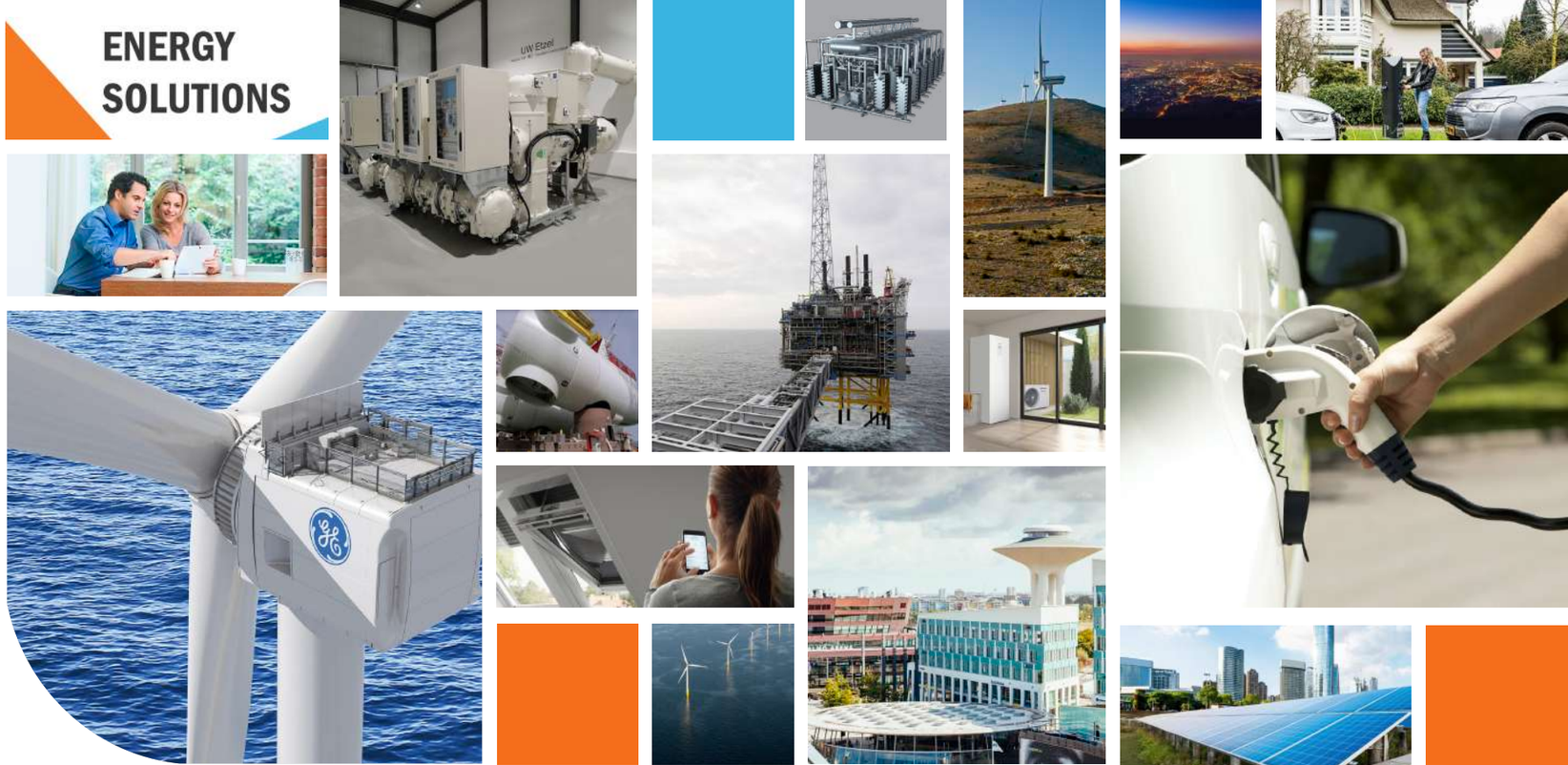


The future is green:
15 solutions for the EU 2050 decarbonisation goals

Contents

Foreword

In 2016, I initiated Energy Solutions as a direct response to the ambition of the European Energy Union. Energy Solutions has grown to become a cross-national, sectorial and cross-party European Parliamentary Network, which currently consists of 15 corporate members (3M, Danfoss, EDF, E.ON, Equinor, GE, ISTA, Microsoft, Ørsted, Panasonic, PKA, Schneider Electric, Siemens, Velux and Vestas), and a Steering Committee of Members of the European Parliament from various geographies and across the entire political spectrum from Greens to ECR.

The objective of the Energy Solutions Network is to facilitate dialogue between policy-makers, industry and third-party stakeholders with a view to develop a holistic approach to energy regulation and ultimately support system-based solutions.

During the past five years, we have sparkled the discussions on a number of important issues such as the reform of the emissions trading system; the completion of the European electricity market; the successful integration and increased use of renewables across the continent; as well as the implementation of the "energy-efficiency first" principle. Together we have helped shape the completion of the EU Energy Union – the most ambitious political project to date in delivering affordable, secure and sustainable energy for all Europeans.

