to where it is needed most.



Carbon neutral by 2050

The Committee on Climate Change (CCC) has advised government to set a stringent decarbonisation target in its latest report which urges a net zero greenhouse gas emissions target by 2050, up from its previous recommendation of 80 per cent and delivered for about the same cost.

The CCC called for policymakers to act far more urgently in setting out the required frameworks, with a major ramp up

of investment across heat, industry and transport required. The CCC outlined these key actions and costs in a series of social media posts, warning that current policy would not even hit the previous target.

It also reiterated calls for progress on hydrogen for heat, carbon capture and storage for the government to bring forward the 2040 ban on sales of new petrol and diesel vehicles.

Cheaper wave energy

EU funding for the POLYWEC and WETFEET projects has been granted for the development of a new wave energy technology which promises to overcome the steep costs of marine constructions and protect them from the buffeting they get from the harsh ocean elements.

The team of engineers introduced a wave energy conversion system, equipped with an innovative electrostatic power take-off device (dielectric elastomer generator (DEG)). The DEG is not only less

costly than conventional designs but it is made from far more durable materials.

A scaled-down version of the system, which is designed to be incorporated into existing ocean energy systems, was tested at the FloWave Ocean Energy Research Facility of the University of Edinburgh, in Scotland.

Results showed one full-size device could generate the equivalent of 500 kWh (100 homes). The belief is these devices could be installed in Scottish waters within decades.



Electric vehicles to take over our roads by 2040

The latest forecast from research firm BloombergNEF (BNEF) has revealed that electrical vehicles (EV) are on track to dominate global sales of passenger cars and buses taking up to 57 per cent of the market by 2040, and to encroach significantly on the market for vans and short-distance trucking.

For the first time BNEF has incorporated in its Electrical Vehicle Outlook 2019 forecast the commercial vehicle market, and projections show electric models taking 56 per cent of light commercial vehicle sales in Europe, the U.S. and China, plus 31 per cent of the medium commercial market.

With regards to the electrification trend, the report sees that over the next 20 years

there will be further reductions in EV battery costs, making electric cars cheaper than internal combustion engines alternatives. BNEF also expects that passenger EV sales will rise from 2 million worldwide in 2018 to 28 million in 2030 and 56 million in 2040. Conventional vehicles sales are seen to drop by almost half, however, this fleet will continue growing until 2030 causing a further rise in vehicle admissions.

Lastly, the report estimates that EVs will add 6.8 per cent to global electricity consumption in 2040 and that they will drive a surge in EV lithium-ion battery demand from 151 gigawatt-hours in 2019 to 1,748GWh in 2030.

IN BRIEF

Balancing climate action and social equality

The city of Freiburg im Breisgau, Germany voted at a referendum in February in favour of an eco-district building development plan (named Dietenbach) of 6,500 apartments, schools, local businesses and services with 60 hectares left as green space. According to Dietenbach, the climate-neutral space will encompass energy-efficient construction, green roofs, solar energy, alternative waste heat sources, with an infrastructure dominated by active mobility.

The world's tallest passive house

Bolueta in Bilbao, Spain, is now the tallest passive house building in the world. The 32-storey building with 171 residential apartments was recently issued a certificate as proof of its highly energy-efficient, comfortable and affordable Passive House Standard construction.

EU project reduces the cost of tidal energy

The €20 million Enabling Future Arrays in Tidal (EnFAIT) scheme has already reduced the cost of tidal energy by 15 per cent since launching 18 months ago, says Edinburgh-based Nova Innovation, which leads the consortium. To reach the expected figures of surpassing 40 per cent by 2022 improvement measurement and forecasting of tidal flows will drive these cost reductions.

Transparent tenant energy billing

TEAM, energy management specialist, has launched its Sigma Tenant Billing solution which integrates with existing EMS to deliver effective bill calculation and efficiently apportion utility costs between tenants, cost centres or departments delivering transparent billing. Users can also integrate the data into their accounting system for a quicker billing process.



New superhub in Oxford

Oxford City Council has received government funding to build what it terms a 'Superhub' – a 48MW lithium ion battery plus 2MW/5MWh flow storage hybrid that underpins a network of EV chargers via a 10km private wire around the city. It will also install 300 heat pumps which will also be smartly controlled to enable flexibility trading. As well as powering a public 'ultra-rapid and fast' charging network of around 100 charging points, the plan is to run the private wire to council depots on either side of the city, enabling electrification of Oxford's fleet. The consortium hopes to deliver the storage, private wire and EV chargers by 2020 and the installation of heat pumps by 2021, if planning is accepted by summer.

Optimising geothermal

The city utility of Munich, Stadtwerke München (SWM) plans to tap into its three geothermal power plants (Sauerlach, Dürnhar, Kirchstockach) outside the city to connect them to its Munich district heating networks.

The three geothermal plants should help achieve the goal of fully supplying the city of Munich, Germany with renewable energy by 2040.

The municipal utility has secured a permit for 'Munich Suedost' which allows further research into geothermal resources including seismic measurements, of an area extending into further districts. Using these seismic measurements, the plan is to explore in more detail (3D) how the water-bearing layers run and where there are fractures in the rock, in order to use the thermal water flows underground sustainably.

Boosting wind efficiency

The EU project ROMEO is developing and testing, at three EU offshore wind farms next year, tools that will allow wind farm operators to improve their decision-making processes and shift to less costly condition-based maintenance strategies, such as predicting failures in existing turbines. The aim is to better understand how turbine components behave in real time to boost EU wind energy through more efficient means.

Integrated photovoltaic costs are coming down

In order to achieve the EU 2030 energy targets, the current EU building stock needs to decarbonise quickly and be made more efficient, with attention on building skins such as roofs and facades through the use of innovative solutions and materials.

To help address this issue, the concept of building integrated photovoltaics (BIPV) has been proposed. BIPV's integrate technology, aesthetics and energy systems to buildings in order to maximise the local use of electricity generated.

In a bid to promote the use of BIPV technology various cases are provided by solarfassade to

support the technology transfer and continuous spread of building-integrated photovoltaics. Though the high cost of BIPV systems has been a barrier, in recent years the cost breakdown of PV has reduced BIPV prices, but it is considered essential to build trust of architects, investors and financial stakeholders by showing real stories and business cases.

BIPV technology still needs to overcome some market barriers however, several Horizon 2020 projects are tackling these issues and driving BIPV towards helping transform the EU energy market into a decentralised, renewable and interconnected system.

EC approves Polish waste-to-energy plant

The European Commission has approved, under EU state aid rules, Polish plans to support the construction of a highly efficient waste-to-energy cogeneration plant located in Olsztyn.

The €54 million support will contribute to the EU's energy and environmental objectives without unduly distorting competition in the single market. Cogeneration increases energy efficiency by recycling the heat from power generation for other uses such as public district heating in Olsztyn, to the overall benefit of the environment.

The installation will also help reduce municipal waste disposal in landfills by incinerating 100,000 tonnes of waste that is currently landfilled.

Six steps to better COMMUNICATION

Having a good communication plan at the start of a project is essential for ensuring that your research reaches the right people. We've come up with a six step guide to setting your communication goals and making them a success

1

Consider the objectives and expected impact of your project. Ask yourself in what ways communication can help you to achieve the objectives of your project and ensure the findings/results of your project reach your target audiences.

2

Be in line with the stages of the project. There are stages of development of a project that should be considered when envisaging the communication strategy. These stages are:

1st Stage

First months of the project when most activities have just started. The communication strategy should focus on establishing the conditions for a successful dissemination (in terms of developing the plan, defining the branding and identity of the project, a simple "motto", and setting up the tools and channels to be used during the project).

2nd Stage

When the project has reached a mature stage (usually around the middle of the project's lifetime) and most of the activities are ongoing, with some results have been obtained or produced. The communication strategy should focus on maintaining continuous and steady dissemination (promoting the website, engaging with social networks, participating/organising events...), aiming at creating and increasing awareness around the project and engaging stakeholders in the project activities, whenever necessary.

3rd Stage

Towards the end of the project, when most activities are concluding and some outcomes are available, the communication strategy should focus on intensifying the dissemination towards exploitation and sustainability for some type of projects (i.e. RIA) and commercialisation and market uptake for others (i.e. IAs). Your communication should now be aligned to your exploitation and business models, and contribute to "selling" the benefits of the results, towards potential customers and/or investors.

3

Assess how each work package and activity can be communicated. Each work package and task has its own objectives and expected results. Analyse what type of communication and dissemination actions should be used for each different tasks that will help make it a success and increase its impact.

4

Think about your target groups. Communication goals may vary according to different target audiences – primary and secondary target audiences require different approaches. Tailoring your communication strategy to each target group is essential to its success. Make sure to think about what reaction you are trying to provoke from the people you are contacting. For example:

- Be engaged in dialogue and provide feedback.
- Change on behaviour or attitudes towards a certain topic.
- Take a certain decision or action.
- Influence others and spread the word.
- Use or benefit from the results of the project.

5

Don't forget what is feasible. Don't forget what is feasible when assessing what will be possible to achieve. Try to leverage as much as possible from your existing networks (within the consortium) and "piggyback" on existing related projects and events. How broad or narrow the range of people you communicate with will be dependent on your project, but try to keep your communication objectives as specific as possible.

6

Transform the research results into useful material to be used by the stakeholders. Stakeholders are "hungry" for research results that can be implemented in real life. But often, research results are not available in a format tailored to the users' needs, or are presented in an incomprehensible way (e.g. too technical or scientific language), hampering the valorisation of research results. The projects should analyse and focus on the stakeholders' specific needs and deliver the research results in a way that is exploitable by the stakeholders in their work and practice.

- *Insight Media are experts in research communication and dissemination and are the official dissemination partner in a number of EU projects. To find out more about how we can help you communicate your research, email sam@insightm.co.uk or visit our website at www.insightm.co.uk*

DryFiciency – new heat pump technologies for industrial drying

The European DryFiciency project is developing two new types of heat pump technology that use waste heat to produce high temperatures suitable for industrial drying processes. These heat pumps are being tested in three real industrial settings, with the aim of helping energy intensive industries to improve energy efficiency and reduce carbon emissions

Heat pumps are already regarded as an essential technology in residential buildings for reducing carbon emissions and improving energy efficiency. For industrial applications, heat pump applications are still in their infancy, primarily because the temperatures they typically produce are too low to be efficiently used in most industrial processes.

Nevertheless, many industries stand to benefit significantly from the introduction of heat pump technologies in their industrial processes, using waste energy to provide heating and cooling. Increasing the energy efficiency of an industrial process by installing heat pumps provides substantial cost reductions for the industry. Furthermore, industrial heat pumps have

important positive environmental impacts for society in the form of reduced energy use and carbon emissions.

The EU-funded DryFiciency project is looking into technically and economically viable solutions for turning waste heat into useable heat at temperature levels of up to 160°C. The focus of the project is on



Insight in the closed loop heat pump prototype during construction (Photo credit: AIT Austrian Institute of Technology GmbH)

industrial drying applications, which typically account for 12-25 per cent of the total energy demand in industrial processes.

The project outcomes are two pioneering high temperature heat pump technologies: a closed loop heat pump for air drying processes and an open loop heat pump for steam drying processes.

The closed loop heat pump

Closed loop heat pump systems work by evaporating a synthetic refrigerant with waste heat, compressing the refrigerant and thereby providing heat at higher temperature levels. This delivers a much higher amount of energy in heat than the amount of electric energy needed for this operation due to the reuse of the existing waste heat as a valuable heat source.

The closed loop heat pump technology being developed in DryFiciency is being managed by Veronika Wilk, senior research engineer at AIT Austrian Institute of Technology. Several significant innovations will allow the closed heat pump to produce temperatures of up to 160°C, a temperature which can be used for several industrial drying options. Amongst these improvements is a previously-developed refrigerant known as OpteonMZ, which is well-matched to high temperatures, is non-flammable and non-toxic. Two new



Brick production at Wienerberger (Photo credit: Johannes Zinner)

will be integrated into a continuous starch drying process. The heat pump prototype will deliver up to ten per cent of the heat demand of the dryer and thereby reduce the CO₂ emissions by about 500 tonnes per year and end energy consumption by 2200 MWh per year.

The other demonstration site for the closed loop heat pump is at Wienerberger, a global

the sealant and the lubrication oil for the compressors. We will use online monitoring throughout the demonstrations to evaluate how efficiently the heat pumps are working, and to examine the heat pumps regularly for durability and degradation."

The open loop heat pump

The open loop heat pump developed in the project first began to take shape when Michael Bantle, senior research scientist at SINTEF was in talks with the global manufacturer of confectionery, food and pet food Mars about their drying process used for producing petfood. At the time, this drying process was using up to 80 per cent of the entire production line's energy. "Mars wanted to reduce their energy use by using their own waste heat," says Bantle. "We did some calculations and worked out that using standard heat pumps would require an initial investment of around €1m, which would only be recuperated over the course of 25 years."

"So, we developed a new concept for a compression technology that uses a modified version of a turbo compressor from a car. These are mass produced components – every diesel car has one – so they are fairly cheap. This meant that the initial investment cost for Mars

"We did some calculations and worked out that using standard heat pumps would require an initial investment of around €1m, which would only be recuperated over the course of 25 years"

compressors are also being used which will work at the required temperatures.

The closed loop heat pump is being tested in two industrial settings. The first of these is with AGRANA, the leading Austrian food industry company that applies dryers in the production of sugar and starch. The heat for the dryers is normally provided through the burning of natural gas, but in this advanced demonstration a closed loop heat pump

supplier of building materials, where, similar to AGRANA's food drying processes, heat pump drying is replacing fossil-fuel-based combustion-driven drying in the brick making process.

"Many of the aspects we are looking at in the demonstrations are related to the high temperatures", Wilk explains. "The process is a challenge not only for the refrigerant but for all components that are used in the manufacturing of the heat pump, including



Starch factory Agrana
Stärke GmbH
(Photo credit: APA-
PictureDesk/Agrana/Schedl)

could be reduced by 90 per cent to around €100,000, and the system would be able to save 75 per cent of the energy used for drying.”

The prototype heat pump has now been built, and the researchers are convinced that it can help to drastically reduce carbon emissions by switching from fuel-based combustion technology to electricity. Since the system uses turbo compressors, it has the added benefit of not needing lubrication, meaning that the usual temperature limitations on the lubricant need not be addressed. Because the heat pump uses steam, it is also possible to resort to the many standard components available that are certified to work with steam, although it will still undergo rigorous testing to provide detailed analysis regarding endurance and performance.

The open loop heat pump system will undergo testing for sludge drying processes at Scanship, the leading Norwegian waste processing and water purification company.

Next steps

The project runs until August 2020, so the team is looking forward to the operation of the demoplants. “We want to see what is possible with the configurations that we have at the moment,” says Wilk. “When we get to the end of the project, we won’t have a completed commercial product but we will be close to market entry.”

The versatility of heat pumps means that there are many potential applications for them beyond the ones being tested in the DryFiciency project. Ultimately, Wilk says, the researchers hope that their work can inspire others to consider integrating heat pumps in their industrial processes. “Whenever cooling is necessary or waste heat is generated in a process, heat pumps are a promising option,” she explains. “Our work can hopefully make other industries consider how they can implement heat pumps in order to decarbonise their own processes and gain a competitive advantage.” ★

Michael Bantle, Research Scientist at
SINTEF Energy Research
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PROJECT INFORMATION

Project Title:

DryFiciency – Waste Heat Recovery in Industrial Drying Processes

Project Objective:

DryFiciency elaborated solutions to improve energy efficiency and reduced fossil carbon emissions for energy-intensive industries. High temperature vapour compression heat pumps facilitating the use of waste heat in other processes at temperature levels up to 160 °C are developed, demonstrated and validated in drying processes of several industrial sectors.

Project Duration and Timing:

48 months from 09/2016 to 08/2020

Project Funding:

Costs: €6.7 million
EC Funding: €5 million

Project Partners:

AIT Austrian Institute of Technology GmbH (Lead, AT), Agrana Stärke GmbH (AT), Bitzer Kühlmaschinen GmbH (DE), Chemours Deutschland GmbH (DE), European Heat Pump Association (BE), EPCon Evaporation Technology AS (NO), Fuchs Europe Schmierstoffe GmbH (DE), Rotrex A/S (DK), RTDS GmbH (AT), SINTEF (NO), Viking Heat Engines (NO), Wienerberger AG (AT)



MAIN CONTACT



Veronika Wilk

Veronika Wilk is a senior research engineer at AIT researching on the topic of industrial energy efficiency and use of innovative renewable energy technologies with a special focus on developing and integrating novel industrial heat pump solutions. Veronika holds a PhD in chemical engineering from Vienna University of Technology.