Today our Network becomes even more relevant in the face of the tremendous challenge – tackling the imminent threat of climate change while preserving the competitiveness of the EU industry, speeding up innovation and creating sustainable jobs for future generations. This requires a systemic change both in terms of approach to policy and regulation – thinking beyond the silos in an integrated way.

Those challenges can only be tackled in close cooperation between the private sector – investing and developing the necessary green technology solutions – and the policy-makers – creating the favourable environment for upscaling those.

I am looking forward to working with all of you to help bringing to life the vision of a fully decarbonised EU economy by bridging the gap between regulation and technology solutions.

Sincerely yours,

MEP Morten Helveg Petersen

About Energy Solutions

Energy Solutions is a cross-national, sectorial and cross-party European Parliamentary Network, which consists of 15 corporate members and Members of the European Parliament from various geographies and political affiliations, with a focus on the transition to a greener future.

Chair of Energy Solutions,
MEP **Morten Helveg Petersen**
(ALDE, Denmark)

Vice-Chair of Energy Solutions,
MEP **Angelika Niebler**
(EPP, Germany)

Vice-Chair of Energy Solutions,
MEP **Bendt Bendtsen**
(EPP, Denmark)

Vice-Chair of Energy Solutions,
MEP **Miroslav Poche**
(S&D, Czech Republic)

Vice-Chair of Energy Solutions,
MEP **Angelika Mlinar**
(ALDE, Austria)

Vice-Chair of Energy Solutions,
MEP **Fredrick Federley**
(ALDE, Sweden)

Vice-Chair of Energy Solutions,
MEP **Hans-Olaf Henkel**
(ECR, Germany)

Vice-Chair of Energy Solutions,
MEP **Claude Turmes**
(Greens, Luxembourg)

Vice-Chair of Energy Solutions,
MEP **Davor Škrlec**
(Greens, Croatia)

3M™ Novec™ Insulating Gases are enabling sustainable, ‘SF6 – free’ electrical equipment for the power industry

‘SF6 – free’ electrical equipment using Novec Insulating Gases is commercially available from several suppliers in the EU, and is installed in multiple locations across Western Europe, including Germany, France, Scotland, England, Denmark, Netherlands, Norway, Italy, Switzerland, and further afield in South Korea.

The electric transmission and distribution industry has evolved using SF6 as an insulating gas because of its unique dielectric properties and reliability. But SF6 is a potent greenhouse gas with a global warming potential 23,500 times that of CO_2 when compared over a 100-year period. In fact, it is the most potent greenhouse gas that the Intergovernmental Panel on Climate Change (IPCC) has ever evaluated. This led 3M to collaborate with industry leading equipment manufacturers to come up with alternative solutions using Novec Insulating Gases. Greenhouse gas reductions as high as 99% are attainable when used in an insulating gas mixture, compared with equipment applications using SF6.

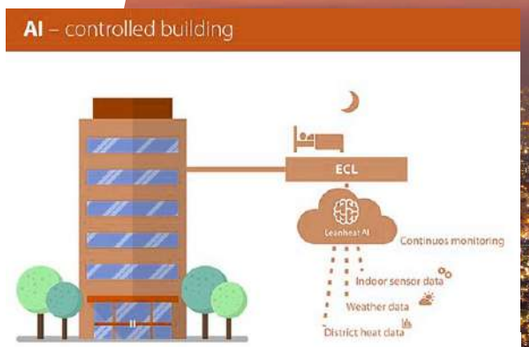
Gas mixtures using Novec Insulating Gases, including AirPlus™ (ABB) and g3 (GE) are now fully commercialised and installed in medium and high voltage switchgear applications, enabling significant reductions in the carbon footprint of many power utilities.

Assuming SF6 annual emissions of approximately >6 million metric CO_2 equivalent, 80% of which is used in electrical equipment, widespread use of SF6 alternatives featuring Novec Insulating Gas would enable a reduction of >5 million metric tons of CO_2 per annum. This is equivalent to removing >1 million passenger cars from the road per year.

Based on the emissions data, SF6 can be seen to offer ‘low hanging fruit’ in achieving the 2030 climate and energy targets of the European Union, and in particular the CO_2 emission target of 40%. Novec Insulating Gases are fully aligned with the European Union’s 10-year Mid Term Strategy for smart, sustainable and inclusive growth.

The EU F-Gas Regulation targets reduction of greenhouse gases with the highest GWPs, and SF6 has been identified as the most potent greenhouse gas ever evaluated by the Intergovernmental Panel on Climate Change. Novec Insulating Gases are a key enabler of commercialised sustainable alternatives to SF6 - based electrical equipment, along with other SF6 alternatives and technologies available on the EU market today.

IoT solution for energy efficiency in centrally heated buildings



Artificial intelligence and machine learning automatically generate very precise and accurate mathematical thermodynamic models of the buildings it controls.

Heating, and, to a lesser extent, cooling, account for 50% of European Union final energy consumption and much of it is wasted. Traditional heating systems fail to adjust to changing weather or the thermodynamic properties of the building. This results in overheating (and thus energy waste) and poor indoor comfort.

Leanheat aims to address this issue. Leanheat's IoT (Internet of Things) solution monitors, controls and optimizes the temperature and humidity of buildings connected to district heating. The solution improves the energy efficiency of properties the operating efficiency of district heating companies and creates a healthier indoor climate for residents. The automatic and self-learning system monitors both individual buildings and groups of buildings in real time.