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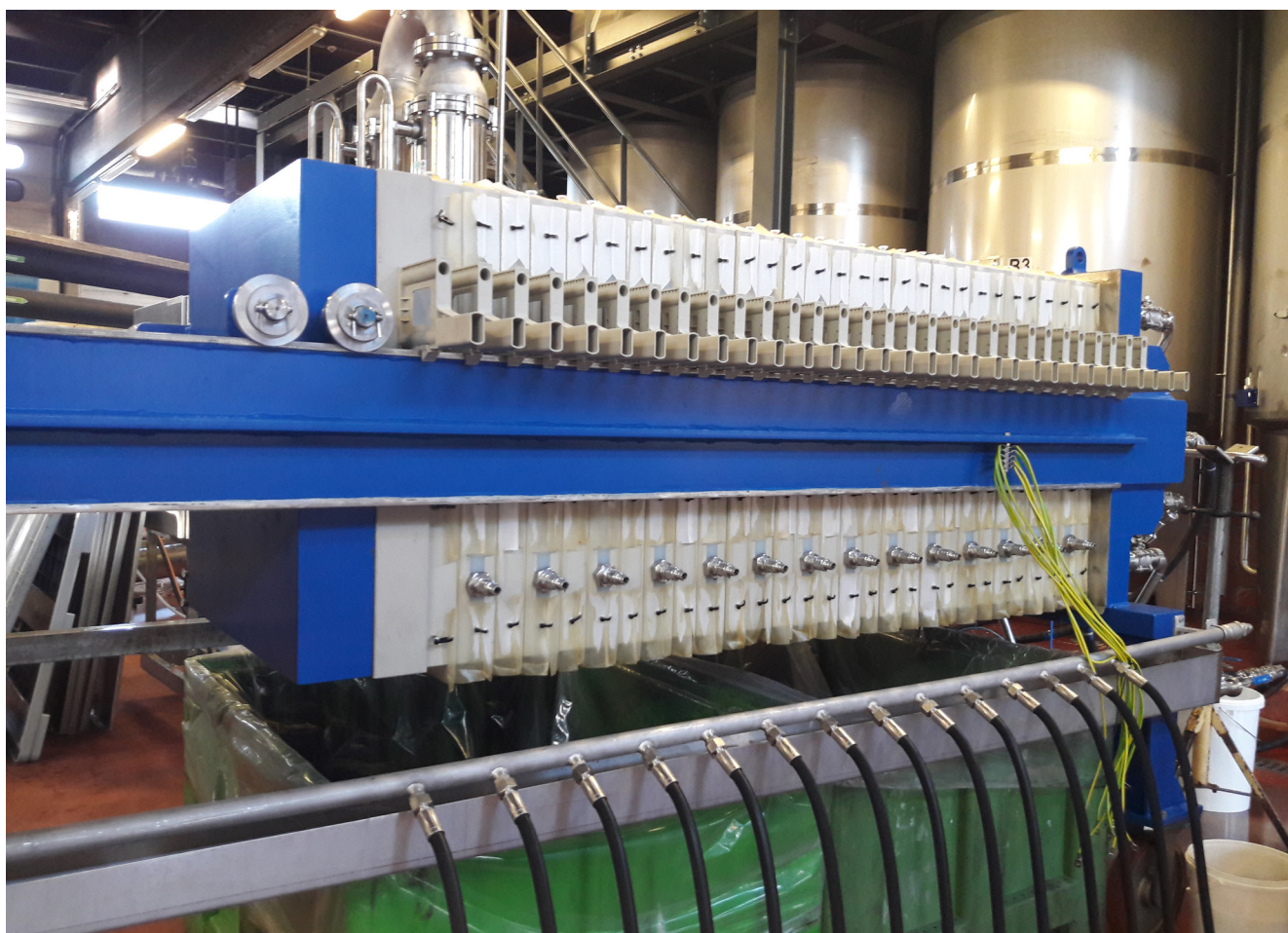
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Helping to reduce energy consumption in the bioeconomy

Rehap is a European project optimising industrial processes in the development of high added-value bio-based products for the construction industry. The goal is to develop technologies for the low-energy production of materials and contribute to a range of policies that are in place to improve the energy and environmental performance of the building industry



Filter press: Membrane squeezed filter press used to isolate biomass at BBEPP, one of the REHAP partners based in Belgium

The drive towards greater energy efficiency is not limited to the generation of heat, lighting or the creation of smarter cities. As the bioeconomy continues to make its own waves in tackling climate change by increasing the production and utilisation of biological resources, biological process and by promoting principles of sustainability and the circular economy, a significant element of

this is in creating the efficient processes needed to achieve both sustainable production and reduce energy consumption in that production.

The cross-cutting nature of the bioeconomy means that it addresses a handful of challenges such as food security, natural resource scarcity and fossil-resource dependence. Currently, the building sector accounts for 40 per

cent of total energy use in the EU with arguably not enough happening to improve the energy performance in the construction industry.

Rehap is an EU-funded project aiming to strengthen the bioeconomy by creating novel materials from agricultural and forestry residues. The project is looking to develop methods to convert these natural

wastes into sustainable polyurethanes, bio-additives and high-performance bio-resins to be used commercially in the green building sector for foams, adhesives, wooden panels and concrete.

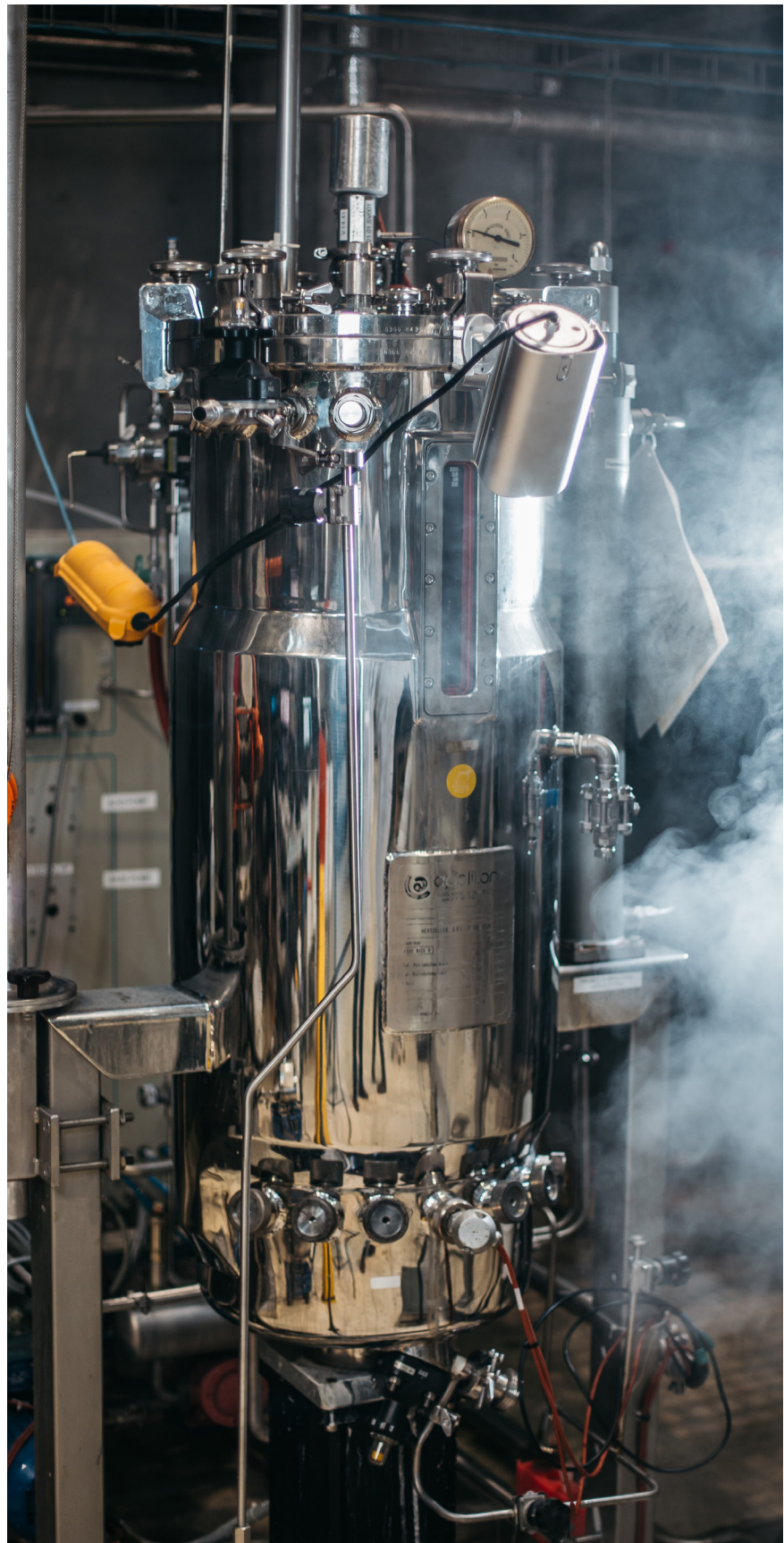
In the development of these new bio-based alternative materials, one of the project's targets is to decrease the use of fossil resources and energy, and optimise alternative energy resources in the process industry. In doing so, Rehap aims to highlight the areas and possibilities available to other industries in mitigating climate change with a renewed industrial base reducing energy demand and lowering emissions.

Optimisation

The efficient use of energy is continually gaining importance and is a crucial contributor towards reducing CO₂ emissions and the energy consumption in the process industry. However, with energy already being one of the largest cost factors in this sector the optimisation and subsequent improved energy efficiency of industry will benefit both the climate and lead to energy cost savings.

"The current state most typical of industrial processes is that they are poorly optimised which is leading to unfavourable environmental and economic impacts," explains Aitor Barrio, research scientist in the Building Technologies Division of Tecnalia and Rehap project coordinator. "However, there is a lot of potential to minimise energy consumption through the optimisation of process conditions, modifying equipment and updating techniques, and that's what we're trying to do in Rehap."

One area in which Rehap is looking to do this is by redesigning factories so that the energy they are generating can feed back to other points in the plants that need more energy. Barrio describes that with the introduction of new technologies based on state-of-the-art innovations, Rehap is able to optimise the processes to obtain targeted bioproducts, reducing the required energy for their production, and increasing the efficiency of the biomass used for the production of energy. "In the production of bioethanol, Rehap partner Biochemtex has created a technology that



150 L fermenter during sterilization at BBEPP in Belgium

"In the production of bioethanol, Rehap has created a technology that produces a residual from lignin which is burnt to produce energy for processes in the factory"

produces a residual from lignin which is burnt to produce energy for processes in the factory. To make this process even more efficient, we optimised the waste process for the retention of bioethanol and increased the transformation of the raw material to bioethanol, leaving a richer lignin residue and less water content which has more combustion power. This means less amount of waste is needed for the higher production of energy for the factory," explains Barrio.

"We're also hoping to propose some further technologies that monitor and control the extraction/fractionation/purification and upscaling processes to improve energy consumption levels. Rehap is investigating the use of waste side streams and temperature optimisation for energy reduction," he adds.

A key challenge facing Rehap, however, is the complexities and heterogenous nature of the processes involved in the development of bio-materials. The project is currently managing seven different products including bio-polyesterpolyols, bio-phenolic resins, bio-fire retardants, bio-1,4 BDO, bio-2,3 BDO, bioplasticizers and NIPUs, and developing new processes in the recovery and valorisation of tannins and sugars from softwood barks and lignin, and sugars from straw hydrolysis residue. Rehap is following tight measures and assessments to evaluate the sustainability and energy impact of all these new processes to propose effective solutions that benefit the energy efficiency of future industry.

Upscaling processes

The unique and complex nature of each of the processes means that when it comes to

upscaling it can get complicated. A significant target of the Rehap project is up-scaling the developed processes and producing adequate amounts for application in the final targeted products for commercial use: superplasticisers for concrete, BioPU monomers for PU adhesives, BioNiPus for PUR foams and bioresins for wooden panels.

This means that the optimisation, new technologies and energy savings executed at lab scale need to be transferable to pilot and industry scale for marketable energy efficiency. However, the acquirements at pilot scale are very different to those at industrial scale, as Barrio explains.

"In the lab you have more equipment, the loads are easier to manage as is controlling the conditions and reactions of the optimised processes. At industrial scale because the equipment is different it is not so easy to manage these types of reactions and the consumption of energy is altered, too, making it hard to calculate the real reductions in industrial energy savings."

Future prospects

In a bid to reduce energy use in a more sustainable building industry, the new processes developed by the Rehap project will directly impact the circular economy. The energy consumed by a building throughout its life comprises of the energy consumed to create it, in refurbishing it, powering and heating it, and lastly in the disposal of the building. As more regulations are in place towards net zero carbon buildings, improvements in reducing the amount of energy in the early and later stages of a building's life become more relevant.

"Waste valorisation of the residuals used in the design and production of Rehap's new products, new materials and new composites, the optimisation of the processes, and the end-of-life and disassembling of the products for use in a new material life cycle is where Rehap is constantly evaluating its energy consumption," concludes Barrio. Across these stages the project is pushing to reduce the amount of energy used in the building industry from cradle-to-grave."★



PROJECT INFORMATION

Project Title:

Rehap - Systemic approach to Reduce Energy demand and CO₂ emissions of processes that transform agroforestry waste into High Added value Products.

Project Objective:

Rehap aims to strengthen the European bio-economy industry by creating novel materials from agriculture and forestry waste, and considering how they can be used commercially in the green, sustainable building sector.

Project Duration and Timing:

48 months from 01/10/2016 – 30/09/2020

Project Funding:

Overall budget: €8 224 644,99
EU contribution: €6 743 545

Project Partners:

TECNALIA (ES), VTT Technical Research Centre of Finland (FI), UNIA Augsburg (AT), RINA Consulting (IT), COLLANTI (IT), FORESA (ES), RAMPF (DE), Insight Media (UK), LAFARGE (FR), BBEPP (BE), Novamont (IT), CUSA (ES), CTXI (IT), Biosyncaucho (ES), Cartif (ES)



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Moving capital from energy supply to energy efficiency



On the 14 September 2018 Dr. Steven Fawkes, Managing Partner of EnergyPro, onlyelevenpercent blogger and long-time expert on energy efficiency and energy efficiency financing presented to the Association of Environment Conscious Building (AECB) Convention, which took place in the UK, giving a keynote talk entitled, "Moving capital from energy supply to energy efficiency". Having been interested in low-energy housing since as early as the 1980s, helping to build some low-energy, self-build housing and a house at Energy World in Milton Keynes, Fawkes was keen to talk and leave some grounds for optimism about shifting capital away from energy supply to energy efficiency, a topic he now spends much of his time working on

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sing a picture of a £50 note and declaring, "there is big money in energy efficiency" Dr. Steven Fawkes set the scene of his keynote perfectly. The £50 note is significant because it's the only bank note in the world to celebrate energy efficiency, many other countries have designs showing oil, gas or electricity. The one he presented, however, displayed a picture of Matthew Boulton and James Watt. Watt, of course, pioneered a much more efficient steam engine, while Boulton helped him turn this work into a successful business.

Boulton and Watt's business offered shared savings energy contracts – taking a share of the savings in coal that the new engine produced when pumping water out of mines. "This," pointed out Fawkes, "is another example of a UK innovation that has never been exploited properly. 250 years later and we still don't really know how to exploit the massive potential for economic, cost-effective energy efficiency which is all around us."

According to Fawkes, decades of studies across geographies and sectors have each revealed that the potential for exploitation is massive. One example of this he used in his address was that "in 2012 the IEA published its Efficient Worlds Scenario, which estimated the potential for energy efficiency as 40 per cent in buildings, 23 per cent in industry and 21 per cent in transport. Implementing this scenario would halve the rate of growth of energy demand and result in emissions peaking in 2020. Significantly, the economic impact would be \$18 trillion, which is more than the combined GDP of the US, Canada, Mexico and Chile in 2011."

Fawkes believes that in order to measure progress in the shift in investment from energy supply to energy efficiency, the starting point needs to be considered. "The IEA now measures the global investment into energy efficiency on an annual basis," he says. "They estimate that total global investment into energy efficiency in 2016 was \$231 billion, and this is increasing. However, there is bad news in that the IEA and IRENA estimate that to achieve their "66 per cent, 2°C" scenario it would need to ramp up to almost \$3 trillion a year in the 2040s, more than a factor of 10 higher than the current level."

To put this into context, he used the statistic that in 2017 the total investment into the energy system was estimated at \$1.8 trillion, and provided a number of highlights:

- Investment in coal was \$79 billion which was 13 per cent down.
- Investment in electrical networks was \$303 billion – with growth expectations in the next few years as it includes storage.
- Investment in fossil fuel generation was \$132 billion, down 9 per cent.

- Investment in renewable generation was \$298 billion which was down 7 per cent. Important to note – the capacity installed in the year actually went up due to the falling costs of wind and solar generation.
- Oil and gas investment went up – Fawkes believes that this could be in line with the oil price and because of the growth of investment in fracking. However, an experienced oil and gas investment banker recently said to Fawkes, "it is now really difficult to raise money for new oil exploration and production companies in London, traditionally one of the global centres for oil and gas funding."

Fawkes was keen to stress that there is no shortage of capital. "Though traditional energy efficiency people have tended to say 'there is no money for our projects', there is no shortage of capital," he says. "Fitch Ratings reported that there is approximately \$9 trillion of global government debt that trades at negative interest rates, i.e. investors are paying to hold that debt. There is a wall of capital looking for good investments and an increasing share of that capital wants to invest in green



Dr. Steven Fawkes



“We need to consider the impact of non-energy benefits and how people make decisions”

projects. Due to an over-supply of funds, the yield a project needs to generate to attract investment has come down.”

In order to tip the balance of investment more in favour of energy efficiency, Fawkes discusses two areas; changing the way we think about energy efficiency and making it more investable.

Changing the way we think about efficiency is something that he believes starts with thinking about it as an energy resource in exactly the same way we think about other energy resources. “Energy efficiency isn’t

something immediately seen,” he says. “Therefore, it takes someone to think about it to really use it.

“There is an energy efficiency resource in almost every building, industrial plant and transport facility,” he continues. “But the resource is only there when you think about it. If you look at a building in a certain way you can see energy (and money) flying out of the roof, the walls, the doors and the windows.”

Studying the oil and gas industry, Fawkes made an analogy with the Petroleum Resources Management System (PRMS), a classification that has been standardised by the industry and which sets out the different types of oil and gas resources and reserves. “In fund raising, the PRMS means that if you have a potential resource, you can raise money on the back of it,” he explains. “It is still high-risk money because you have to drill testing holes and then work out a viable, financeable way of getting the oil out to market and efficiency needs to be thought of in these terms.

“A potential study is like a prospective resource,” he continues. “The output of an energy audit moves that resource into a contingent resource. Then some of the projects identified will be developed and ultimately move into production, that is production of savings of negawatt hours.

“But, for the market to become more efficient, just as an owner of a field in Pennsylvania or Texas may choose to lease their land to an oil and gas company, building owners need to open their minds to leasing their buildings to efficiency exploration and production companies in exactly the same way. There could also be the possibility to hold auctions based on selling the right to explore the building for efficiency resources.”

Fawkes, is however, very much aware of the many barriers that face energy efficiency with one in particular being vitally important – failure to recognise the many non-energy benefits including:

- Better comfort
- Better health outcomes
- Better employee productivity / reduced absenteeism
- Better plant productivity
- Increased asset value
- Reduced need for capex in energy supply
- Poverty alleviation
- Improved local air quality
- and many more.

"We need to consider the impact of non-energy benefits and how people make decisions," he says. "We need to make energy efficiency more strategic. Even in the corporate and investment world, where economics are critical, it has been found that profitability is not the main driver of investment decisions and that financial evaluation tools only play a secondary role in decision making. The strategic nature of a project or investment carries a heavier weight than just the economics. If an action is considered strategic there is much less consideration of the investment return.

"Non-energy benefits such as comfort, productivity, increased resilience etc. are the way to do this for energy efficiency as they are much more strategic and therefore much more interesting than simple energy cost savings. To those developing efficiency projects I suggest they work out what is strategic to the decision maker and stress those strategic benefits. Only as an additional point should you mention that it will save on energy costs."

"There is an increasing amount of work going on around the world to value these non-energy benefits, including several projects funded by the European Commission. Some are difficult to value but many have real and measurable value. Studies by the World Green Building Council and Rocky Mountain Institute have shown the real value of benefits including; a reduction in sick days, higher asset values and reduced capex and build times.

"To build better business cases we need to continue assessing the value of energy savings, and also assess the financial value of non-energy benefits, and assess the strategic effect of the proposed investment. Putting these three elements together will make better business cases and better business cases will help with more capital flow." Fawkes also makes it clear that it's not just about capital investment in organisations. Individuals choosing houses exhibit some of the same characteristics. "Evidence shows that your average customers, not energy enthusiasts or specialists, are sold on passive houses because they increase the overall quality of life by providing a quieter environment, better air quality, greater comfort and longevity," he says.