In doing so, Leanheat reduces peak load demand in district energy networks. Additionally, by providing network operators with an accurate estimation of energy consumption of connected buildings, Leanheat enables them to make better production decisions, leading to energy savings and further reduced use or shut down of peak plants. As peak plants are usually powered by fossil fuels, Leanheat is also an important contributor to transitioning away from fossil fuels to sustainable energy sources for heat generation.

Danfoss took over full ownership of Leanheat in May 2019. By the end of 2018, Leanheat had been installed in 100,000 apartments globally with the aim to achieve the milestone of one million apartments by 2022.

1. Leanheat helps to cut on average 20% in peak power requirements

2. On average, Leanheat delivers 11% savings in energy consumption

According to 2017 results from 40,000 apartments equipped with the Leanheat solution in Finland, the technology contributed to over 7,000,000 kg CO_2 emissions reduction.

Both the Clean Energy for All package and the EU long-term climate strategy highlight the potential of district energy to contribute to the EU's long-term goals by increasing its share by up to 50% by 2050. District energy can play a key role in decarbonizing heating and cooling by facilitating the integration of renewable energy (including electricity) and unavoidable waste heat. The Renewable Energy Directive (2018) sets the target to increase the share of these energy carriers in heating and cooling by 1.3% points annually.

To fulfil this potential, the sector must undergo a transformation to "4th generation district energy" (4G). In a 4G system the most sustainable available heat sources are used in exact balance with heat demand and are distributed efficiently. This means that future district energy networks, by design, will have to be able to integrate a multitude of sustainable energy sources that are of intermittent nature and thus will be available at different times. As such, matching energy supply with demand will be essential.

Digital solutions based on IoT and AI technologies will play a major role in enabling the management of such a system: they will be required to manage demand peaks, organize flexible use of several energy sources and storage facilities (including thermal mass of a buildings itself).

Smart predictive controls based on the IoT, such as Leanheat, are key solutions that enable interactive heat demand side management, and hence are particularly relevant for a successful transition to a more sustainable energy system. The Leanheat solution ensures energy efficient operation of the district energy networks that enables district energy operators to transition from fossil fuels to sustainable energy sources (including fluctuating renewable electricity). Beyond that, it also increases consumer engagement and improves a level of comfort and well-being.

Increasing value of electric vehicles for customers

EDF is taking the lead on clean mobility by allowing drivers to value the energy contained in the batteries of their electric vehicles (EVs). Currently being developed in France, the enabling suite of technologies will contribute to a wider adoption of zero-emission vehicles in Europe.

Deploying electric mobility in Europe is greatly improving Air Quality, especially in city centres where 75% of the EU population lives. Driving electric suppresses all greenhouse gases and particulate matters at the tailpipe. Besides the vehicle part of the equation, infrastructure must be deployed to allow seamless and efficient charging to drivers. The Vehicle-to-Grid smart charging solution gives EV drivers the opportunity to value the battery of their vehicles, using the energy stored on board to power their homes or feeding it back into the grid. Participating to the reduction of energy demand at peak hours, storing electricity at times when wind is blowing, or sun is shining to use it at night or when needed, these are examples of what this technology is enabling. Providing such flexibility will be rewarded, thus reducing the cost of driving electric for EU citizens. Combining power-related components with big data and extremely fast communication technologies is the challenge that EDF and its partners have successfully achieved. Real-site pilots are now being implemented before large-scale deployment in 2020.

Electric vehicles have the potential to reduce CO_2 emissions of road transport due to light vehicles in the European Union by 37.5%, equivalent to 133 MtCO2/year by 2030, estimated with today's EU electricity mix. Because of the already planned decrease of the CO2 content of this mix, the total emission cut will be even bigger. This remains true for other emissions, especially NOx and particulate matters, with a reduction potential equivalent of up to 66,6 ktPM/year and 666 ktNOx/year by 2030.

Creating new products and new services, smart charging and vehicle-to-grid solutions will lead to job creation which, according to Environment & Transport, could total up to 850,000 qualified jobs in Europe.

Poor Air Quality in Europe is associated to a mortality rate which is ten times higher than road accidents (365,000 deaths/year) in the European Union. Reducing air pollution in urban areas is thus of utmost importance for EU citizens and EU wealth as a whole.

By allowing to store intermittent energy production such as renewable energy, and by combining it with the use of a car battery, smart charging technology contributes to a more important use of renewable energy (100% carbon free) to power building and clean mobility at consumer level and in line with consumer needs, while at the same time reinforcing the flexibility of the electricity grid.

It also increases the proposition value of electric vehicles, boosting its adoption and drastically reducing the emissions of the transport sector.

Hyllie: Tomorrow's Smart Climate-friendly City, today

Since 2011 E.ON have worked with city authorities in Hyllie, a district in Malmö, Sweden, to develop the smart and climate-neutral city of the future.

Hyllie is powered by local renewable energy from wind and solar, while biomass and locally generated waste is used in a 4,500-metre-long district heating network. Ensuring a circular waste management approach and keeping Hyllie on target to be 100% powered by renewable or recycled energy by 2020.

Customers in Hyllie reap the benefits of living in a smart city. The installation of residential solar PV and efficient heating systems means lower energy bills and lower carbon footprints. At the same time, customers have more control by using their mobile phone to see and adjust their electricity use in real-time.

The whole district is underpinned by a smart grid. The grid's two-way communication between energy generation and buildings allows better demand-supply synchronization.

This technical advancement is a true enabler for a smart city, utilizing a high-level of weather dependent renewables. If there is too much wind or sun the grid will soon be able to store the excess energy in local batteries, to be used when power generation is low. Thus, guaranteeing the most efficient use of resources.

Hyllie is now the Swedish reference project for a climate-friendly city. It has become a hotbed for inspiration and innovation for the whole of Sweden, and beyond.

Since the start of the project, more than 2,000 apartments, 8,500 jobs, a 4,500-metre-long heating grid and a 900-metre-long cooling grid have all be constructed. As the Swedish reference project for a climate-friendly city we are also now using the concepts developed across Sweden as well as in Germany and the UK.

In 1950, just 30% of the world's population lived in urban areas. By 2050 that number will rise to 68%. Cities are responsible for most of the world's economic activity, energy consumption and greenhouse gas emissions. Decarbonising our cities is a huge part of solving the climate change puzzle. The technologies used, such as the data driven smart grid are essential for integrating increasing amount of weather dependent renewables. The buildings have all been constructed with the highest energy efficiency standards, reducing energy consumption. The installation of PV systems and highly efficient heating systems in residential properties means lower bills and lower carbon footprints.

The Hyllie concept has been designed with scalability in mind so it can grow from being a Swedish success story, to a European one.

equinor

Northern Lights: a European Project of Common Interest (PCI) for CO_2 transport from Europe´s industries to storage on the Norwegian Continental Shelf

Northern Lights aims to become the world´s first CCS project receiving CO_2 from several industrial sources. The concept of the Norwegian part of the Northern Lights project foresees CO_2 capture in two onshore industrial facilities for transport by ship to a receiving point in Naturgassparken in Øygarden municipality, where it will be sent through pipelines to injection wells on the Norwegian Continental Shelf. Equinor, Total and Shell are responsible for the transport and storage parts of the project. The project partners are currently conducting FEED studies and expect a final investment decision in 2020.

In extension to the Norwegian part, the Northern Lights project aims to contribute to developing a European CO_2 transport and storage network. Realisation of this project and follow up storage projects in the North Sea could help to decarbonise Europe´s industries and create a hydrogen market. For this purpose, the CO_2 shipping solution of this project received the status of a European Project of Common Interest. The project has recently submitted a request to update the PCI application, which would expand its geographical scope to capture sites located in Belgium, France, Germany, Ireland, the Netherlands, Sweden and the United Kingdom. Carbon capture projects in some of Europe's most innovative industrial companies, such as Air Liquide, ArcelorMittal, Fortum, is crucial to kickstart a continent-wide CCS network.

Shipping is the preferred transport option for CO_2 sources located close to harbours, where no geological storage is available within reasonable distance, and may be achievable at a lower cost compared to pipeline transport for several potential CO_2 sources around the North Sea basin. The Northern Lights transport and storage project is planned to start operating in 2023 with the capacity to store 1.5Mton/y. The project's extension to cross-border shipping of CO_2 is expected to take place from 2024-25 for most other European capture initiatives, with a total capacity of 5 Mton/y.

If deployed on a large scale, the CCS solution can help create employment opportunities in Europe. According to a recent Sintef study, a European CCS industry could generate 30,000 to 40,000 jobs and 80,000 to 90,000 jobs in 2050. Most importantly, CCS could help preserve the existing jobs in the European industry, which risk disappearing if there are no viable options for industrial activities to remain competitive in a low-carbon environment.

GE Renewable Energy

Unleashing Limitless Energy

Cypress – 5MW Onshore wind turbine

The Cypress is GE's largest onshore wind turbine in operation to date. The Cypress platform is powered by a revolutionary two-piece blade design, enabling blades to be manufactured at even longer lengths and improving logistics to offer more sitting options. Longer blades improve Annual Energy Production (AEP) and help drive down Levelized Cost of Electricity (LCOE), and the proprietary design will allow these larger turbines to be installed in locations that were previously inaccessible.

It significantly drives down logistical costs, by enabling blade assembly onsite and reducing the costs for permitting equipment and road work required for transporting longer blades. Equally importantly, it features blade tips that offer customers greater flexibility to address site wind conditions and requirements.

The Cypress platform is produced at GE Renewable Energy's facility in Salzbergen, Germany, while its split blades are produced by GE's LM Wind Power facilities in Kolding, Denmark and Castellon, Spain. In March 2019 the Cypress prototype was successfully installed and is fully operational in Wieringermeer, Netherlands. The first Cypress order was announced by GE on April 2019 and the project is scheduled to be completed by the end of 2019 at the Bavaria region in South Germany.

One Cypress 5.3-158 can provide clean power for the equivalent of 5,200 European residential homes.

Haliade-X – 12MW Offshore Wind Turbine

The most powerful offshore wind turbine in the world to date, featuring a 12 MW capacity (the world's first), 220-meter rotor, a 107-meter blade designed by LM Wind Power, and digital capabilities. In addition to being the biggest offshore wind turbine, the Haliade-X will also be the most efficient of wind turbines in the ocean.