Returning to the theme of making efficiency more investable, Fawkes believes that energy efficiency is hard to invest in for lots of reasons:

- A lack of standardisation
- The outcome is rarely measured
- Uncertainty i.e. the risks are unknown
- Projects are small compared to needs of institutional investors
- A lack of capacity in financial institutions and CFOs – but also in the supply chain and amongst decision makers
- Traditional contracting models like Energy Performance Contracts arguably don't work well – especially in the real estate, industry and residential sectors

"Several groups and analysts including the Energy Efficiency Financial Institutions Group have identified a lack of standardisation in the way that energy efficiency retrofit projects are developed and documented as a barrier to investment for several reasons. It:

- Increases performance risk
- Increases transaction costs
- Makes it hard to aggregate projects – aggregation is essential because energy efficiency projects are small compared to the size of financial institutions
- Makes it difficult for a financial institution to build capacity – if a bank wishes to deploy capital into energy efficiency it is hard to build human capacity and scale without standardisation.

An important response to the lack of standardisation is the Investor Confidence Project (ICP) which has a project certification system, Investor Ready Energy Efficiency™ (IREE™), which is based on best practice, is transparent and has independent certification by quality assurance professionals.

"ICP and IREE™ were introduced in Europe from the US a few years back with the assistance of the European Commission's Horizon 2020 programme," he says. "The system is now up and running across Europe for energy efficiency projects in buildings, industry, street lighting and district energy. Its impact has been confirmed by Munich Re HSB who offer energy efficiency performance insurance. An IREE™ certified project will offer a lower



Galway Community Centre, a Passivhaus building designed by Simmonds Mills

insurance premium and not require an independent engineering analysis (which the customer pays for), thus proving the thesis that IREE™ reduces risk and transaction costs."

Of course banks and investors also have a huge role to play as Fawkes points out: "There are four reasons why financial institutions should consider deploying capital into energy efficiency:

1. It is a large potential market
2. It can reduce risks in two ways:
 - improving the cash flow of clients
 - avoiding financing stranded assets
3. It helps Corporate Social Responsibility
4. Banking regulations are increasingly looking at climate risks through bodies such as the Financial Stability Board Task Force on Climate-related Financial Disclosures (FSB TCFD)

"The impact of risk reduction and the banking regulations will become more significant. As banks begin to measure and declare their climate-related risks it will drive banking behaviour. Having a mortgage portfolio dominated by high energy-consuming houses will be higher risk than having a portfolio dominated by low-energy houses and that could affect regulatory capital and stress testing.

"Banks and investors are really starting to pay attention to this," he continues. "The International Investors Group on Climate Change, which represents investors with more than €1 trillion of assets under management, supports energy efficiency. In Europe, as well as the work of the Energy Efficiency Financial Institutions Group there are a number of financial institutions that are leading the way. ING Real Estate, which has c.€50 billion lending to commercial real estate, has developed an app to help its borrowers assess the potential for improvement and offers higher Loan to Values for high-efficiency portfolios as well as cheaper money for efficiency improvements. They see this as a) good business and b) reducing the risk of stranded assets as the Minimum Energy Efficiency Standards in the Netherlands progressively tighten.

"Another important European initiative is the European Energy Efficient Mortgages Plan which is backed by the European Mortgage Federation, the European Covered Bonds Council and Horizon 2020. It is developing a standard energy efficiency mortgage for Europe. Though this is a challenge, it will enable scaling which will ultimately allow refinancing through the issuing of green bonds, an asset class that is much in demand by institutional investors."

Fawkes rounded up his keynote by talking about the creation of a level playing field and a real market for energy efficiency. Although the market for energy is clear and functional, like all markets it is based on standard units, known risks, standardised contracts and liquidity.

Hope View House – a dramatic Passivhaus designed by Warren Benbow Architects



Fawkes is adamant there is not yet a market for energy efficiency. "I can call an energy broker or sit at a Bloomberg terminal and buy some energy in the energy market but I can't buy energy efficiency, and that is a major barrier."

"The increasing and fast development of smart meters, cloud computing and big data means that we are seeing the emergence of tools and regulatory systems that can create a real market for energy efficiency. In California now, and increasingly in other states, utility regulators are introducing metered efficiency and 'pay for performance' models where payments are based on actual metered results and not just on the basis of installing a piece of kit.

"At EnergyPro we are working with OpenEE, the pioneer of this approach, to bring it to the UK and Europe with the belief that it has the potential to transform the energy efficiency world by making efficiency a reliable, distributed energy resource which can be included in binding contract agreements and that utilities can rely upon and easily invest in."

Looking to the future Fawkes concludes that we are moving:

- From justifying energy efficiency on cost savings alone to justifying energy efficiency on the basis of its strategic non-energy benefits.
- From a world where energy efficiency was considered to be no risk to a world where we understand the real risks of efficiency projects.
- From a situation where efficiency is a pain to utilities to one in which it is a reliable, contractable distributed energy resource.
- From a world where it is hard to invest in energy efficiency to one where it is easy to invest in.
- From a global annual investment in energy efficiency of c.\$250 billion to more than \$1 trillion a year. ★

Dr. Steven Fawkes founded EnergyPro in 2012. The company specialises in energy efficiency, energy management and the financing of energy efficiency and clean technology. Among other job accolades and expertise, Dr. Fawkes is an experienced public speaker, author, worldwide government advisor and blogger, running his own blog, Only Eleven Percent.

Only Eleven Percent is a repository of all Fawkes' knowledge, experience, proficiency and complete involvement with energy efficiency and energy efficiency financing. From regular detailed blog posts and opinion pieces on matters of energy transition to smart cities, to a plethora of interesting and some startling energy facts, and a detailed jargon buster, Fawkes' blog aims to make it easier to understand the developing world of energy efficiency.

Developing DR business cases in a volatile market place

Sim4Blocks is an EU-funded project with a central aim of demonstrating demand response systems and services in a small-scale blocks-of-buildings format at three pilot sites across Europe. The goal is to develop effective business models to roll out access of these services to electricity markets in a rapidly evolving energy efficient arena at both local and national level



The presence of demand response (DR) is progressing in the realm of smart buildings as a competitive strategy for integrating renewable energy sources into electricity supplies and balancing these supply and demand imbalances for businesses, in industry settings and in households.

For DR solutions to achieve a far-reaching successful uptake across all stakeholder groups in this field, consumers are considered to need to participate in DR by banding together and exploiting their small flexible assets at an aggregated blocks-of-building level. For this option to appeal to industry, viable systems, algorithms and

business models need to be established to prove to aggregators the marketability of bringing small flexible loads in blocks-of-buildings together.

Sim4Blocks is a European project simulating DR and developing subsequent business models for blocks-of-buildings in a living

laboratory environment at three pilot sites with diverse energy systems and consumer involvement in St Cugat (Spain), Naters (Switzerland) and Wüstenrot (Germany).

The project outcomes are to highlight the reliability of combining the flexibility of smaller buildings at cluster level and deliver real-time state-of-the-art DR for the grid through the engagement of consumers and the adoption of the studied business models, narrated by legislative developments, in real energy markets across the EU.

Legislative change in energy efficiency

The EU framework for energy efficiency is evolving and propelling EU member states to change their legislation, impacting the consumption of energy across many EU countries, a transformation Sim4Blocks is reckoning with head on.

Through the continued enforcement of such energy-led frameworks, Europe in the short and long-term can be seen to be moving towards a far more harmonised energy market. "Though positive for EU DR policy," Malcolm Yadack, research associate at Stuttgart University of Applied Sciences believes, "it will be a major challenge to incentivise and implement small scale flexibility markets."

Yadack, member of the coordination team at Sim4Blocks, is helping to coordinate the progress of Sim4Blocks across its three pilot sites and demonstrate proficiently and accurately that in this altering climate of energy efficiency, how much flexibility is available and make clear policy recommendations in publications to cement arguments for the market access of various DR models at local level.

Cluster management

Central to the objectives of Sim4Blocks is the management of DR at the blocks-of-buildings scale and the development of its business models, but the project is confronted with local electricity markets that are unique from one another. "This makes it challenging to generalise the most efficient way to manage energy-flexible building clusters that would be able to provide DR across the EU," Yadack adds.

For example, the Spanish market has high barriers to DR participation in the frequency reserve market and so the project has taken a more pragmatic cluster management approach with customer engagement DR in St Cugat, by measuring the effect of consumers' willingness to adjust energy use in certain scenarios.



Part of the demo site at Wüstenrot in Switzerland and, left, the site map where the work is taking place

Wüstenrot, on the other hand, takes a highly automated approach to DR. The neighbourhood is connected through an innovative agrothermal district heating network. Real-time simulation is key to this site with a complete physical model inputting and analysing different operational strategies for control of individual homeowners' heat pumps..

"The results from these demonstrations are really promising," said Yadack. "They're testing and showing viable, close-to-market approaches to DR that could be replicated in other blocks-of-buildings and district settings."

Successful implementation

In order to disseminate the project's business models successfully into the real economy, the necessary stakeholders in the field of smart buildings need to be involved.

"It is these engagements," explains Yadack, "with noteworthy actors and

The introduction of Europe's new data protection framework is also proving to be a barrier facing the implementation of DR services, especially for consumers and network operators at the blocks-of-buildings level. In a liberalised market, if a third-party actor cannot access the energy data of households in order to offer flexibility at a local level (e.g., to the DSO) then those local markets, Yadack says, will struggle to materialise.

Expected outcome

To mitigate these risks in the development of Sim4Blocks' business models the project is constantly analysing and assessing the market conditions across the board and qualifying value in having a local DR cluster manager. The project is currently putting final touches to the actual implementation of DR systems and optimisation control algorithms to enable aggregators to bring the small flexible loads at the pilot sites to market.

"Industry and the EU as a whole need to take action on policy and market structure if small-scale flexibility is to come to market"

groups such as IEA Annex 67, state-of-the-art aggregators, municipal utility companies and relationships with local residents that are proving valuable in helping Sim4Blocks apply and validate the research on how to assess, calculate and value small scale flexibility into the wider economy."

However, challenges arise in engaging with such a comprehensive and diverse target audience like Sim4Blocks'. Even if the project is able to persuade stakeholders that there is capacity and success for locally aggregated flexible energy, Yadack highlights that Sim4Blocks is very dependent on regulation. "Industry and the EU as a whole need to take action on policy and market structure if small-scale flexibility is to come to market."

"If the local situation, the nuances and specificities of a given neighbourhood can be given the best consideration," concludes Yadack, "and if at the same time Sim4Blocks can provide evidence in its business cases that there is political potential and monetary value in the flexibility that these districts can offer, then the local cluster management of their energy use should be seriously taken into consideration by national and international aggregators as a component in their flexibility portfolios" ★

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PROJECT INFORMATION

Project Title:

Sim4Blocks – Simulation Supported Real Time Energy Management in Building Blocks

Project Objective:

Sim4Blocks is demonstrating demand response systems and services at the blocks-of-buildings-scale at three pilot sites across Europe. The goal is to develop effective business models to roll out access of these services to electricity markets for residential and commercial applications in further EU countries.

Project Duration and Timing:

48 months from 01/04/2016 – 31/03/2020

Project Funding:

Overall budget: € 5 523 043,75
EU Contribution: € 3 729 055,76

Project Partners:

AIT Austrian Institute of Technology GmbH (AT), CIMNE (BEE)Group (ES), EDF Energy R&D (UK), ELIMES AG. (CH), Energea (ES), Enisyst GmbH (DE), HFT Stuttgart (DE), HES-SO (CH), Home Pulse, Promusa (ES), Stadtwerke (DE), UCD Dublin (IR), EIFER (DE), Insight Media (UK), REstore (BE), Wüstenrot (DE)



MAIN CONTACT



Prof. Dr. Wolfram Mollenkopf

Wolfram Mollenkopf, a professor at HFT, has been

responsible for teaching within the building physics and energy technology sector and has been in charge with the coordination of research projects here since 2015. Before this, Mollenkopf worked on the conception of electricity and heat supply at the public utility of Tübingen.

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Digitising building energy renovation

In a market where time, costs and disruption to people's lives are key drivers, the BERTIM project has looked to digital solutions and a prefabrication business model to help boost the market potential for energy-efficient renovation. Project coordinator Nagore Tellado explains how she hopes this approach will lead to greater innovation in the construction sector and, ultimately, more much-needed renovation of Europe's inefficient buildings



The EC has funded many projects supporting its policies designed to increase the energy efficiency of buildings through their renovation, with varying degrees of success. All aim to reduce Co2 emissions, increase energy efficiency, help make buildings less reliant on fossil fuel energy and benefit the environment overall - but while the policies are in place and the research is being generously funded, the market for this type of renovation is just not keeping up.

One of the main reasons for this is that the cost of energy is relatively cheap, while to renovate a building is very expensive and also very intrusive for those living or working in it. If we want to renovate buildings on a large scale to meet the EC's

ambitious targets and change this market situation, then we need cost-effective solutions available that are quick to install and keep to a minimum any intrusion on residents' lives.

BERTIM is a project that may well have a chance in this difficult market. Having just completed its four-year effort, which was coordinated by TecNALIA, the project addressed these two essential elements the market is looking for. On the one hand it has developed a prefabricated solution which allows for cost-effective renovation that improves energy performance, air quality, aesthetics, comfort, and raises the value of the property while on the other hand, it ensures low intrusiveness during renovation works, while providing a clear indication of

any return on investment the improvements will deliver.

There are two elements to BERTIM's approach. The manufacturing element of the solution is included in a holistic methodology for the renovation process, from data collecting to installation. Meanwhile, there is a systemic methodology that is based on a digital data flow in BIM that has been implemented in a bespoke software named RenoBIM. This helps constructors reduce renovation operation time, allows for customised mass production, and lowers the financial risk for investors.

"Put simply, for BERTIM, cost-effective solutions for building renovation have two drivers," says project coordinator Nagore

"This systemic renovation methodology accurately models every aspect of renovation and provides the client with potential cost and energy savings and a potential return on investment before the work starts"



BERTIM prefabricated modules including windows during building renovation by POBI

Tellado from TecNALIA in Bilbao, Spain. "Firstly, we have digitised the whole process of renovation and secondly, we have developed a system of using mass-manufactured prefabricated modules that speed up the whole process and, through a franchise business model, are fully scalable."

Tellado is, however, quick to concede that initial investment costs for BERTIM's renovation package may still be a barrier to market. While compared to traditional renovation solutions, BERTIM reduces installation time by more than half, the prefabricated solution is still not cheaper than the traditional solution at the moment. "Our solution still requires a lot of man effort if done on a small scale," she says. "But, if we are able to use these solutions in a large number of buildings, then an economy of scale will be reached and we will then start to see better returns on investment."

The BERTIM solutions are designed for larger buildings that need to be renovated very quickly, like those in city centres where work cannot take months due to the disruption that would cause. "We have a demo site in France, where we renovated one building in two and a half days," Tellado explains. "While the work in the factory making the prefabricated elements for the renovation takes longer than it does for traditional renovation, the BERTIM solution is very quick to install at the site itself – and digitisation is key to being able to achieve this."

The project has developed its own platform named RenoBIM that effectively streamlines the whole renovation process for timber-based buildings using a complete flow of data for every stage of the process. This involves capturing real building data, using laser scanning or tool station techniques, which is transferred to a 3D web environment for building information modelling (BIM). The BIM application is then used to define the building renovation requirements and communicate with CNC manufacturing machines.

The novel nature of this new RenoBIM tool is that it is comprised of three main blocks:

- **Data gathering and building model template:** from digital data acquisition or directly from parametric values, the 3D template of the building for renovation is

erected. This methodology provides added value to the companies currently working only in data acquisition.

- **Interoperability:** the renovation project will be defined in BIM. Any software used in the construction sector (thermal, structural, fluid, etc) and using BIM will be able to access the building model and so can carry out the required analysis. RenoBIM exports directly to Energy+ for energy assessment
- **Configuration of timber modules:** a predesign and pre-dimensioning on the prefabricated modules can be carried out with the RenoBIM configurator. Once the project is accepted by the client this pre-design is exported to a CAD/CAM software.

"Key to the success of this tool is that it is able to provide calculations of energy efficiency and returns of investment and a first calculation of how many prefabricated modules are needed as well as how these calculations will be affected by the use of different renovation solutions," says Tellado. "This is the very first platform to provide a rough design and calculations of energy, costs, aesthetic in the same platform that can then be exported to IFC to be used with any detailed design software."

The prefabricated renovation modules developed by BERTIM are not only façades that improve insulation and the aesthetic of a building, but also include other elements of the building's services, like heating and cooling, lighting etc. "What we wanted to do was to be able to renovate all these services without having to disrupt those living in the building while the renovation work is carried out," says Tellado.

"So we developed a system where the ventilation and the pipes for the heating and cooling go through the façade and into each dwelling in the building. This prevents problems associated with buildings that are hermetically sealed after renovation, where there are often problems with condensation and ventilation. The pipes and ducts are added to the façade, which reduces the amount of work needed inside each of the dwellings in the building."



PROJECT INFORMATION

Project Title:

BERTIM: Building Energy Renovation through Timber prefabricated Modules

Project Objective:

BERTIM developed a prefabricated solution which provides the opportunity to renovate improving energy performance, air quality, aesthetics, comfort and property value at the same time, while ensuring low intrusiveness during renovation works.

Project Duration and Timing:

June 2015 - May 2019

Project Funding:

European Union's Horizon2020 research and innovation programme

Project Partners:

TECNALIA, EGOIN, EMVS -Empresa Municipal de la Vivienda y Suelo de Madrid, S.A., Institut Technologique FCBA, POBI Industrie, Setra Trävaror AB, SP Technical Research Institute of Sweden, LULEA UNIVERSITY OF TECHNOLOGY, Oslo Kommune, Dietrich's France, TUM Technische Universität München, Building Realisation and Robotics - br2, ASM-Market Research and Analysis Centre



BERTIM project has received funding from the European Union's H2020 research and innovation programme under grant agreement number: 636984

"In summary, this systemic renovation methodology, based on prefabricated timber modules, that accurately models every aspect of renovation and provides the client with a cost, energy savings and a potential return on investment before the work starts," she continues. "It also provides details of the aesthetic of the building, how many modules will be required and their dimensions, as well as details of possible heating and cooling systems renovation to improve energy efficiency and the costs that will be saved. This is all done before the hard work of the detailed design is carried out as it is all

BERTIM's Demonstration building in France after renovation



digitised using one model, rather than each of the stakeholders involved in any renovation currently, who all use their own tools, models and calculations.”

By providing accurate models of the buildings, BERTIM is able to produce very accurate facades that can be applied to the building quickly. For example, the new facades are constructed with the new windows in place, which must be the same size and in the same place as the existing windows on the building. Once the new façade is in place, the old windows can be removed from the inside and this process minimises disruption to those living in the building.