The Haliade-X 12 MW provides significant savings across offshore wind turbine manufacturing, installation cycle times, service and repairs, through its simplified process and intelligent components. The Haliade-X 12 MW larger capacity can produce energy even at lower wind speeds, increasing profits and dramatically lowering the levelized cost of energy.

The first Haliade-X 12 MW wind turbine prototype is being produced at GE Renewable Energy's site in Saint Nazaire, France, while its 107m blades are being produced in Cherbourg, France. The prototype will be installed in Maasvlakte-Rotterdam, Netherlands during summer 2019.

One Haliade-X 12 MW turbine can power the equivalent of up to 16,000 European homes with clean energy.

BoilerView – Efficiency optimisation of heat generation systems

In Germany, around 60% of all heat generation systems in residential and commercial properties are inefficient. They are sometimes oversized, inefficiently set or inadequately maintained. However, the biggest challenge is the fact that the systems should be constantly adjusted to suit new external conditions in order to function as efficiently as possible. Digital monitoring of the system makes such adjustments possible. It enables ista to develop a clear requirement profile for the building and optimise the efficiency and reliability of the system.

For several years ista has been using various components of data-based analysis, optimisation and control of heat generation systems on a large scale in the Netherlands. We are now launching intelligent heating system control together with our partners in Poland, Sweden and Switzerland.

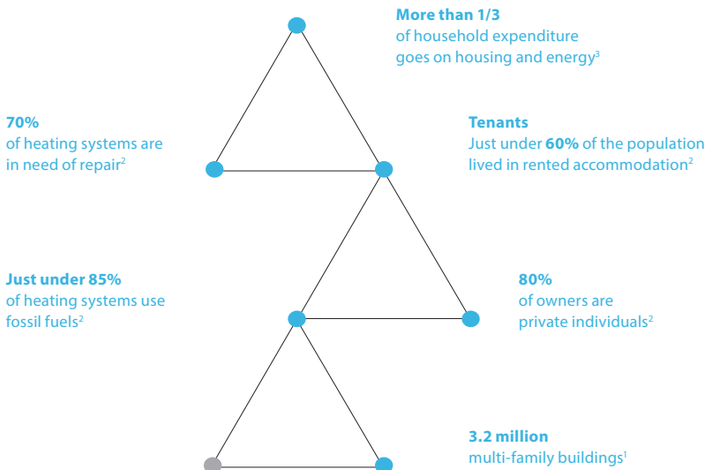
ista stands for efficiency solutions that require little investment and achieve results as quickly as possible.

The high-frequency measurement of the output power of a heat generation system provides the detailed information required to continuously optimise the system, detect faults and reduce outages. This saves energy, cuts CO_2 emissions and increases tenant comfort.

ista's plant monitoring data can also be supplemented with further information, for example on primary energy, the weather and the user. ista has already developed and tested various optimisation systems on the basis of this detailed data set. This makes it possible, for example to:

- optimise plant settings
- take weather forecasts into account in the heating curve
- reduce outages and optimally identify maintenance times
- define the fundamental heating system requirements of the building so the right investment decision can be taken in the event of a system replacement or change
- perform dynamic pump control and night-time reduction and use system times geared to the users' requirements

In the near future, heat generation systems will be almost exclusively digitally analysed and optimised. This is the road ista is taking together with property owners and managers in a wide variety of pilot projects and established services.



Source
[1] Federal Statistical Office according to 2011 census, [2] BDEW 2016 , [3] Federal Statistical Office, 2014

Microsoft

Helping Allego offer electric vehicle smart charging solutions with Azure Digital Twins

Allego is one of the leading providers of charging solutions and electric vehicle cloud services. Its pan-European network of almost 9,500 charge points offers a seamless charging experience for cities, companies, and consumers. The company is coordinator of leading European fast charge and ultra-fast charge projects, one of the market leaders in services for Public Transport and facilitates over 600 cities and companies with smart charging solutions.

Using Azure Digital Twins, Allego has developed an intelligent electric vehicle charging solution. It models entities within the electric vehicle charging network such as regions, utility companies, charging stations, vehicles, and others to optimize charging schedules using real-time data like electric grid constraints, charging preferences, and more. As a result, Allego is providing electric vehicle drivers everywhere with flexible, easy-to-use, and environmentally friendly charging options.

Allego's charging solution monitors and services charging points remotely and supports a variety of electric vehicles, charge speeds, and charging stations. These capabilities enable grid operators and energy suppliers to adapt to energy demand on the grid. For example, operators can reschedule electric vehicle charges to align to availability of renewable resources, lower energy rates, or to optimal power capacities. Additionally, electric vehicle drivers now have better visibility into their energy usage throughout the system, making it easier and more affordable to own and operate an electric vehicle.

The solution also provides the ability to adjust pricing and prioritization for charging. For example, buses may have the highest priority at charging stations, so charging is reallocated dynamically when buses arrive and connect. The system will continuously monitor and consider a variety of data points to dynamically reschedule and reprioritize charging for optimal efficiency.

Beyond EV charging, for example, Azure Digital Twins provides exciting potential use cases for utilities and infrastructure. Adger Energi, a Norwegian electric utility, is using Azure Digital Twins to identify ways to operate its electrical grid more efficiently through distributed energy resources, device controls, and predictive forecasting—thus avoiding costly and time-consuming energy upgrades. This innovation in using distributed energy resources has already garnered industry recognition, receiving the *Innovative Star of Energy Efficiency Award: Power Generation and Supply*.

Looking forward, Microsoft will continue to invest in additional energy management capabilities within Azure Digital Twins and seamless integration with other Azure services.

Ørsted

Offshore wind leading the change towards a Europe powered by green energy

Today, Europe sits on one of the world's best offshore wind resources in the North Seas. Here the wind speeds are high, relatively constant, and the waters are shallow. However, the North Seas still has an immense and untapped potential that can supply energy equal to the maximum production of Europe's existing coal and lignite-fired power plants two times over. If this potential is realized, offshore wind can lead the change towards a Europe powered by green energy.

In 2017, renewable energy reached a breakthrough in Europe. It became cheaper to install offshore wind farms than to build new fossil-fuel based power plants. The cost of offshore wind has fallen 63% in six years and is now among technologies that offer cost effective and scalable renewable energy, alongside onshore wind and solar power. This confirms that it's economically viable to build a European economy that runs entirely on green energy.

As the global market leader in offshore wind energy, we are proud at Ørsted to have been the first mover in maturing a green, scalable, and very powerful renewable energy technology. Since we built the world's first offshore wind farm in Denmark in 1991, the technology has undergone a major maturation and it is also now deployed in Denmark, Germany, the Netherlands and United Kingdom. Several factors have contributed to the maturing of the offshore wind technology and have made offshore wind cheaper than black energy. Among these factors are clear and ambitious national plans for buildout, which allowed for industrialization in every part of the supply chain. Furthermore, research, development, and the drive for improvement has resulted in cheaper and more efficient components, and in new methods of installation. The sizes of turbines and wind farms have also grown significantly, yielding more production per turbine and hence producing at a lower cost of energy.

The buildout of offshore wind is vital if Europe is to meet its commitment in the Paris Agreement to limit global temperature increases to 2 degrees above preindustrial levels by 2100, while striving towards 1.5 degrees. In 2018, our European offshore wind farms avoided emissions equal to 6.3 million tons of CO_2. This is equal to the yearly CO_2 emissions from about 3.2 million cars.

Moreover, investments in offshore wind farms bring thousands of new job opportunities. Our analysis shows that the offshore wind farms Ørsted has installed (globally) in combination with the offshore wind farms we have under construction create 180,000 job years in their lifetimes. This job effect corresponds to ensuring 5,000 average European citizens life-long employment.

The cost of energy from new offshore wind farms is now lower than new-built coal, gas and nuclear power plants in Europe. This makes offshore wind energy a competitive option to policymakers seeking to bolster Europe's efforts to decarbonize. A fact which can be seen directly in European countries' buildout plans and future scenarios. As one example, European Commission scenarios for reaching net-zero emissions in Europe by 2050 (Clean Planet for all), suggests that roughly 25% of the electricity supply would come from offshore wind energy.

Panasonic

Decarbonising heating systems with ambient air: air-to-water heat pumps

Panasonic is one of the global leaders in products, technologies and solutions for decarbonisation. With more than 100 years of existence and more than 60 years of experience in heating and cooling solutions, Panasonic is selling to more than 120 countries around the world. In October 2018, Panasonic opened a factory and production lines for air-to-water heat pumps in Czech Republic (Pilsen).

Panasonic is committed to realise its Environmental Vision for 2050. The Environment Vision 2050 means to work towards the creation and more efficient utilisation of energy which exceeds the amount of energy used, aiming for a society with clean energy and a more comfortable lifestyle. This includes the promotion of innovative and energy-efficient technologies, such as heat pumps, the effective utilisation of resources as well as the creation of factories and transition of existing factories towards zero CO_2 emissions plants.

Heat pumps participate to this vision looking at cleaner energies and more comfortable lifestyles. Heat pumps are a sustainable and low-energy system for heating and sanitary hot water production, both for residential and commercial applications. Heat pumps can be installed in any type of climate and any European country. In the case of air-to-water heat pumps, the captured heat is automatically transferred to water, which is then ready for use in the space heating system and for supplying domestic hot water needs. This proven technology has been developed and used over many years. Its uptake is steadily growing at EU and global level.

According to recent figures from the European Heat Pump Association (EHPA), 2018 data from 19 European countries reveal a market growth of 12% compared to 2017 figures, with more than 1.25 million heat pumps (all type of heat pumps considered) sold, with a total installed base of 11.8 million units across Europe.

Heat pumps can help to reduce by half emissions from heating (compared to conventional boilers). According to EHPA statistics, the EU-19 stock of heat pumps (all types of heat pump considered) achieved a saving 32.98 Mt of greenhouse gas emissions in 2018.

Panasonic is taking a step further by lowering the global warming potential of the refrigerants used in its heat pumps and constantly improving their performance.