BERTIM has been working with a French manufacturer called POBI, which is able to mass-produce the renovation modules and it is their intention to franchise the BERTIM process across the whole country. Tellado explains how this will work: “There will be companies all over France who are able to gather the building data, use the BERTIM platform to provide a rough estimation before speaking to the client to get agreement on what level of renovation will be carried out, how much that will cost and what returns on investment will be achievable through energy performance savings and how the building will look. Once that agreement is reached, the prefabricated renovation modules will then be produced by POBI at its central manufacturing site.”

Tellado believes there is a very clear business model for BERTIM now that the project has finished and she wants all stakeholders, from architects and constructors to building owners and investors, to see the clear opportunity that it provides in a market with such clear potential for growth.

“To be successful in the market we need to work with architects, developers, constructors and building owners,” she says. “They need to know that there is a timber renovation solution that can be applied very, very quickly. Working with the timber façade manufacturers, they will then be able to make the calculations needed to make a final decision that works for all. The timber façades can then be designed using any material enabling the architect to be able to design the final aesthetic.”

Of course, there are still many challenges ahead for BERTIM and, indeed, the whole energy-efficient renovation market, and Tellado sees the big challenge that needs to be managed is still one of cost. “The main challenge for BERTIM is still that the traditional way to renovate is cheaper, even though the quality may not be so high and the time needed to complete a renovation is much more,” she says. “So it will be difficult for those only considering saving money on the renovation to choose BERTIM. Those who want a very fast renovation where

long-term return on investment can be calculated, however, then BERTIM has a clear chance. “I believe that the construction sector in general is not very innovative,” she continues. “But looking at how the world is moving, those who engage with digitisation and industrialisation first will be the most successful.”

“This sector must incorporate these new technologies to become more efficient. It cannot continue to be so reliant on the manual workforce but must adopt new technologies to streamline and speed up processes, reduce errors on site and improve coordination. If most of the work is done off site to be simply installed on site, it is much more efficient in every respect, while also reducing disruption, noise, dust and risk on site.

“BERTIM does just that and is designed to increase the efficiency of the whole sector by digitising the process, making renovation faster, while also delivering better quality solutions.”★

MAIN CONTACT



Nagore Tellado

Ms. Nagore Tellado, MsC in Fundamental Physics (University of Zaragoza, 1998)

and Executive MBA (University of the Basque Country, 2013). She joined TECNALIA in 2001 as a researcher in urban sustainability. She currently holds the position of Project Manager specialised in International Projects related to energy efficiency in buildings and built environments and development of new products for energy efficiency in which advanced simulation, solution development and decision support tools are involved. She has participated in a large number of European 7th FP and H2020 projects, both as researcher and as project coordinator.

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Laying the foundations in transforming Europe's building stock

Europe's buildings are currently deemed at a rate of 97 per cent inefficient making the EU's building stock both poor performing for energy targets and detrimental to mortgage portfolios. In a bid to make radical changes, the Energy efficient Mortgages Action Plan aims to create, with the support of all stakeholders, a standardised energy efficient mortgage as a significant economic incentive to transform the damaging risks from inefficient buildings into a rewarding, low carbon-built environment

As more houses in Europe are left dilapidated and the overall energy performance condition of its building stock continues to worsen, the need to finance the restoration of buildings to make them more energy efficient is becoming more pressing.

The World Green Building Council (WorldGBC) recently released a report, 'Creating an energy efficient mortgage for Europe: Towards a new market standard' in the

Energy efficient Mortgages Action Plan (EeMAP) initiative, which set out new market standards to make it easier and more appealing for green mortgages to be implemented and to incentivise the renovation of buildings otherwise left to waste.

The report, the first for the sector, lays out a building performance assessment criteria to deliver a standardised European framework for energy efficient





mortgages as financial incentives for energy efficient buildings.

With mortgages accounting for a third of the European banking sector's assets, the criteria in the report for the final energy efficient mortgage framework will be targeted at three core groups: banks and investors, the building sector and energy companies, and governments.

Mutual benefits

Though the report is mainly directed at banks to provide them with a clear guide on how to address better performing buildings in their mortgage portfolios, it also aims to create demand across an EU incentive chain through mutual benefits to further address the positive implications of energy efficient buildings.

By understanding the needs of each participant in the supply chain (borrowers, lenders, investors, SMEs and the government), the wider European market has the chance to revolutionise the accessibility, appeal and practice of energy efficient mortgages. But understanding the consumers' perspective is key to ensuring there will be enough market demand for purchasing these products. However, to grow the market of energy efficient

mortgages to the regional, national, European and even global scale desired, not only will each stakeholder group need to be confident in the impacts of these mortgages, but the report also acknowledges that the financial risk reductions the mortgage scheme proposes need to be proven, and a number of incentivised measures need to be rolled out to increase customer and banker appeal in the form of fiscal measures.

Performance criteria

To help ensure the risk reductions are delivered, such as preventing extra future costs involved in building maintenance and operation due to changing temperatures and increases in energy costs, and that energy efficient mortgages aren't simply greenwashing banks, the report sets out a building performance assessment criteria. This criteria is based on existing tools already available in most EU markets.

The establishment of a performance criteria will ensure that energy efficient mortgage products are fit for purpose. It will lay out what performance standards are needed to deliver risk reductions in mortgage lending, meet the expectations of the market and deliver benefits for the customer. The proposed criteria cover three key areas:

- Energy performance thresholds:
 - An Energy Performance Certificate (EPC) showing;
 - a) Nearly Zero Energy Building (NZEB) compliant
 - b) 20% better than current regulations
 - OR 30% improvement
- Ongoing performance monitoring:
 - a) Actual consumption (meter readings using smart meters where available)
 - b) Revised EPC for renovations (for the purpose of loan performance assessments)
- Quality assurance requirements regarding works undertaken:
 - a) Planned and carried out by qualified/accredited professionals
 - b) Planned to prevent 'lock-in' i.e. future improvements are not made more difficult/expensive
 - c) Documentary evidence of work undertaken

“The report is mainly directed at banks to provide them with a clear guide on how to address better performing buildings in their mortgage portfolios”

The criteria, founded on the input of 500 experts across Europe to underpin the design and operation of energy efficient mortgages, is currently being tested in the EeMAP pilot scheme initiative by 37 major European banks. The mortgage lender would apply all of these to determine eligibility for an energy efficient mortgage. To accompany the criteria, the report sets out a framework of definitions to summarise in greater detail what compliance evidence is needed, the compliance threshold and the rationale grounding each of the three criteras.

To help further deliver an effective performance criteria for maximum impact, the report discloses WorldGBC Europe's extensive research to pinpoint the challenges but also the opportunities of piloting energy efficient mortgages. The report also includes a configuration of the existing opportunities and

infrastructure in place in countries across Europe which mortgage lenders are encouraged to work with in assessing the energy performance of buildings and in establishing the mortgages. For example, in some markets voluntary sustainability certificates have been introduced, which EeMAP encourages mortgage lenders to use for energy efficient mortgages.

However, the diversity of each European market means that with common tools there also comes missing data, adding a level of difficulty when determining the standardised level of energy performance required to obtain the mortgage. Further data collection is proposed in the report to provide more evidence on previous studies that link higher energy performance of buildings with lower mortgage risks.

Implementation

A key element to the continuing design of energy efficient mortgages and future success is to provide assurance and guarantee confidence to all stakeholders involved. The report highlights that to ensure committed backing from lenders for example, a guarantee needs to be made that the predicted performance of a building is matched in practice through third-party or contractor liability schemes, a solution currently underused in the residential market.

One solution that the report addresses to alleviate the challenges of implementing the scheme and enhance existing EPCs is building renovation passports. However, though these tailored building plans prevent lock-in – when renovation work makes it more difficult, or costlier, to undertake further work in the future – they cannot be incorporated into the pilot scheme. A feasibility study on their wider adoption across Europe is not available, and so alternative means to prevent lock-in are reported to be needed in the meantime. Once a study is available, EeMAP will use it to inform future initiatives in the EeMAP.

In order to take the next steps in creating an energy efficient market in Europe, the report ascertains how the EeMAP consortium will continue to ensure the building performance assessment criteria remains fit for purpose. The pilot scheme will provide a lot of data and feedback from the pilot banks on the proposed framework for future developments, whilst the WorldGBC's network will continue to gather expertise from national stakeholders on implementing the framework and raise awareness globally on the benefits of renovating and transforming Europe's building stock.

The report concludes by outlining in detail the immediate and long-term actions that can be taken to enable as many building owners as possible across Europe to participate in energy efficient mortgages, so that the housing stock can turn the tide towards a thriving, clean environment. ★

Architects at the heart of quality built environments



Georg Pendl, President of the Architects' Council of Europe

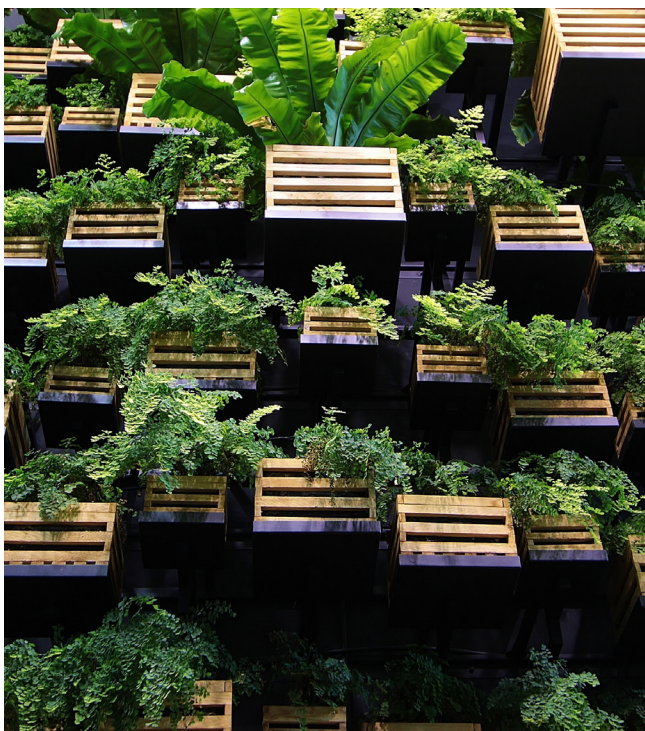
There is consensus that the quality of our built environment has a positive impact on the quality of the lives of the people who live and work in that environment – but there is also a view that modern urban planning and badly-designed buildings are leading to a loss of quality and that things need to change if we are to achieve a more sustainable future. Georg Pendl, President of the Architects' Council of Europe is optimistic about this future, particularly if architects are able to play a more central, more holistic role in planning

Last year, European Ministers of Culture, along with other institutions and NGOs, highlighted in the Davos Declaration "a trend towards a loss of quality in... the built environment... all over Europe", characterised by "the trivialisation of construction, the lack of design values, ...the growth of faceless urban sprawl and irresponsible land use, the deterioration of historic fabric, and the loss of regional traditions and identities".

Of course this statement is an overarching generalisation designed to attract attention to make a very important point. As the declaration also stated, a high-quality built environment makes a "crucial contribution... to achieving a sustainable society, characterised by a high quality of life, cultural diversity,

individual and collective well-being, social justice and cohesion, and economic efficiency", so it is important we work towards achieving this quality. But while there is a broad consensus that a high-quality built environment impacts positively on people's everyday lives, it can prove difficult for public authorities, project developers and built environment professionals to assess and guarantee the quality of the buildings and urban spaces they commission and design.

The Architects' Council of Europe (ACE) has responded to this conundrum with a recent statement called Achieving Quality in the Built Environment, which seeks to define more clearly what quality means. The statement supports the Council of the EU's



HOTEL LONE by architects 3LHD. Photo by ©3LHD and 22-26 by architects Baumschlager Eberle. Photo by Maurizio Tami

decision to create under its Workplan for Culture 2019-2022 an expert group called High-quality Architecture and the Built Environment for Everyone. Georg Pendl, President of ACE believes the focus on architecture within a cultural context may go some way to improving the perceived lack of quality in our newly-developed built environments. "This is something new and I think there is good chance that this will improve things," he says. "Firstly, on the political level, it seems more evident that the success of the whole European idea will not be based on economic success alone. This does not create a mutually beneficial experience for all in the union. Culture could be a much stronger driving force for the European idea and this may make architecture more relevant."

Pendl will wait to see how serious the commission is about culture when the next budget is published, but he believes that with the new workplan for culture stating that architecture should be for the common good, we are moving in a positive direction. "This is a good thing for the ACE," he continues. "I don't see our role as simply lobbying for architects. I believe our role is to promote the quality of the built environment. I believe that if there is a good built environment and a desire for good quality, then it follows that architects will do well."

"If this workplan is leading to the need for a quality built environment being more clearly defined and an acknowledgement that we need to take care of this for the wellbeing of all, then it helps us in many respects, including in terms of sustainability and energy efficiency."

Pendl believes that architecture needs to play a central role in the whole planning process for our built environments, helping to get the right balance between the cultural, social, economic, environmental and the technical requirements of people living and working in them.

"Architects are able to take a more holistic approach to the whole thing," he explains. "It starts with the shape of the building, the basic volume and ratio of volume, floor areas and all the many factors. The earlier you think about sustainability in the planning process, the more sustainable the result will be."

"If you have a simple plan and then try to make a sustainable building, you are already 70 per cent lost. Taking this holistic view, the architect can start by considering the use for the building, considering things like more mixed use rather than the usual segregated use we have in Europe. The earlier the architect has a role in the planning process then the bigger impact the architect will have."

The problem Pendl sees so often is that decisions taken at an early stage are not long-term planning decisions. For example, traffic solutions are often planned before the buildings are planned and how the buildings will be used. "There are many decisions taken before the core planning process begins, while a lot of the focus is on the business element of any development, the return for the investors."

"And this is what the Davos declaration is seeking to highlight," continues Pendl. "It brings into consideration 'baukultur', a term that means a more holistic way of thinking about the whole planning process – not only the architecture of buildings, but zoning, urbanism, planning processes that involve citizens and the participation of residents and users. These are all elements of 'baukultur' and it offers architects and planners other opportunities for developing better built environments."

"I would say that at the moment in Europe, and for some time, we haven't invested enough thinking, creativity and, to be blunt, effort in

our built environment. A lot is done in a very unplanned, hasty way and this way of doing things is not sustainable. If you consider the development of cities, particularly in Europe where we have a unique model of a dense way of living together compared to other continents, it was very good until the 1920s, 1930s. Since then, urbanism has lost relevance, which can be seen in the new suburbs, which just grow and grow, particularly in the big cities. The growth is accidental, randomised, with little long-term planning. This doesn't start with urban planning. It starts with zonal plans which lead to this enormous urban sprawl as if cities can grow endlessly. This cannot be the case.

"Urban sprawl brings many problems, particularly with the whole infrastructure, which becomes increasingly problematic. This is all on the wider scale. It is also to do with energy use and sustainability as these aspects are not only related to the buildings themselves and the energy they use, but connected to the traffic that is needed to connect people and to move them around for work."

Pendl is also critical of the directives and regulations surrounding the development of modern urban spaces and uses the European obsession with cooling our homes and work spaces. "Cooling is a modern trend anyway. We have only started needing cooling in the last 30-40 years in Europe. It is ridiculous and comes because of the wrong ways to build. A hundred years ago no one had an area of the house they needed to cool and now we have rooms where regulations dictate that the temperature cannot exceed 26 degrees. This is absurd. If it is summer, then it is hot."

The materials we use to build are also a very big issue in terms of the quality of our built environments, restricting what architects can do. "On the European level, for example, all the energy directives and the ever-stricter rules make it more difficult to experiment, to try different materials," he says. "The energy issues are driven by the insulation industry. It's that simple, but a little crazy. We build concrete walls of, say, 20cm and then we

pack in 25 or 26cm of EPS or ESPS, which is something that will cause problems later on." Meanwhile, he says, the renovation of older buildings to bring them up to date and improve their quality in terms of their possible use for homes or work, is restricted by cost and lack of imagination in terms of changing their use.

"Often, renovation concentrates on thermal insulation, which again is largely due to the influence the insulation industry has," he says. "But one should also consider the use of a building and the possible change of use that may be possible, when considering its renovation."

"Take the buildings of the early 20th century. If you just pack them with insulation you lose the quality of the buildings. You may as well just demolish them. The problem is that the design of the building does not match the insulation needs. You can insulate on the inside of the building, but this is not easy and it is not cheap, while it is also disruptive for the residents. These are cost issues and, though important, the high pressure that is created by all the directives that exist is not good either."

Pendl believes that as we move towards a carbon-neutral future, a better built environment that is energy efficient and helps people lead more fulfilled and happy lives is possible. While the mainstream sector of the built environment is currently very much driven by technology and industry, he wants to see a move towards more traditional, localised methods of building, like building with clay and wood and other natural materials. "I would like to see more work take place where people are using the materials found in the local area for their built environment, making low-tech and simple designs."

"This is not the solution for everything, of course, but it shows us that you can have a completely different starting point and approach in the whole building process and we need this to move away from urban sprawls and homes restricted by ever-tighter regulation to quality, sustainable built environments that make people happy." ★

According to the statement presented on 4 May 2019 in Innsbruck (Austria) on the occasion of the ACE conference "How to Achieve Quality in the Built Environment: Quality assurance tools and systems" the essential features of a high-quality place should include the following

Aesthetics: architectural quality has an artistic dimension; buildings and cities must be beautiful and exciting.

Habitability: the place serves the purpose and achieves the functions for which it is designed. Its technical characteristics make it safe, healthy and comfortable. It is well maintained and provides a feeling of safety. At district level, it integrates harmoniously all necessary functions and services that people regularly require (homes, workplaces, shops, public services, etc.)

Environment friendly: designed to be low-carbon, energy-efficient and resilient to climate change throughout its life-cycle.



Accessibility and mobility: the place is well-connected (public transport) and it is easy to move from one point to another – in particular using soft modes of transport (walking, cycling) – including for people with reduced mobility. The distribution of volumes and spaces is straightforward, making the place easy to perceive by users.

Inclusiveness: the place is designed for all: everyone, regardless of age, gender and ethnicity must feel welcome and have the opportunity to participate.

Distinctiveness and sense of place: the place is specific, fitting the local context, and has distinctive characteristics, generating a sense of place;

Affordability: there is a strong compatibility of the programme with the place and the budget of the client;

Integration into the environment: integration into built, natural and cultural environment in a harmonious and coherent manner.

The ethical challenge of IoT

The Internet of Things is quietly revolutionising the world we live in, especially in the built environment where we are often now surrounded by connected devices. But does technological development leave no room for ethical and moral reasoning? The VIRT-EU project is fighting this assumption by creating tools for Internet of Things developers that help bring ethics into their own conversations

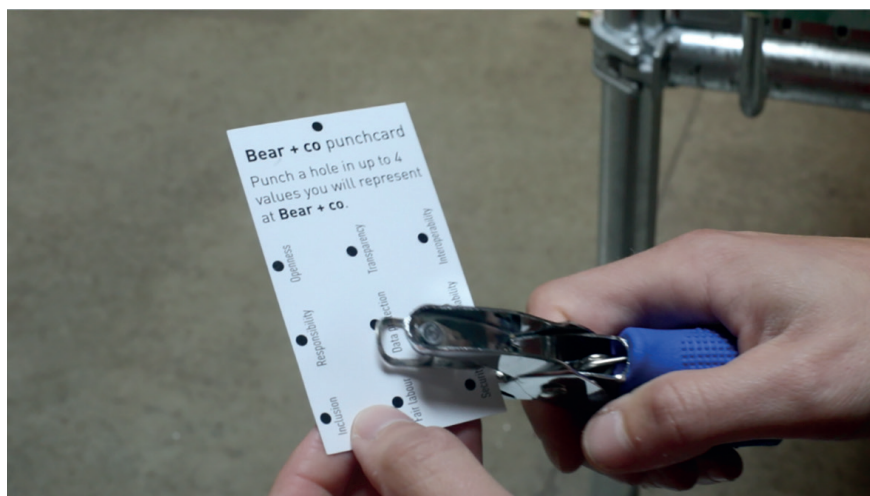
Google's infamous “Don't be evil” motto laid out the core values of its founders in the simplest terms (whether or not you think they have stuck to their promise is another conversation). But is being tech-ethical as simple as just stating your values, or does it require further introspection throughout the process of development?

The imminent rollout of the 5G network has been described as the herald of the fourth industrial revolution, bringing unprecedented connectivity between devices which will transform the way we live. But as more devices in our homes become connected and join the growing Internet of Things (IoT), developers need to start asking themselves more questions about the ethical implications of their creations.

It's become a familiar story lately. A popular “smart” device is found to be embarrassingly insecure or easily hackable, leading to a leak of highly sensitive data. IoT developers are learning fast that security cannot be overlooked, and privacy issues regarding the protection of user identity are equally important. When we buy products like Amazon's Alexa which are intimately involved in our everyday lives – seeing and hearing everything we do – we need to know that the personal data they collect about us is not being misused.

The VIRT-EU project

The VIRT-EU project, coordinated by Irina Shklovski of the IT University of Copenhagen, is creating tools and activities that help IoT developers bring ethics into their own conversations. The project's approach rests on the assumption that when designers of technologies talk to each other, debate and disagree about what tools to use and how to manage and



Participants in Bear & Co select the values that they want to uphold, but their subsequent decisions may come into conflict with these.

respond to data, they negotiate and enact ethics. In this process, they (as do we all) have the capacity to develop ethically from who they are to who they might ideally become. VIRT-EU seeks to identify and intervene in the ethical processes enmeshed in technological innovation, particularly addressing sensing technologies that collect and algorithmically process personal data.

To achieve this, VIRT-EU is analysing and mapping the ethical practices of European hardware and software entrepreneurs, maker and hacker spaces, and community innovators. Leveraging state of the art social science, humanities and ICT methodologies, the project partners have developed new ways of collaborating across different methods and fields. The project goals are to identify and understand from a perspective of multiple complimentary ethical theories the ethical and social values of IoT innovators as they consider data and human behaviour, to trace how these values manifest in design decisions, and to

generate tools that enable ethical and social self-assessment in practice.

To achieve this, the project has developed a Privacy, Ethical and Social Impact Assessment (PESIA) framework and co-designed tools with and for IoT developers that also draw on existing legal and rights frameworks. The main objective of VIRT-EU is to affect the design and development processes of technological innovation by integrating PESIA tools with developer practices, resulting in better alignment with the ethical and social values of EU citizens.

Bear & CO – An immersive ethics experience

One of the tools created in the project, called “Bear & Co”, is an immersive experience that plunges participants into the world of a fictitious IoT start-up. Inspired by the real-life CloudPets – a “smart” teddy bear company whose product famously recorded and stored millions of easily-hacked conversations between parents and children online – Bear & Co invites participants to become



an “employee” of the company and see how seemingly innocuous decisions can lead to ethical difficulties.

Participants are first asked to state their values – what they will bring to the company and care most about. Then, their values are tested through different scenarios and problems. After they finish, their decisions are compared with their initial set of core values – often showing a misalignment between the two.

“Bear & Co is designed to make people think more deeply about the decisions that have to be made when developing an IoT product,” says project coordinator Irina Shklovski. “On the surface, it is easy to think of these decisions as purely technical, but often there are

“We’ve run events where we’ve asked the founders of start-ups to think about a world in which their product is in every household. The vast majority of the time, they end up with some wildly dystopian future because they’ve never considered what would happen at this scale”

these underlying repercussions which may conflict with the values of the developers.

“We’ve run events where we’ve asked the founders of start-ups to think about a world in which their product is in every household. The vast majority of the time,

they end up with some wildly dystopian future because they’ve never considered what would happen at this scale.

There are no easy answers to these issues, but it’s important for people to think about them properly, even though it can be quite uncomfortable for them.”



PROJECT INFORMATION

Project Title:

Values and ethics In Responsible Technology in EUrope

Project Objective:

VIRT-EU addresses these concerns at the point of design through researching and intervening upon the development cultures and ethics of the next-generation IoT innovators. We ask how do European IoT innovators and developers make ethically consequential decisions – about code, hardware and data – for new connective devices?

Project Duration and Timing:

Jan 2017 – Dec 2019, 3 years

Project Funding:

Horizon 2020 EUR 1,999,951

Project Partners:

IT University of Copenhagen (ITU)
London School of Economics (LSE)
Copenhagen Institute of Interaction Design (CIID)
Uppsala University (UU)
Open Rights Group (ORG)
Politecnico di Torino (Polito)



MAIN CONTACT



Irina Shklovski

My research is positioned at the intersection of human computer interaction, information sciences,

sociology and communication, focusing on topics including privacy, big data, interpersonal communication, social networks, the role of technology in organisational practice and in coping with disruptions.

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The VIRT-EU Design Challenge

The project is now inviting working professionals in the field of design and technology to join the VIRT-EU Design Challenge, which aims to address how communal living can be supported and enhanced by IoT.

“We share our space, our information, and our devices in complex ways, even as we simply try to get through ordinary life,” says Shklovski. “We want people to think about how we can use connected Internet of Things systems and products to re-imagine collaborative and communal living that is sensitive to differences between members of these living spaces? How might we design for supporting the infinite diversity of human social configurations?”

Participants can submit their initial concepts now. VIRT-EU will respond with feedback and provide access to its custom tools to support the last stage of concept development. June 20th is the final deadline for full concept development, including a technical diagram, user storyboard and business plan.

Finalists will be announced between June 24th and June 27th, and will be invited to present their concepts as part of ORGCon 2019 on 13 July 2019 in London. The winning team will receive £1200, while the runner-up will receive £750. Both will receive an hour of one-to-one mentoring from an IoT industry leader. ★

To find out more about the VIRT-EU Design Challenge, visit designchallenge.virteuproject.eu

Facilitating the cohesion of energy efficiency and demand response markets

The EU has set targets to make buildings more energy efficient and also offer greater energy flexibility. New and resounding technical and business solutions are considered a necessity to reach these objectives. Two European projects, NOVICE and HOLISDER are both testing innovative models to increase the impact of flexible energy services by addressing the relationship between ESCOs, demand response aggregators and end-users but in slightly different ways – one in the building renovation sector and the other in the deployment of end-user technologies for consumer empowerment

Recent updates to the Energy Efficiency Directive (EED) highlight that EU buildings need to be 30 per cent energy efficient by 2030 and Member States need to incentivise Demand Response (DR) participation and liberalise the market to help lower electricity use at times of high market prices or grid instability.

Currently, energy services companies (offer supporting energy services to end-users), aggregators (acquire flexibility from end-users to serve different market players) and end-users are limited in their involvement in addressing the challenges of the EED. In order to meet these aims, incentives which increase public engagement and the cooperation of ESCOs and aggregators is needed.

In bringing these two stakeholders to work together, not only will they be able to access wider DR markets, but their joint expertise can significantly benefit customers in exploring new revenue streams and reducing their energy costs.

The EU-funded NOVICE project is developing a new business model for building renovation projects that uses an enhanced Energy Performance Contract (EPC), to allow ESCOs and aggregators to work together. By combining revenues from both energy efficiency and demand response, clients can maximise revenues from their energy assets which leads to shorter payback periods and an improved return on investment compared to



Moorhouse, UK



Pilot in Finland



PROJECT INFORMATION

Project Title:

HOLISDER. Integrating Real-Intelligence in Energy Management Systems enabling Holistic Demand Response Optimization in Buildings and Districts

Project Objective:

Introduce a Holistic Demand Response Optimization Framework that enables significant energy costs reduction at the building/ consumer side, while introducing small and medium sized buildings (residential and non-residential ones) as a major contributor to energy networks' stability through optimised energy management in response to network constraints and conditions.

Project Duration and Timing:

October 2017-September 2020

Project Funding:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768614. EU contribution M€ 3.9

Project Partners:

TECNALIA, HONEYWELL, HYPERTECH, TNO, ETRA, SOLINTEL, KONCAR, BELIT, ASM, MYTILINEOS, KIWI, CAVERION, BEOELEK



HOLISDER

"In bringing these two stakeholders to work together, not only will they be able to access wider DR markets, but their joint expertise can significantly benefit customers in exploring new revenue streams and reducing their energy costs"

projects that consider energy efficiency alone. NOVICE will attempt to demonstrate and validate this business model through implementation at pilot sites in some of Europe's most mature energy markets.

The HOLISDER project is taking a more technical and consumer-centric approach, in the context of Living Labs and four pilot site demonstrations. The project aims to pull together intermediaries and third parties for defining new business models in energy efficiency and DR optimisation. By acting on behalf of the consumer, third parties can give them more empowerment in energy market transactions across Europe.

United cause

Throughout the EU, energy markets are volatile and at odds with one another, regulated and managed differently from one to the next, making it extremely difficult to implement cohesive

applications and policies for smart sustainable buildings. HOLISDER and NOVICE are developing new business models to demonstrate the opportunities available in open markets, such as those in the United Kingdom and Ireland where more DR markets are open, mature and more accessible. These models will offer a major opportunity to influence policy makers and regulators to integrate, monetise and create new revenue streams in otherwise restricted markets.

"It is rare to consider both energy efficiency and DR together in a single building retrofit project," Jo Southernwood, coordinator of NOVICE believes, "but both NOVICE and HOLISDER are looking at new business models that enable these two approaches to work together in closer alignment." Southernwood and Ander Romero, project coordinator of HOLISDER, see eye-to-eye in the slight differences



MAIN CONTACT

**Ander Romero**

Project Manager in the Building Technologies Division of TECNALIA. Having worked for more than 15 years

managing projects and departments in the fields of energy efficiency and sustainability in buildings and cities, he has extensive experience within the international research and innovation industry.

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between how each project is going about this.

“HOLISDER is developing new and innovative technologies that facilitate residential and small tertiary buildings to be involved in the DR market with more ease through collaboration with ESCOs and aggregators,” explains Romero. “NOVICE is more focused on emerging value propositions for commercial buildings, using a new EPC template to combine the services of ESCOs and aggregators into a single offering that that benefits all stakeholders,” adds Southernwood.

This collaboration provides each market player with the opportunity to access a new market type and facilitate consumers’ involvement by making the most out their flexibility value. Traditionally, ESCOs and aggregators work quite independently – ESCOs typically attract public sector clients whilst aggregators look for industrial clients with large, easily controllable loads. “By working together, an ESCO might be able to provide energy efficiency advice to some of those industrial clients they otherwise wouldn’t interact with, and an aggregator might be able to provide DR services to public sector clients they wouldn’t normally have approached,” explains Southernwood.

For HOLISDER, “this collaboration means helping aggregators act as energy service providers, and ESCOs and energy retailers as aggregators, to offer DR optimisation services to individual consumers,” Romero added.

Addressing market barriers

Though the partnership between ESCOs and aggregators is a challenge in itself, the contrast in the level of maturity of energy markets across Europe and the subsequent involvement in, and implementation of, DR services is a greater barrier that both projects are also addressing, making it important to understand the dynamics and opinions between existing players in the market today. Currently, when completing a building energy efficiency upgrade an ESCO will secure finance to deploy energy saving actions on the client side and recover their contracted investment in

static revenue, Southernwood explains. This current model, which also sees clients have two separate contracts for aggregators and ESCOs, can be unattractive in terms of contract length and returns on investment making it difficult to persuade clients and investors to sign up to energy saving contracts. “At NOVICE we are looking to roll out a dual energy services business model for building energy renovation upgrades to see whether it’s possible to include conditions and clauses that cover both DR

themselves from competition, Jo adds. HOLISDER is also using demonstrations and results to address the barriers the project faces in implementing DR across the EU. Four pilot sites are located across Europe in Greece, UK, Finland and Serbia, incorporating diverse building typologies to validate the establishment of an open interoperability and data management framework comprising in a fully-fledged suite of tools for DR implementation spanning diverse climatic conditions, demographics and cultures.



and energy efficiency services into a new EPC contract. This will bring aggregators and ESCOs together for significant financial and energy efficiency benefits,” Southernwood states.

“The lack of government support, complexity of EPCs, lack of familiarity across the EU on the opportunities DR services offers and the perception that building owners or managers will lose control of their building, however, makes our business model difficult to implement,” she adds.

In a bid to increase the engagement and implementation of a dual energy business model the project, now in its final year, is organising workshops, webinars, events and developing online tools to attract all the actors across the supply chain – building owners, end-users, ESCOs and aggregators for example – to start them thinking about the different ways they can do business together and differentiate

Romero goes on to describe how HOLISDER, like NOVICE, is keen to engage with all actors along the DR value chain (building occupants, ESCOs, aggregators, facility managers etc.) and gather intelligence to overcome the several challenges the project faces. To help implement the project’s business models which look to pull together ESCOs and aggregators to help tackle market capacity restrictions that cannot be addressed by individual consumers, the project is adopting a Living Labs approach.

“The Living Labs will be a platform to validate the co-creation of the energy efficiency and DR sectors the project is targeting,” explains Romero. “They will look to address the engagement of pilot site occupants, involve and train end-users to transform into active market players through a variety of innovative end-user applications such as personalised informative billing and load scheduling, plus enable extensive feedback obtainment

and ensure the seamless exchange of best practices between all stakeholders involved towards user-driven open products and services.” The business models derived at the end of the project will inform and educate aggregators and ESCOs on how they can better manage their markets, individually and collaboratively, for the wider deployment of DR through the increased engagement of their customers.

Driving trends across the EU

Raising awareness of how DR systems can be implemented more successfully and facilitating the deployment of these solutions to improve the energy efficiency of smart buildings aligns with the energy targets set out by the European Commission.

From the outcomes of the projects and their results, both HOLISDER and NOVICE are keen to provide recommendations on realistic regulations and mechanisms that could increase the DR uptake across EU Member States and mediate the active participation in various schemes for more sustainable and smart buildings. In order to incentivise this successfully, there is the understanding that the standards put in place need to cater for the unstable energy markets. “At HOLISDER,” Romero points out, “the project is looking to provide

personalised energy management guidance or automation, and developing five emerging business models to address the current energy market of aggregators, retailers and ESCOs, in order to make it easier for each energy market to be included. For NOVICE, with its aim of increasing renovation rates of tertiary buildings throughout Europe by taking advantage of the dual revenue streams created by energy efficiency and demand response, the differences in energy markets across Europe also creates an added challenge. “Knowing of the complexities of the energy markets and the unique interests of investors in EPCs, it’s extremely difficult to develop a business model suitable for every European market,” Southernwood states.

“What NOVICE can do is create complete or simplified models using data from a range of stakeholders in well-established markets. NOVICE can then look to establish a standardised risk assessment for investors to help them make decisions on energy related projects. These can be used as case studies to support policy recommendations that can be replicated throughout the EU, to make it as simple as possible for other Member States to adopt similar models,” she continues.

“It is rare to consider both energy efficiency and DR together, but both NOVICE and HOLISDER are looking at new business models that enable these two market players to work in closer alignment”

advanced adaptability to DR regulations by allowing the ability to switch between the different DR services, implicit (the consumers reaction to price signals), explicit (open, tradable flexibility) and hybrid and their applicability in varying market structures.”

The project is also making it easier to implement the wide adoption of flexible energy services by ensuring the replicability of its Interoperability and Secure Data Management Framework across different EU building types and systems, establishing a human-centric DR optimisation framework that provides

From one project, measuring the appeal and financial viability of the NOVICE dual revenue stream EPC template, to another, facilitating the real-time optimisation of energy management services in an ever-changing market place. Both NOVICE and HOLISDER are raising significant awareness and interest of how a coordinated effort between ESCOs, aggregators and end-users, is needed at local and European level to provide a solution that successfully addresses both demand response flexibility and improves efficiency in infrastructure of the EU energy market. ★



PROJECT INFORMATION

Project Title:

NOVICE - New Buildings Energy Renovation Business Models incorporating dual energy services

Project Objective:

NOVICE aims to develop and demonstrate an innovative business model that provides energy savings to buildings and demand response services to the grid when buildings are renovated. This will create a dual revenue stream, reducing the payback period for building renovations and accelerating market uptake of Energy Performance Contracting.

Project Duration and Timing:

3 years starting on 1st June 2017

Project Funding:

H2020 funded, €2.041 million

Project Partners:

International Energy Research Centre, Tecnalia, KiWi Power, Hypertech, e7, Solintel, Joule Assets, Noel Lawler Green Energy Associates, Apleona



MAIN CONTACT



Jo Southernwood

Jo is a skilled low carbon energy specialist with over 10 years' experience in energy efficiency

and low carbon technologies for the built environment. Jo coordinates the NOVICE project, which is exploring solutions that combine energy efficiency with demand side response to improve ROI for deep energy efficiency retrofit projects.