Air-to-water heat pump systems are a technology of future, available today. Heat pumps are a contributor to the achievement of EU 2020 and 2030 renewable energy and energy efficiency targets. They are up to four times more energy efficient than traditional heating systems, such as conventional boilers. They utilise renewable energy by extracting heat from ambient air outside the building, even when it is below freezing outside. In fact, up to 80% of the heat energy required is derived this way and allow for heating systems to move away from conventional fossil fuel (oil, gas, LPG) and traditional electric heating systems.

Last but not least, they are a key technology to help decarbonise EU building stock and achieve the EPBD (Energy Performance of Building Directive) goals, while allowing flexibility on the energy markets. Indeed, heat pumps have the potential to play a role in demand side-management and the integration of renewable energy into the electricity grid.

On the road to renewable energy in the EU with PKA Pension Fund

Within the borders of the EU, PKA has invested in five offshore wind farms in Denmark, the Netherlands, Germany and United Kingdom, one onshore wind farm in Sweden and the world's largest biomass power station in the UK.

One of the targets of EU's 2050 long-term strategy and UN Sustainable Development Goal 7 is to substantially increase the share of renewable energy in the global energy mix by 2030. The EU has set binding targets of 20% final energy consumption from renewable sources by 2020 and 32% by 2030 to achieve its strategic long-term vision for a prosperous, modern, competitive and climate neutral economy by 2050.

PKA has been an active investor in renewable energy since 2011 with focus on tackling climate change. Today, PKA has invested about EUR 2 billion in renewable energy projects in the EU, which supports the EU member states in reaching the EU targets as well as the UN Sustainability Development Goal 7 of increasing their share of energy from renewable sources. PKA strives for climate-related investments to make up to 10% of all investments by 2020.

Furthermore, PKA aims to influence greenhouse gas emitters to take action on climate change by engaging with the companies through dialogue, active ownership and international investor initiatives, such as Climate Action 100+ and IIGCC.

PKA's recent efforts to tackle climate change is about the ability to maximize the amount that beneficiaries will have in retirement, and at the same time, ensuring them a sustainable economy, society and environment that they will retire into. PKA's climate-related investments have attractive risk-adjusted returns and at the same time, it gives the opportunity for PKA to make a positive impact on climate change.

PKA has invested in renewable energy sources, which combined provide green energy to 2.9 million households in the EU.

PKA's investments in renewable energy contribute to the EU members states to achieve the EU targets of 20% final energy consumption from renewable sources by 2020 and 32% by 2030.

Schneider Electric's microgrid solutions: example of Finland's largest industrial microgrid

In Finland, Schneider Electric has delivered the largest industrial microgrid and an advanced IoT-enabled building automation system for Lidl's new distribution center in Järvenpää, Finland.

Schneider Electric's microgrid offer includes EcoStuxure Microgrid Advisor - a cloud-based solution that leverages powerful analytics to control and optimize energy resources for sustainable and cost-effective facility performance. It is based on Schneider Electric's EcoStruxure architecture that connects best-in-class OT solutions with the latest in IT technology, helping our customers solve their energy, operational, and IT technology challenges by interoperable connecting devices, edge control, and apps and analytics.

Our microgrid solutions will enable the distribution center to reach a high level of energy efficiency based on 100% renewable energy. It will include a 1600-panel solar power plant on the building's roof, enabling solar-generated electricity to be utilized in the co-generation of heating and cooling. The heat recovered from the distribution center's refrigeration equipment and systems will also be used for the building's energy needs and supplied to Järvenpää's residents, heating water for approximately 500 private homes.

The Lidl distribution center's integrated building management system will be executed with Schneider Electric EcoStruxure Building Operation software, that will deliver high energy efficiency. This open building management platform integrates multiple systems for centralized, real-time control and management across one to many enterprise buildings.

This installation includes full remote access as well as analytic services to further improve energy efficiency. The unique management services offer has earned international ISO 27001-2013 information security certification, as the first of its kind in Finland.

With more than 46,000 employees, 115 plants and distribution center and major R&D centers across Europe, Schneider Electric is leading the digital transformation of energy management and automation toward a more electric, digital, decarbonized and decentralized world.

Climate action is at the heart of Schneider Electric's strategy – as our CEO, Jean-Pascal Tricoire says: *"When it comes to climate change, I'm neither an optimist nor a pessimist. I'm an activist."*

To achieve the EU long-term decarbonization objectives, Schneider Electric is supporting the digital transition toward a more decentralized and decarbonised energy system. Combined with digitized electric distribution networks, the advent of microgrids and smart distribution enable the introduction of renewable energy, resulting in a more sustainable and resilient grid.

Microgrids generate a more sustainable and self-sufficient future: by creating an optimized way to access reliable, green and resilient energy, they help businesses to contribute to lower CO_2 emissions, while becoming more efficient and profitable. Schneider Electric microgrid solutions simplify the integration of renewables and allow facility managers and microgrids operator to collect, forecast and automatically optimize the operation of onsite resources.

SIEMENS

Advancing decarbonization and sector integration through renewable hydrogen

Siemens is at the forefront of renewable hydrogen production through electrolysers. The first applications and power-to-x projects started in Germany, but quickly expanded to other EU member states, such as Austria and Sweden, and with projects in Australia and Dubai even beyond the EU. Whereas current projects are in the range of up to 10 MW, Siemens expects to build the first projects scalable up to 100 MW electrolyser capacity as early as 2020.