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We cannot afford to hesitate anymore

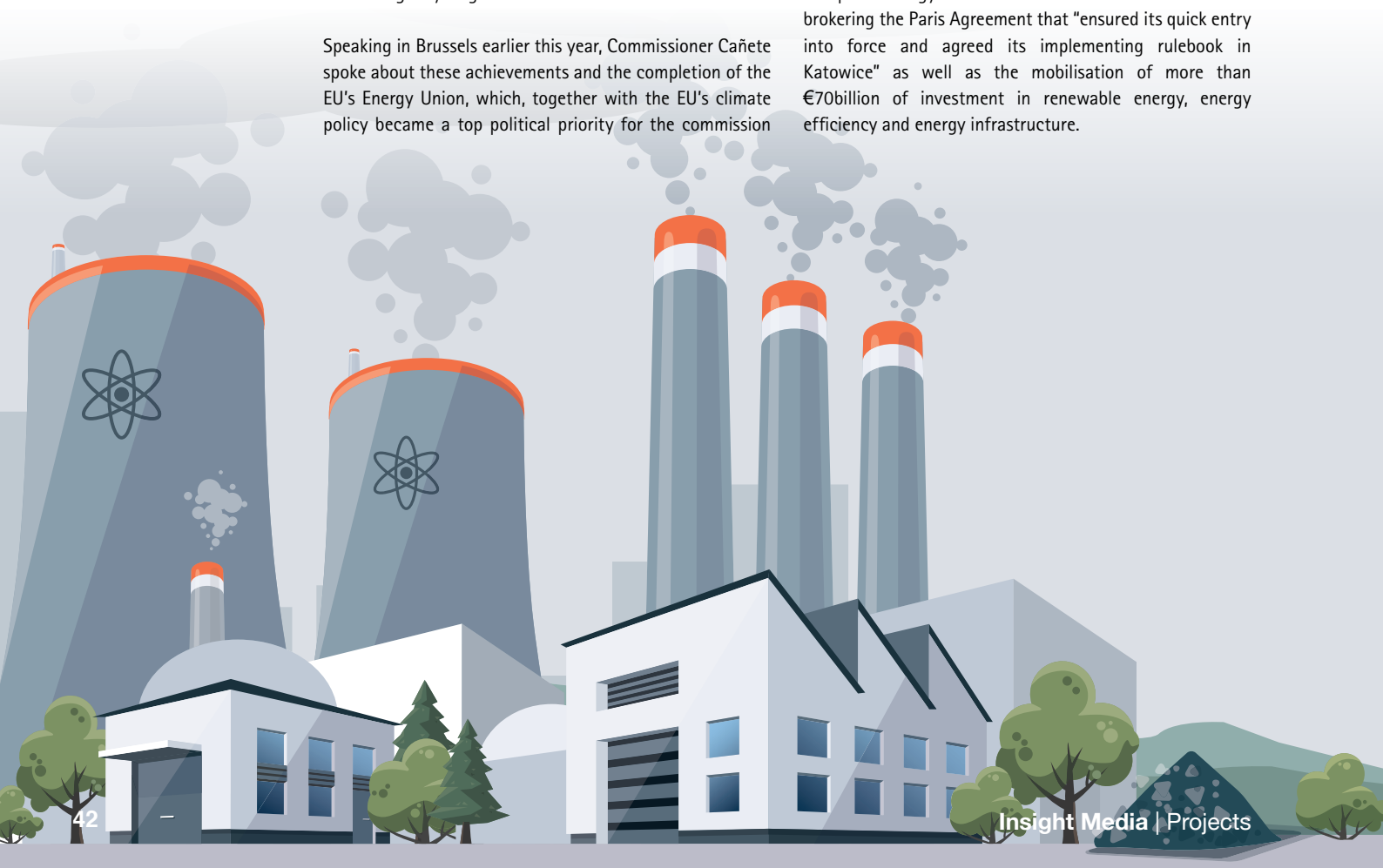
According to the Commissioner for Climate Action and Energy Arias Cañete, Europe's Energy Union has achieved a great deal in helping move towards a more energy-efficient and carbon-neutral world – but he fully acknowledges that there is still a long way to go and that a coherent combined effort is still required in order to hit ambitious targets. Here, Commissioner Cañete outlines his pride in what has been done so far and looks at what needs to happen now

Commissioner Arias Cañete, in charge of Climate Action and Energy at the European Commission, is a passionate advocate of the commission's climate and energy framework, which promotes a gradual transition away from the use of fossil fuels towards a climate neutral economy. He calls it "the world's most ambitious and advanced framework" dealing with this challenge, but is open about the fact that though the actions that have been taken over the past few years have been far reaching and have taken place in "record time", he believes there is still a long way to go.

Speaking in Brussels earlier this year, Commissioner Cañete spoke about these achievements and the completion of the EU's Energy Union, which, together with the EU's climate policy became a top political priority for the commission

under President Juncker and an "extensive technical manual to achieving our climate and energy goals by 2030". But he also believes that the commission has achieved far more than simply "translating the European Council conclusions into action points, and we have now agreed all the necessary legislation to meet our 2030 targets".

Indeed, Commissioner Cañete went on to list these achievements as positive actions that have led to new targets, more funding and a further integration of the European energy market. He lists the achievements as brokering the Paris Agreement that "ensured its quick entry into force and agreed its implementing rulebook in Katowice" as well as the mobilisation of more than €70billion of investment in renewable energy, energy efficiency and energy infrastructure.



He goes further, to include the creation of "an enabling framework for industry to innovate and for clean investments to flow." This framework includes the 25 per cent climate-mainstreaming in the proposed next EU budget, the sustainable finance initiative, the batteries alliance and the coal regions in transition platform.

"We also agreed on higher targets for renewable energy (32 per cent by 2030) and energy efficiency (32.5 per cent by 2030), which would allow the European Union to reduce emissions by 2030 beyond our current 40 per cent target – to around 45 per cent compared to 1990."

Meanwhile Commissioner Cañete acknowledged that it was not enough for the EU to contribute to the Paris Agreement's temperature goals and so "we set a long-term vision for a prosperous, modern and climate neutral economy by 2050."

A particular high point for the EU in terms of its climate and energy strategy, Commissioner Cañete believes, is the integrated European energy market. Here he listed the achievements to date as being: the Baltic states' electricity markets now being "on the way to be synchronised with the Continental Electricity Network"; the interconnection between the Iberian peninsula and the rest of Europe being "enhanced"; the increase in gas diversification and the end of "dependency on a single supplier in many Member States" and, with energy being traded more freely across borders, "wholesale electricity prices have decreased by six per cent between 2010 and 2017."

Perhaps more important than listing achievements, however, is outlining a clear strategy for the future as well as concrete actions that will ensure policy is delivered and targets are met. Commissioner Cañete concedes that if the Energy Union is to deliver these results, then there are a number of priority actions that need to be taken and that many of these are urgent.

Once again, the Commissioner was able to outline these actions during a speech in Brussels in April 2019, framing the efficacy of the Energy Union framework to be "only as good as its implementation and proper enforcement". He said: "We need to finalise the swift adoption of the remaining legislative proposals for an effective implementation of our strong and ambitious regulatory framework."

"We need to complete key infrastructure projects to deliver on an integrated European energy market for solidarity. Chief amongst them, the Baltic synchronisation, France/Spain/Portugal interconnections, energy hubs in Central and Southern Europe, and the North Sea Grid."

He was also clear on the need to keep up the deployment of renewable energy across Europe and step up efforts to save more energy.

Commissioner Cañete



"As for renewables, the EU is on track to reach its target for 2020," he stated. "In 2017, the share of renewable energy in the EU energy mix reached 17.52 per cent. This is above the indicative trajectory of 16 per cent. 11 Member States have already achieved their 2020 target, 10 Member States are already on, or above, their interim trajectories set for 2017-2018, and seven Member States would need to step up efforts to comply with their 2020 targets."

In terms of energy efficiency, Commissioner Cañete outlined the need to intensify efforts to reach the 2020 target. Following a gradual decrease between 2007 and 2014, energy consumption has started to increase, and it is now slightly above the linear trajectory for the 2020 targets. This needs to change, he said.

"In 2017, the share of renewable energy in the EU energy mix reached 17.52 per cent. This is above the indicative trajectory of 16 per cent"

"To prevent this, we have taken an early action. In 2018, the Commission established a dedicated task force on energy efficiency with Member States to fully exploit energy efficiency potentials and look both short-term and long-term solutions. For the period 2021-2030, the Energy Union has been structured with the new Governance Regulation, which will allow Member States to achieve their energy and climate targets in a coherent and most efficient way. All Member States have now officially submitted their draft integrated National Energy and Climate Plans."

The Commission is currently assessing these plans and there will, potentially follow recommendations in June 2019 which will be looking at elements such as the completeness of the plan, the ambition of objectives, targets and contributions, the adequacy of supporting policies and measures, the coherence, policy interactions and investment needs, and the opportunities for regional cooperation.

"As a preliminary overall assessment," he said, "I would say many Member States have included headline figures and goals in their plans without detailing the measures and policy tools necessary to meet their objectives. We will be seeking more clarity and information from many Member States as we draft our recommendations."

Commissioner Cañete then called for more efficient and democratic decision-making in some energy policy areas, including in the nuclear area.

"It is absolutely essential that our taxation framework gives the right incentives to consumers and facilitates the deployment of key emerging technologies for a climate neutral, energy-efficient and circular economy," he said.

"Today's energy taxation framework, which is 16 years old, is clearly outdated in this sense.

"There is just not enough policy coherence between the energy taxation framework and the energy and climate policies and objectives. One of the reasons for this is the unanimity requirement in the area of energy/environmental taxation, which prevents Member States from finding swift agreements on Commission proposals.

"Also, the European Parliament should have the same role in decision-making as for all other energy and climate policy legislation. This would be possible without a treaty change by means of activating one of the so-called 'passerelle clauses' which would allow us to pass to the ordinary legislative procedure."

Speaking about the Euratom Treaty, Commissioner Cañete said that the treaty provides the most advanced legal framework for nuclear, in particular in the areas of nuclear safety, waste management or radiation protection, but that it was signed in 1957, and has never been adapted. "We believe it needs to evolve in line with a more united, stronger and democratic European Union," he said.

"That is why we propose to reflect on ways to enhance the involvement of the European Parliament and of national Parliaments in policy-making under the Euratom Treaty.

In this regard, the Commission proposes to establish a high-level group of experts assessing how to increase democratic accountability and transparency in the implementation of the Euratom Treaty."

Finally, Commissioner Cañete moved on to the need for more investment in innovation that will help keep up the momentum that has been created by the completion of the Energy Union. Modernising and decarbonising the EU's economy will require significant

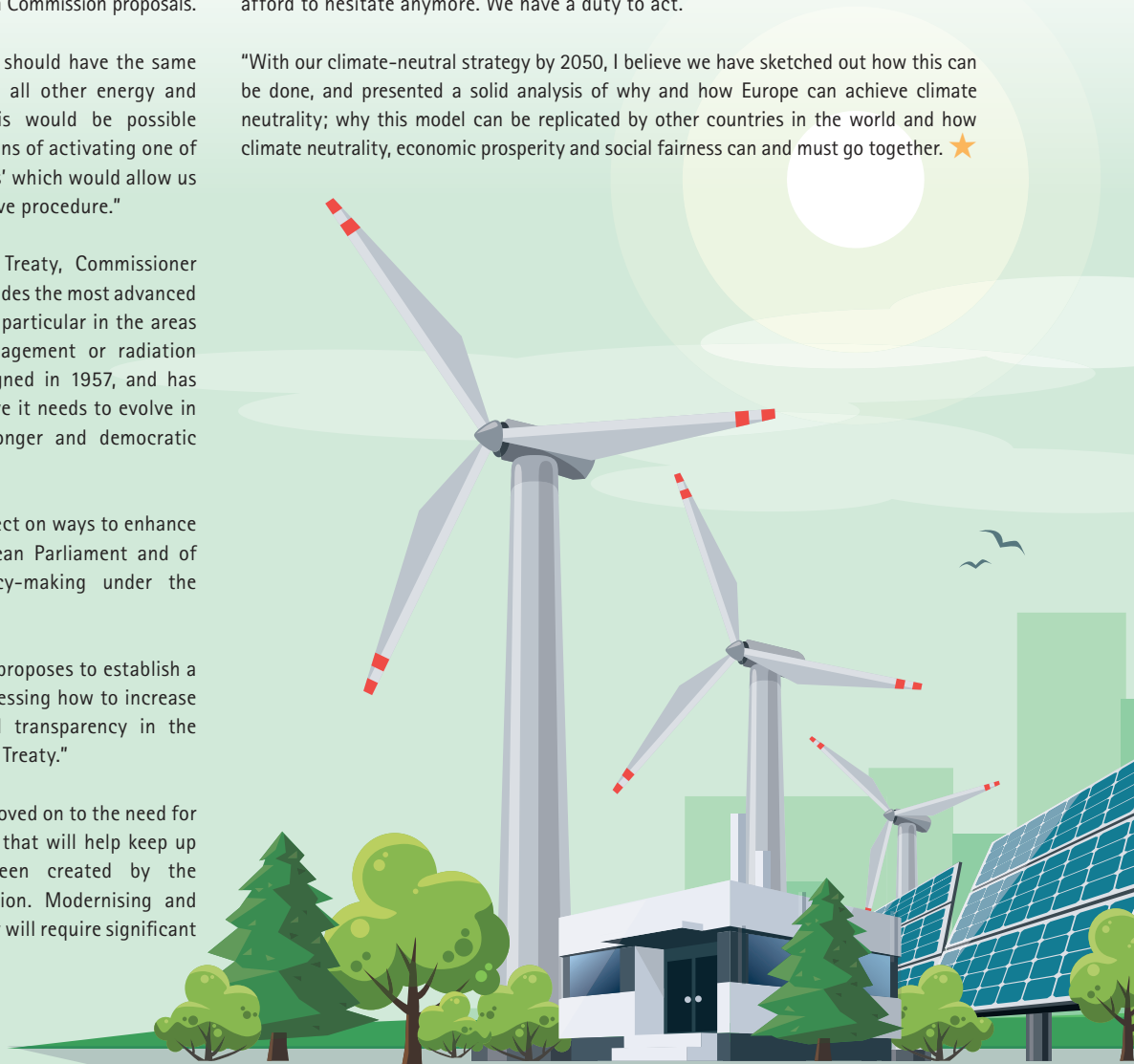
"We have a little time left to stabilise climate change and fulfil the goals of the Paris Agreement. We have not yet run out of time – but cannot afford to hesitate anymore"

additional investment but, as he pointed out, only around two per cent of GDP is invested in our energy system and related infrastructure and this would have to increase to 2.8 per cent in order to achieve net-zero emissions by 2050.

"We will need to continue our work on sustainable finance, putting capital markets at the service of the climate. And we will need to make the best use of new financing mechanisms, including the 35 per cent climate-mainstreamed Horizon Europe, the new approved LIFE and Connecting Europe Facility, as well as the InvestEU programme.

Commissioner Cañete is naturally upbeat about the commission's recent achievements towards a more energy-efficient and carbon neutral world, but he wants to keep up the momentum. "We have a little time left to stabilise climate change and fulfil the goals of the Paris Agreement," he said. "We have not yet run out of time – but cannot afford to hesitate anymore. We have a duty to act.

"With our climate-neutral strategy by 2050, I believe we have sketched out how this can be done, and presented a solid analysis of why and how Europe can achieve climate neutrality; why this model can be replicated by other countries in the world and how climate neutrality, economic prosperity and social fairness can and must go together. ★



The journey to a brighter future for Europe's energy

Miroslav Poche, MEP and appointed parliamentary committee rapporteur, outlines some of the challenges and positives in the transition towards a united European energy market



What is the role you play in helping to shape Europe's energy future?

Miroslav Poche. As a member of the European Parliament's Committee on Industry, Research and Energy (ITRE), the shadow rapporteur for the recasting of the Agency for the Cooperation of Energy Regulators (ACER) and the rapporteur on the recasting of the Energy Efficiency Directive (EED), I share the responsibility along with other colleagues to

ensure that the 'Clean Energy for All' package delivers in terms of ambition and effectiveness. This means promoting renewable energy, making our buildings more energy efficient, decarbonising our economy, fighting energy poverty and lastly, energy efficiency.

With the EED my role is to deliver the best possible deal as energy efficiency is key to achieving the ambitious carbon reduction

goals that have been set out in the Paris Agreement.

My role at the ACER is to ensure that the agency adapts to today's energy market and energy system needs, and also addresses the need for enhanced regional cooperation. One of my priorities in this role is to allow the agency to charge for specific services so that it is provided with sufficient financial and

human resources in order to carry out its current and future tasks.

Can you explain the journey the EED has been on and what you see now as its main objectives?

MP: When I was appointed rapporteur for the last phase of the EED negotiations I always knew it was going to be a hard task to reach an acceptable compromise, and I proved myself right.

I initially supported a binding 40 per cent energy efficiency target due to the clear positive impacts it would mean for our environment, the economic growth, employment, and on the competitiveness and security of supply. And I believe that the EU has the capacity to reach this ambitious target.

"I believe that the reason there are failures in implementing early targets is quite simple – there is no legislation. Legislation would ensure that the EU's previous energy and climate targets are achieved"

However, as expected, talks between Parliament and the Council were not easy. While Parliament fought for the higher binding target of 35 per cent for energy efficiency by 2030, the Council proposed a target of only 30 per cent and with weaker energy savings obligations (Article 7). In the end, both the Commission and the Council showed a great willingness to compromise and everyone acknowledged the fact that energy efficiency is key to achieving the ambitious carbon reduction goals set out in the Paris Agreement.

The next crucial objective will be to make sure that the Directive will be implemented and enforced correctly. For example, back in 2015 the European Commission referred Hungary to the Court for failing to transpose the 2012 EED, whilst the other 26 Member States, except Malta, were hit by infringement procedures because they missed the June 2014 deadline in which to tell the Commission how they were



Miroslav Poche

transposing the Directive. Legislation is only as good as its implementation and enforcement.

How have some failures in implementing early targets come about? What do you see as the main stumbling blocks and what possible solutions are there?

MP: I believe that the reason there are failures in implementing early targets is quite simple – there is no legislation. Legislation would ensure that the EU's previous energy and climate targets are achieved. This is why the Governance regulation is a cornerstone of the Clean Energy Package, which defines how Member States will collaborate both with each other and the Commission in order to reach the EU's ambitious

clean energy goals. This includes the renewable energy targets, energy efficiency targets and the EU's long-term greenhouse gas emission goals. One of the biggest challenges facing the Directive will be its implementation, I believe. The correct implementation of the EED and simultaneous fulfilment of the Paris Agreement, will only be achieved if there is understanding, cooperation and action at all levels.

Are we any closer now to effectively tackling energy poverty?

MP: We are certainly closer to effectively tackling energy poverty, than ever before. For the first time there is a mandatory requirement for Member States to use a share of their energy



efficiency measures to help their most vulnerable customers, which includes those affected by energy poverty.

There are a number of things Member States can and should be doing to reduce energy poverty. Firstly, they should be assessing the number of households facing energy poverty in each EU country, as well as including in its plan a national indicative objective to reduce energy poverty. They can also include policies and measures that address these issues, including social policy measures and similar relevant national programmes. What is more, once the Energy Union is completed, we should start to see a considerable reduction in energy bills.

How realistic is the “5th freedom” – Europe’s 28 (soon to be 27) sharing a single energy market? How will the UK fit into this plan?

MP: The “5th freedom” is slowly becoming reality, though the free movement of energy in Europe has not yet been fully established since there are certain limitations, such as the fact that less than 50 per cent of the interconnector capacity in the EU is currently made available to the market. Though this is one reason why the energy market is still fragmented in the EU,

the Clean Energy for All Europeans package sets the legal framework which will allow for better cooperation in the energy sector and help to avoid fragmentation of the market, contributing to building a common energy market.

With regards to the UK, this is obviously a very complicated topic since the EU is a key energy trading partner for the UK, supplying approximately 12 per cent of the UK’s gas and five per cent of electricity (2016). In terms of energy, leaving the EU could make the UK more vulnerable.

However, what happens depends heavily on the final outcome of the Brexit deal and it’s not for me to speculate on what sort of Brexit we will have. If the UK opts for a hard Brexit, the UK will be leaving the EU’s internal energy market, but the UK will still need to continue trading energy with the EU in order to meet the demand. If a trade energy with the EU takes place outside the internal energy market, it is likely to be less efficient, potentially raising costs for consumers. The UK will have to invest more in new electricity generating capacity, pay higher prices and enjoy less security of supply.

Regardless of the final Brexit deal, continued participation in the internal energy market following Brexit would require establishing appropriate trading arrangements with the EU and this would very likely involve the UK adopting and complying with the relevant European legislation.

Saying this, I am still hoping and optimistic that the UK will decide to remain in the EU which would mean continued integration in the energy field, resulting in benefits from competition, less need for new generating capacity, lower prices and guaranteed energy security.

Are you optimistic about Europe’s energy future?

MP: Absolutely. The outcome of the political negotiations on the Clean Energy for All Europeans package is a major step towards completing the Energy Union and combatting climate change. This is clearly a signal that we are serious about delivering the clean energy transition. To make the energy transition a success story, this requires everyone to be involved from individual customers to global corporations, and from local authorities to national governments. If we all work together, we can make this happen.★

Minimising the performance gap

MOEEBIUS is a European project addressing the challenges construction and energy services industries face in meeting the increasing demand for energy efficient buildings. The recently finished project developed solutions to reduce the gap between predicted and actual energy performances and reduce the business risks that hindered the growth of the ESCO market. We spoke to Michele Vavallo, Ander Romero and Pablo de Agustín from MOEEBIUS

What were the aims and objectives of the MOEEBIUS project?

The inability of current modelling techniques to represent realistic use and operation of buildings was the motivation behind the project. MOEEBIUS aimed to develop a holistic energy performance optimisation framework that describes real-life building operation complexities in accurate simulation predictions and enhances the optimisation of building energy performance. In order to address the challenges, the project pursued five key objectives which focused on technical, environmental, social and business factors.

Can you explain the work the project has done to meet these objectives and now, what's next?

The diverse nature of the objectives required the cooperation of all 15 project partners and the crosschecking with MOEEBIUS Living Lab members. End-users and business requirements were assessed, and new business models proposed prior to any technical development. The MOEEBIUS Holistic Energy Performance Optimisation Framework was then developed before finally being adapted to the pilot sites' (UK, Portugal, Serbia) needs and validated. The project is now looking to make these components available on the market however, the technical readiness of them is varied and some are closer to the market than others.

What were the main technical and market challenges MOEEBIUS had to overcome that will enable greater energy efficiency in buildings?

Both the hardware and software components of the framework proved technically challenging, and the innovations presented in

their development. MOEEBIUS also had to ensure interoperability and address the specific requirements of diverse business scenarios defined by building managers, ESCOs or aggregators.

How are you addressing the energy performance gap in buildings – and what is new about the project's approach?

MOEEBIUS presents a holistic approach where the multiple and heterogenous factors in the use and operation of buildings are taken into account. A Building Energy Performance Simulation tool has been established to run the models and update them according to the inputs from other components (i.e. user behaviour profiles, weather forecasts). A Dynamic Assessment Engine launch simulation also uses fault detection and diagnosis to recognise when the building is performing sub-optimally and identify the trends that could lead to performance deviations.

What innovations is the project hoping to deliver to the energy market and what will be their impact on energy consumption?

The MOEEBIUS-PIPE is just one of the components the project delivers innovation which draws on external data sources (weather, building energy management systems (BEMS), district heating) to provide enhanced analytics. For example, this mechanism is used in DR strategies, DR potential of domestic customers and real-time building operation optimisation through simulation-based automation. The project has also tested virtual reality for predictive maintenance support and an assessment framework for energy performance optimisation. If successful, MOEEBIUS is on the way to achieve one of its main objectives of reducing energy consumption.



How has the project demonstrated the value of its solutions and how can end users still engage?

Specific targets were laid out to validate MOEEBIUS objectives across the project life span, the majority of which have been successfully accomplished. For example, some of the targets achieved include: deviations between forecasted and measured consumption below 10 per cent; at least 10.000 occupants directly or indirectly involved in the pilot roll out activities in the three pilot sites. Therefore, the final version of the MOEEBIUS tools was created to meet the needs of stakeholders, and end users helped fine tune the tools to facilitate market uptake.

Can you explain the MOEEBIUS Living Lab approach?

The Living Lab environment runs across the whole project for co-creation through experience sharing and exchange between stakeholders. Three workshops were organised to involve these stakeholders. The first aimed at raising end user and stakeholder awareness, engagement and

acceptance of the project objectives. The second for training them on how to contribute to the MOEEBIUS concept and operation in the pilot sites, and the third workshop involved all stakeholders in the evaluation of MOEEBIUS results. A final version of the MOEEBIUS tool will be created to meet the needs of both end users and stakeholders and end users will then continue to help fine tune and exploit the tools for marketability.

Can you explain the business proposition that makes MOEEBIUS solutions attractive to the market?

Currently, the BEMS market is generally characterised by ESCO, facility management and the energy optimisation of building type services. Some actors take on the role of ESCOs with their hardware and software solutions, such as Siemens, Johnson Controls and Schneider. Since the objective of MOEEBIUS is to offer integrated solutions to ESCOs and facility managers, the project's integrated framework which works on top of existing BEMS installations opens up competition



PROJECT INFORMATION

Project Title:

MOEEBIUS: Modelling Optimization of Energy Efficiency in Buildings for Urban Sustainability

Project Objective:

MOEEBIUS introduces a totally new approach to reduce energy consumption in the building sector, based on modelling optimisation of energy efficiency in buildings for urban sustainability. Project elaborated products and services enabling 'performance gap' minimisation and promoting customer confidence in diverse energy efficiency business models and contracts, e.g. Energy Performance Contracting.

Project Duration and Timing:

11/2015 – 04/2019

Project Funding:

European Union's Horizon 2020 research and innovation programme

Project Partners:

- Tecnia Research & Innovation,
- Honeywell SPOL. S.R.O.,
- Hypertech Energy Labs,
- CORK Institute of Technology,
- Solintel M&P SL,
- Tyndall National Institute,
- Almende B.V.,
- Technischen Hochschule Nürnberg,
- Belit - Belgrade Information Technologies,
- KiWi Power LTD,
- Instituto de Soldadura e Qualidade,
- Grindrop Ltd,
- Beogradske elektrane,
- Municipio de Mafra,
- ASM - Market Research and Analysis Centre Ltd.



MOEEBIUS



MOEEBIUS project has received funding from the European Union's H2020 research and innovation programme under grant agreement number: 680517



Serbia pilot site



Mafra City Hall building, the pilot site of MOEEBIUS project in Portugal



Moorhouse, UK

against these large players in medium and small markets of non-residential buildings, requiring cheaper solutions and faster implementation. Moreover, MOEEBIUS' hybrid business models could enable a new form of organisation in that DR and load shift activities could perform simultaneously rather than ESCOs specialising solely in demand flexibility.

Can you outline the business models developed for ESCOs and the demand response model?

An entity made up of the main industrial and research partners of the project takes over the commercialisation of the integrated solution offering a service to ESCOs that would enable their customers to enact the project's novel and innovative hybrid business models through Energy Efficiency Service Agreements (EESA). The MOEEBIUS go-to-market strategy would focus on offering a product that is a Software-as-a-Service model, compatible with current smart devices and sensors with the possibility of implementing it with the required hardware or over existing BEMS and BACS hardware.

From ESCOs to consumers, who will now benefit from the MOEEBIUS solutions and how do you see the future in relation to the EU's ambitious energy targets?

According to the business model specifications and the go-to-market strategy, the MOEEBIUS solution would be

economically beneficial to both profiles; ESCOs could increase incomes and consumers could reduce their energy bills. From an energy efficiency point of view, the benefit arises from improving the use of energy as a resource for medium and small non-residential buildings and achieving the 2030 European Energy targets.

What are the main lessons to have emerged from the project and how will this impact on future work in helping to reduce energy consumption, increase efficiency etc?

One of the lessons learnt has been that residents can be prone to use old systems which resulted in MOEEBIUS automation systems not being exploited effectively. Reluctance to use a prototype can be because it is not commercially attractive or too technical, therefore specific attention needs to be paid to the design. Another barrier was the difficulties associated with the control-oriented retrofitting of existing buildings, for example, occupant's hesitation, the high costs of deploying one NOD per person and separating the heating supply from the thermal circuit.

The project collate these findings with the results of the Living Lab co-creation process to refine the MOEEBIUS system in order for it be as effective as possible (financially and increasing efficiency) for the market. ★

MAIN CONTACT



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Balancing the needs of the consumer with a low-carbon future

Tim Rotheray is the Director of the Association for Decentralised Energy (ADE), a leading trade association that works with industry, the government and energy providers towards a local, efficient, low-carbon energy system that not only helps tackle climate change but enables energy users to make the choices that work for them, too. Here he answers questions about ADE, demand response, the balancing the market and the future of energy in the UK and Europe

Q&A

Projects Magazine: Can you explain the aims and objectives of the Association of Decentralised Energy?

Tim Rotheray: Our aim is twofold. Firstly, it is to work with the government to help them implement their ambitious plans to tackle climate change. The government needs organisations like us to tell them what the opportunities and possibilities are and how to make them happen.

Secondly, we want to transform our system so that it works for the energy customer. Our overarching ambition is to make it work for the customer to allow them to benefit and participate in the system. Industry can do amazing things in decentralised energy, but it's important that the association helps drive industry to do things better and for less.

PM: Demand response will play an increasingly important role in the energy market if the energy industry is going to be able to deliver on the government's policy agenda. Can you provide some context for demand response and explain why this need is increasing?

TR: Ultimately, dealing with climate change and moving away from fossil fuels is a storage problem. Fossil fuels are easily stored and can be consumed as and when we

need to use them. Moving to a low-carbon system means that we are taking a lot of that storage capacity out of the system. In terms of renewable energy sources such as solar and wind, power is only available when the sun is shining or the wind is blowing.

The electricity grid is a fickle friend. It provides you with something extremely valuable but has very exacting requirements: it has to be in perfect balance of demand and supply at all times. So, as the flexibility in supply provided by easily-stored fossil fuels disappears, we need to look at flexibility in demand to balance the grid. It is possible to do this through a combination of onsite storage and consumers reducing or increasing their demand so that it better matches supply. That, in effect, is demand response.

Flexibility can work on a large scale by aggregating lots of relatively smaller actions to bring them together to create one significant response in terms of what the grid needs. It can also be provided by very large centres of demand, of which there are some, particularly on an industrial scale.

Flexibility isn't a new concept; it used to be provided by special power plants, which would be paid for by the national grid. What we are doing with demand response is taking that money that was paid to power plants and



offering it to customers. So rather than the cost of managing the system being part of their bill, it can become part of their income, so it can help cut their bills.

PM: How do we get more people involved in demand response?

TR: There are two answers to that. One is by raising awareness and the other is through policy and regulation. In terms of how raising awareness can work, renewable energy is a good example. We have gradually seen an increasing number of businesses adopting tougher standards in terms of the carbon content or the renewable percentage of the electricity that they are using. As more people become aware of this, more people are adopting it and people also setting more and more ambitious targets.

Then there is policy and regulation. Essentially, our policies and regulatory system were designed for big power stations engaging with a big central system. Now, the regulatory system needs to be redesigned to enable smaller entities to participate and be rewarded just as much as the big power stations.

PM: Would you be able to summarise the role of aggregators in this sector?

TR: The best way to describe the role of the aggregator is as the facilitator of choice. Take a supermarket as an example. Its focus is on selling groceries to customers. It needs power to do that, but does not want to dedicate a lot of its resources to dealing with its energy system.

The aggregator is able to provide to the customer access to the energy balancing market without having to directly deal with it, which helps improve its profit margins because it can reduce the cost of its energy. The aggregator takes care of the energy system and simplifies the participation for the customer, while also allowing the customer choice on how it participates.

How this works in practice is different for each customer. A supermarket

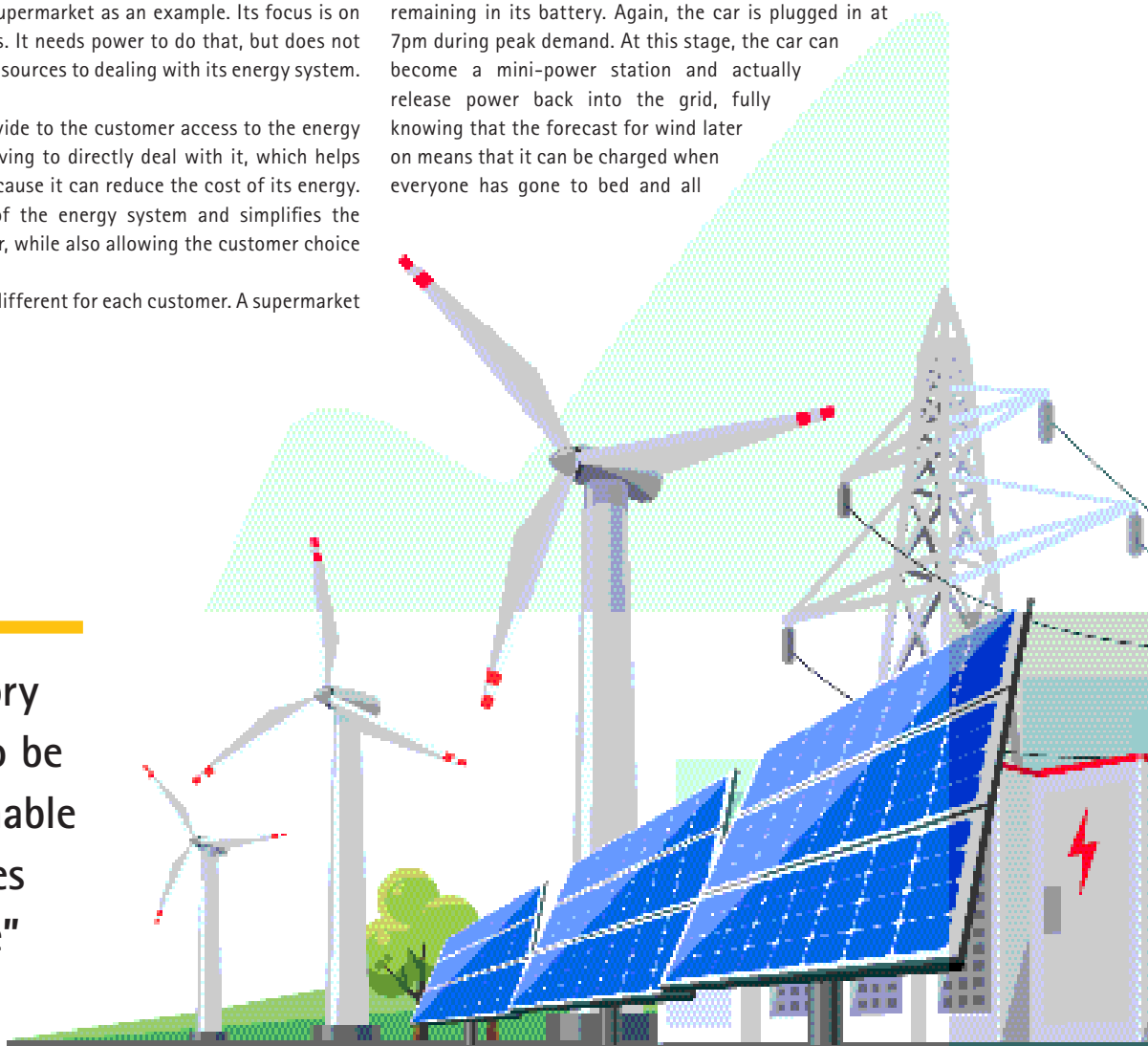
might offer 20 megawatts of refrigeration to an aggregator, to turn off and on when needed, as long as the food stays cold. But if the supermarket cannot turn off its refrigeration, for instance on a particularly hot day, if that supermarket was contracted individually to the grid for its response and it can't provide it, it would get penalised. If, however, it is working through an aggregator, the aggregator has built-in resilience by having multiple customers. So when there is a problem at the supermarket and it cannot respond, it is fine because the aggregator has other customers which can offer the needed responses at that time.

PM: The emergence of electric vehicles offers a huge opportunity for people to be able to participate in demand response. How will that work?

TR: Western Power Distribution in the UK has done some interesting research on this. Someone might plug their car in at 7p, at peak demand, and then set the time for when the car is needed and should be fully charged – say 8am. So instead of the car charging at 7pm during peak demand, it starts charging at 2am in the morning when the wind is blowing and demand is slow. From the customer's perspective, the car is charged when it is needed, and it is also greener and cheaper.

Electric vehicles can also help by putting power back into the grid. Imagine if a driver plugs a car in and it still has some power remaining in its battery. Again, the car is plugged in at 7pm during peak demand. At this stage, the car can become a mini-power station and actually release power back into the grid, fully knowing that the forecast for wind later on means that it can be charged when everyone has gone to bed and all

"The regulatory system needs to be redesigned to enable smaller entities to participate"



the lights have gone off and the heating has been turned down.

PM: Can you give us an idea of how the energy market will evolve over the next 10 to 20 years?

TR: I think the big thing that we are going to see over the next 10 to 20 years is the provision of energy as a service. Energy companies currently sell energy to customers by the kilowatt hour, and it is this that has to come to an end. Selling units of energy will stop. Companies are going to be selling comfort. So, rather than paying a gas bill for kilowatt hours of gas consumed, the customer will simply say: "When I come home, I want my living room to be this temperature. I don't care how you do it, just make sure that it is warm and that I can control it".

It may be that it is done through insulation of the home, changing the boiler or putting in improved system controls such as a thermostat. But the end result will be that the customer is paying to be warm rather than paying for units. This then switches the burden of use to the energy provider. It is in the interests of the company providing that service to cut customer demand to an absolute minimum and manage that demand cleverly.

There is an important conversation about privacy and data to be had as this system emerges. We are used to sharing data when the sharing of that data makes life easier. We share our location with Google in return for getting directions on a map. It is important that data exchange about energy is considered in the same way, and we don't end up in a situation where people are being abused or their privacy is being invaded.

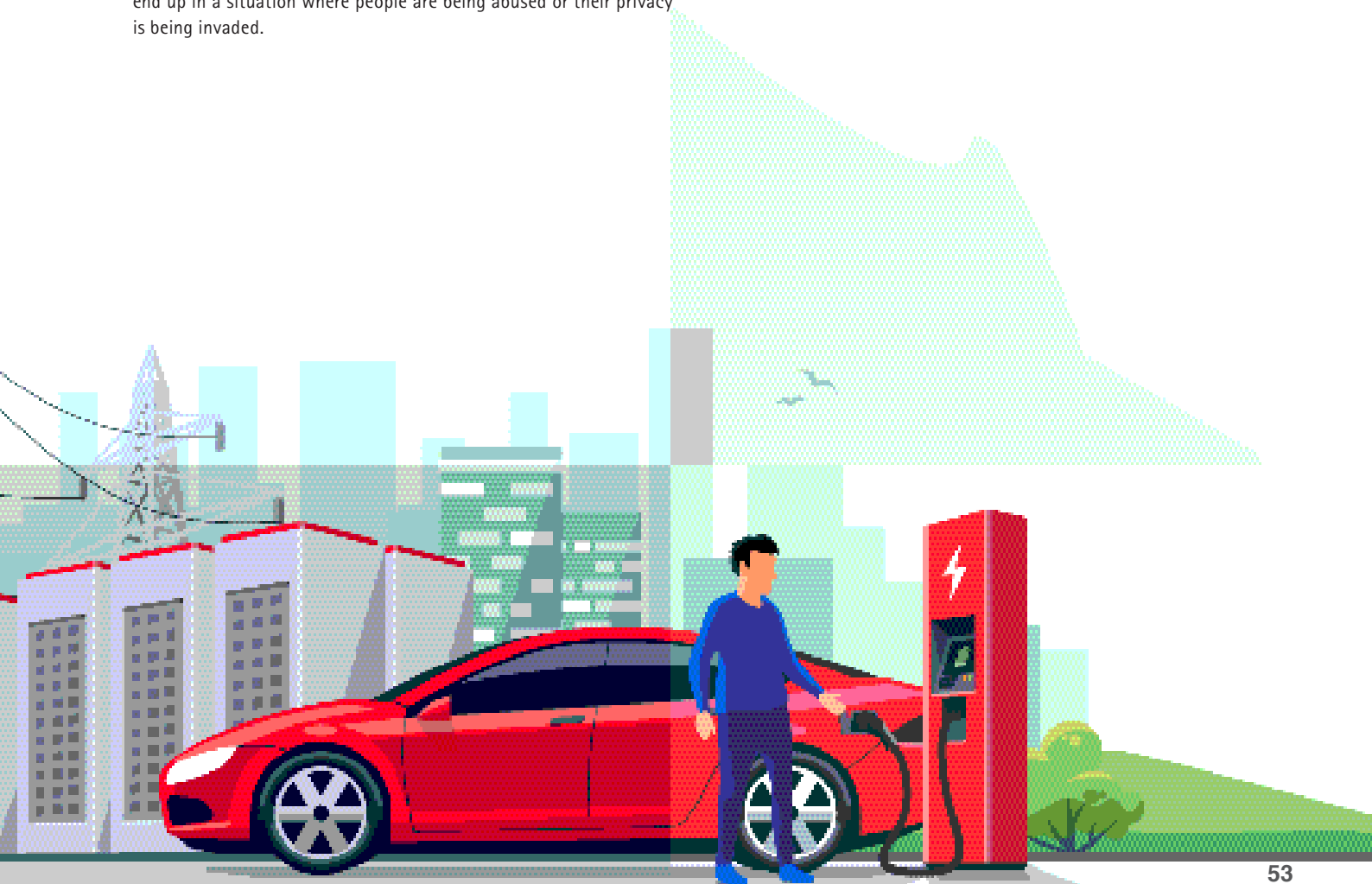
PM: Are you optimistic that our energy systems will become more efficient over the next 20 years?

TR: It is a little-known fact, but UK power demand has been falling for quite a while. We think that energy demand is ever increasing but it's not. UK energy demand is falling, demand for gas is falling and demand for power is falling. And that's because we're getting more efficient, we're getting smarter. This needs to continue and I am optimistic that it can and will.

One note of caution I have, however, is about the scale of ambition that we need to see from government. There is a growing understanding among businesses and householders about climate change and responding to climate change, becoming more resilient and cutting our carbon emissions.

The government has set out in its clean growth strategy showing real ambition in terms of what it wants to deliver. However, I don't think that there is the sense of urgency that is needed to continue to drive the transformation that we need. Some great strides have been made but we have got quite a long way to go yet. ★

For more information about the Association for Decentralised Energy and to find out about the work it does, visit www.theade.co.uk



Putting waste heat to work

Buildings across our towns and cities are pumping huge amounts of heat into the atmosphere, a valuable source of thermal energy that is just wasted. Life4HeatRecovery is a project looking to reverse this by putting this waste to work, helping it heat our homes and supply our hot water for less. In an interview with project coordinator **Roberto Fedrizzi**, we learn more about Europe's hidden renewable energy source and the enormous potential it offers

The average mid-sized supermarket in Europe produces enough waste heat from its refrigeration and air conditioning units in one year to be able to provide the thermal energy needs of 200 homes over the same period. It's not just our supermarkets producing this kind of waste – there are data centres, factories, hospitals, offices and many other buildings and institutions in towns and cities all over Europe producing this energy as a by-product of their activities, all too often just wasted into the atmosphere.

This wasted thermal energy is often referred to as a “pseudo renewable energy source” but, despite its potential value there are currently few ways to use it. As it is most often available at low temperatures – around 10 to 30°C – using it to directly warm water to use in the home or warm water to use in district heating systems is simply not possible: shower water, for example, is typically used at around 40°C. Meanwhile conventional district heating networks supply water at around 80-90°C, so again, the waste thermal energy cannot be used to warm water directly to be useful around these networks.

As well as this being a waste of a potentially valuable energy source, this wasted heat also produces what is known as a “heat island effect”, which raises the temperature of towns and cities to a few degrees higher than those in the countryside. Put simply, heat lost into the built environment just heats our cities and is not easily used for anything else. Moreover, warmer cities use more energy for cooling – and so the vicious circle continues.

Life4HeatRecovery is an EU LIFE program-funded project seeking to change this, by using wasted energy recovered from different sources and applying it to district

District Heating Network. Source: Alperia SpA



heating systems. The central idea of the project is to recover waste energy to create a “circular economy of heat”. Heat is, therefore, collected from where it is produced (the supermarket or factory, for example), recovered into a district heating network and then redistributed into buildings. These could be the same buildings that provided the waste heat in the first place or it could be other buildings on the district heating network around the same town or city.

To do this efficiently, the project is developing complete, pre-fabricated skids that can be installed where the waste heat is produced, which both collect the waste energy using heat pumps in a similar way to how they are also used in a typical geothermal system.

Roberto Fedrizzi, of EURAC Research, who coordinates the Life4HeatRecovery project explains how this works: “The heat pumps are used in two ways. The low-temperature waste heat can be warmed to a level that is useful for district heating. This is done by connecting a heat pump to this waste source which increases the temperature of the available heat from around 10-30°C to something useful, like 70-80°C. This is then connected to the district heating system and the heat is made available for traditional district heating networks.

“The other possibility, however, is for a new generation of district heating networks. These directly distribute the waste heat through the network: this heats the water in the network to around 10-20°C and this low-temperature water is distributed to the door of the buildings on the network. Of course, this low temperature water is not a useful supply of domestic hot water or heating, but it can be warmed up to a useful heat at the individual buildings using heat pumps. The value here is that the low-temperature water does not suffer heat losses along the network pipelines.

“In either case,” he concludes, “with the waste heat being used at source, or being warmed up at the user end, the idea of the project is to use heat pumps between the user and the source of the waste heat.”

While this process of collection and distribution of thermal energy may not be novel in itself, Fedrizzi believes the innovation he and his project partners will deliver lies in three main areas:



Skid Installation. Source: Mijnwater B.V.

“We are simply using heat pumps...But in doing so, we provide heat to the home by using in part thermal energy that is available from the district heating network, as well as using electricity – so we match to sectors that traditionally separated”

- How the project proposes using this thermal energy, that would otherwise be wasted, by coupling low-temperature waste heat with district heating.
- The simplification of this process using skids that can be easily implemented on site
- The attractive returns on investment that are available from utilising this source of waste energy in our towns and cities.

“We are simply using heat pumps,” he explains. “But in doing so, we provide heat to the home by using in part thermal energy that is available from the district heating network, as well as using electricity – so we match to sectors (i.e. district heating and electricity) that traditionally separated.

“On the one hand we have utility companies distributing heat through district heating networks,” he continues. “On the other hand we have electricity companies supplying the electricity to run the heat pumps. Normally these two sources do not talk, but we now have a machine which uses both sources and electricity companies are getting very interested, as this gives them a way to enlarge their markets – they have the opportunity to effectively sell electricity for domestic hot water and heating in the home.”

There is an abundance of waste heat that can be used in this way, while recovering it from these sources using heat pumps is also



District Heating Network. Source: Alperia SpA

a relatively cheap process. “We are studying different business cases for our technology,” explains Fedrizzi, who acknowledges that though this is a complicated, early market place, there are several reasons to be optimistic about future success.

“We are looking at several options. There may well be a business case in supermarkets, for example, selling their waste heat, but we are also proposing a case for waste heat to be collected free because it costs money to waste heat into the air – fans and extractors are needed, and these could be dispensed with, if waste heat was being used in the ways we suggest, saving the company money that way.

“Meanwhile, the green dividend for companies providing their waste heat for free should not be ignored, either,” he continues, using the example of a foundry in Italy being used as a demo site for the project. “Here, waste is supplied free of charge to the local low-temperature district heating network, as the company their products are more attractive to customers wanting greener products if they can demonstrate a lower environmental impact with the overall production process consuming less energy or recycling part of this. Moreover, they can claim to be having a positive impact on the town”.

At the moment, the project is designing the waste heat recovery plants to be used at its

four demo sites. As well as in Italy, sites include a hospital and a detergents factory in the Netherlands as well as a solution in Germany, where waste heat is being recovered from sewers, where it is collected from the warm water that leaves people’s bathrooms. As well as this work, the project is developing the prefabricated skids and working on their functionality for the different applications to be connected at the sites. Work then moves to assessing the results from the sites, so modelling can take place to assess the impact for towns and cities of using waste heat in these ways.

Fedrizzi is confident that this work will deliver exciting results. As well as the energy savings to be made and the associated reduction in emissions and the use of fossil fuels, this type of waste recovery will also generate significant employment opportunities in the towns and cities where it is deployed.

“Our impact will be of a socio-economic impact at the local level in addition to the megawatt hours being saved by using these systems,” he concludes. “By using real-life examples of waste heat recovery in action, companies will be making decisions at the local level that impact on their local area directly – reducing CO₂, creating jobs, reducing heat islands and providing heat and hot water to homes.”★



PROJECT INFORMATION

Project Title:

Life4HeatRecovery

Project Objective:

Life4HeatRecovery steps further beyond by developing and demonstrate a new generation of smart district heating and cooling networks, where low-temperature waste heat sources can be as distributed as consumers are. Life4HeatRecovery solutions will integrate effectively multiple waste heat sources from urban wastewater and service buildings, where they are available along the DHC network, by managing energy at different temperature levels.

Project Duration and Timing:

4 years, starting June 2018

Project Funding:

3.360.000 € - funded by the European Commission through the LIFE program

Project Partners:

EURAC Research, Alperia, Cogeme, KWA Contracting, Enisyst, Linea Group Holding, Mijnwater, UHRIG, Warmtebedrijf Rotterdam, Municipality Wüstenrot



MAIN CONTACT



Roberto Fedrizzi

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Development and management of national and international projects; laboratory testing of sorption and compression heat pumps; thermal systems monitoring; design of heating and cooling systems exploiting compression and sorption heat pumps.

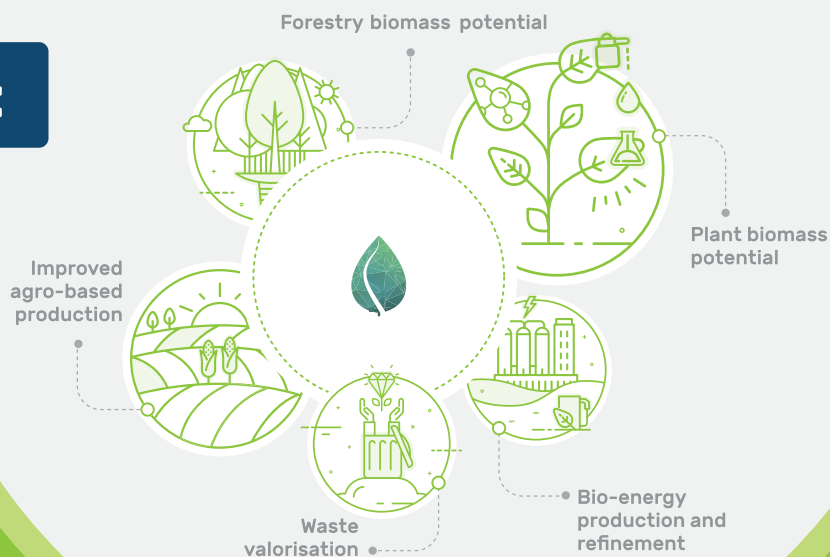
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Flexible and creative – a unique science conference

Established as a platform to disseminate the results of two projects, seven years later Sustainable Places is a world-renowned conference showcasing results coming out of the EU's H2020 and welcoming similar research activities worldwide. This agile and inclusive event is dedicated to the innovations of EU projects and how they are addressing the sustainability of the built environment

In 2013, two EU FP7 research projects, RESILIENT and PERFORMER, banded together and tasked themselves with organising a conference to act as a platform for the dissemination of their results and to cluster like-minded researchers. Over time this cluster space, Sustainable Places, has expanded, successfully outliving the project's funding from the EC and cementing the forum as a valuable platform for those tackling the sustainability targets of the EU's buildings, districts, urban environments, transport and energy infrastructures.

CEA and R2M Solution are the joint organisers of Sustainable Places, drawing on different streams of expertise to foster the continued attraction of a far-reaching and loyal audience. From CEA, one of the founders of Sustainable Places with valuable experience in energy research, the forum gains increased credibility and participation from its close connections with the EC. R2M on the other hand as an exploitation company, draws on its proficiency in planning and pulling together the local actors and companies that are closer to the market.

Together, these two streams have created a space that offers a unique collaborative community focused on the research, networking and creation of market opportunities through the clustering of EU projects. This more accommodating and flexible approach, with EU projects at its heart, is proving

appealing as a destination that combines aspects between a Brussels event, a scientific conference and an exposition.

Changing EU sustainability landscape

Since the first Sustainable Places in 2013, the trends in the energy markets, construction and retrofit have continued to progress and develop and the conference has evolved with these transformations to keep relevant and impactful.

Thomas Messervey, founder and CEO of R2M Solution explains: "The conference in its earlier years considered one of its forward-looking themes to be how buildings connected with the smart grid and, over time, we have looked to maintain this progressive vision of where sustainability is going as it continues to have increasing importance.

"The fact our projects disseminate EC sustainability topics has meant the EC is constantly pulling us forward, especially with supporting policy and the momentum of the funding instruments at both EU and national level. This EC drive is reflected in some of the themes this year as we move beyond buildings to districts, neighbourhoods and cities," continued Messervey.

When it comes to deciding on the themes for the annual forum, Messervey describes the process as being judged three-fold: remaining inclusive of all sides of sustainability, such as energy storage and solutions; applicable to the EC's topics in question that year; or based on the location of the event that year. The hot topic of SP2019, therefore, is island sustainability and demand response (DR). Hosted on the Italian island of Sardinia, it makes sense that 2019 addresses the momentum behind DR trials that are opening on the island and at the same time, the EC programmes and funding





Nizar Touleimat
CEA



Carole Sentein
CEA



Thomas Messervey
R2M

instruments that look specifically at addressing the challenges facing their detachment from the mainland. "In a negative way, islands have to deal with the fact they don't have everything (fuel, water, basic items etc.) and that they are usually seasonally affected in population size; they will go from being very small to very big which is a challenge for infrastructure. However, islands are also a unique opportunity. With respect to the grid, they have more freedom to manage their own grid, install renewables and balancing programmes for flexibility management that the mainland doesn't. They often make a nice test case for future mainland grid set-ups," explains Messervey.

It's attention like this, to the scope of DR across Europe and to the evolution of the energy market and an evolution of the sustainability market that keeps Sustainable Places a burgeoning stage for stakeholders to come together and share their research.

Facilitating policy

Each year the conference sees a 20 to 30 per cent growth, with 2018 attracting 150 attendees and this year set to reach around 200 with at least 50 EU projects participating that are carrying out the EC's call topics. With such niche numbers, Sustainable Places is able to effectively cluster these projects together to collaborate knowledge to help facilitate the adoption of policy.

"The EC is always asking projects how they can contribute to the creation of new policies related to green energy, so when projects meet at Sustainable Places and discuss their

"Our conference is flexible and adaptive, we're happy for you to do whatever it takes for you to share your project"

results the event is actively fostering the involvement of industries in helping push for changes in policy," says Nizar Touleimat, European project manager in data science at CEA. This clustering approach helps EU projects discuss common problems and best practices so that they're not replicating each other's research but helping answer each other's questions to help move faster.

"This is what makes us different to other scientific conferences," explains Messervey. "Unlike traditional scientific conferences that may focus more on individual research and scientific dissemination, it is accurate to state that we focus more on collective research and all aspects of clustering, communication, dissemination and exploitation.



The conference is flexible and adaptive and features thematic plenary sessions, workshops, technical tracks and an exhibition space for posters and result prototypes."

"This year will also feature an EU info-day and brokerage event, a focus on smart cities, sustainable island workshops, free environmental training for local professionals provided by GBC Italia and a clustering of local area officials targeting sustainability in Sardegna. It is going to be quite an event and the social program is also very nice."

Future digitalisation

Sustainable Places is also constantly pushing to address future market trends across the EU and every year it attracts more trail-blazers and more renowned international figures and founding partners of important companies who are bringing these concepts to their keynotes.

One example is this year's opening keynote for SP2019 by Don McLean, founder of IES whose new platform is going to apply sustainable analysis to communities of any size or purpose to look at energy use and other sustainability metrics beyond buildings toward communities, holistically. Another example is Niccolò Sovico from the new Italian start-up Ener2Crowd, which is launching a platform for the crowdfunding of sustainability projects.

"These are just two exciting sessions for us this year and it's the broader input of novel companies and individuals like these which are helping further drive the innovation and impact of the projects at Sustainable Places," continues Messervey. "Of course, there's more data, more measurement, more digitalisation which leads to AI and the expansion of what it means to be sustainable. We are seeing it go from energy efficiency to carbon and material efficiency and how it interacts with all infrastructures, not just buildings."

"By addressing the larger, forward-thinking topics of digitalisation and sustainability, at Sustainable Places we are able to connect more municipalities, local actors and engineering professionals, for example, in evolving their concepts into intelligent solutions for lasting impact upon sustainability and climate change," he concludes. ★

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