One of the most important challenges today is the decarbonization of the entire economy. The key to meeting this challenge is to consistently expand renewable energy sources and integrate them in developed industry, energy, and mobility infrastructures. Power-to-x technologies are the bridge between renewable energy generation energy and other sectors. The principle is simple: “green” electricity and water are converted to carbon-free hydrogen and oxygen in an electrolysis process. The hydrogen can then be stored in existing gas infrastructures and used as fuel or as a raw material in industry. Hydrogen is in fact a versatile element of multifunctional use and high importance for the industrial, transport and energy sector. Until now, hydrogen is largely produced through steam methane reforming or coal gasification, technologies with a high carbon footprint. Being produced through electrolysers powered by wind and solar, however, not only hydrogen production can be made emission-free but can also be a major leverage to speed up the decarbonization of the European economy on a larger scale.

Used in industrial processes, renewable hydrogen can significantly lower the CO_2 footprint, e.g. in ammonia and metal production and petroleum refinement. In Linz, Siemens is conducting a European flagship pilot project with the world’s largest PEM electrolyser (6MW), producing renewable hydrogen for steel production.

Renewable hydrogen can also contribute to the deployment of zero-emission transport by using it directly as a fuel for fuel cell vehicles or as a feedstock for e-fuels. Siemens is also committed to make its gas turbine portfolio ready for a green hydrogen future capable to provide seasonal storage for an emissions-free power system.

With its wide range of application, renewable hydrogen can significantly contribute to cut emissions and accelerate the energy transition. A lot of promising developments are taking place in this sector and Siemens’ technology roadmap for electrolysers foresees to scale up capacity by factor 10 every 4-5 years.

The Hydrogen Roadmap of the FCH suggests that the hydrogen economy could create 5.4m direct jobs by 2050, contributing to a €820 billion annual revenue for the hydrogen and equipment-related industries. Turning Power-to-X into a gigawatt industry is therefore not only a must-have for carbon-neutrality, but also an opportunity to expand and strengthen Europe’s global industrial leadership in climate technologies.

Renewable hydrogen will have to play a significant role on the pathway to reach the 2050 targets. The key role of hydrogen is also highlighted in the EU long-term strategy. The implementation of a holistic approach towards decarbonization is largely feasible through the deployment of hydrogen and power-to-x technologies in all sectors of the economy.

Hydrogen as an energy-carrier enables long-term storage of renewables and thus reduces the need to dispatch electricity from fossil fuels to absorb peak consumption. Synthetic fuels based on renewable hydrogen can replace fossils in multiple economic sectors and can be distributed through the existing infrastructure, which also reduces the costs of the energy transition towards a net-zero economy.

Silyzer 300 – the next paradigm in PEM electrolysis

17.5 MW - per full Module Array (24 modules)
75 % - System efficiency (higher heating value)
24 modules - to build a full Module Array
340 kg - hydrogen per hour per full Module Array (24 modules)

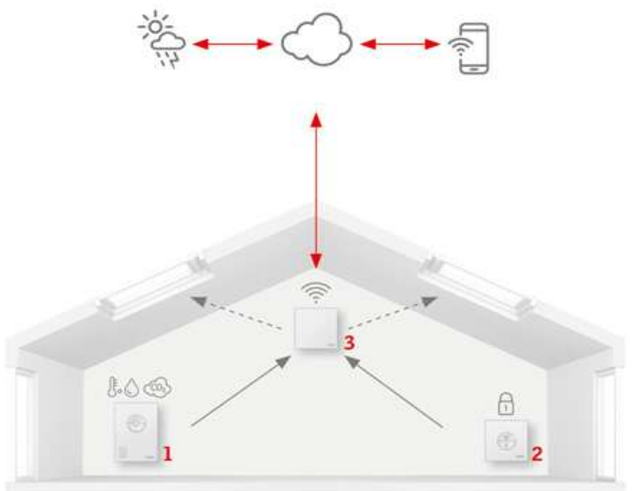
Bringing light to life

For more than 75 years the VELUX Group has created better living environments by bringing daylight and fresh air into people's homes all over the world. Our products help create bright, healthy, energy-efficient places in which to live, work, learn and play. The VELUX Group has manufacturing and sales operations in more than 40 countries, with an extensive distribution network. Our products include roof windows and modular skylights, as well as a range of decorative elements, blinds, roller shutters, installation solutions and remote controls.

Sustainability is deeply ingrained in the VELUX way of doing business. We work to improve the sustainability of our products through the entire product lifecycle, and we continuously seek to minimize our footprint in the way we source, design, manufacture and sell our products. In 2018, we e.g. achieved to reduce 43% of our carbon footprint in our production compared to 2007 baseline. Our target for 2020 remains the same (50% reduction by end of 2020). In addition, 97% of our waste materials from our window production has been recycled or used for heat retention, and 99.5% of wood used for windows are made from sustainable and certified wood in 2018.

VELUX ACTIVE with NETATMO is a smart home system that automatically controls the indoor climate by operating VELUX INTEGRA® electric roof windows, blinds and shutters. It is a solution for The Indoor Generation as the system will air out automatically, taking CO_2, humidity and temperature levels, as well as local weather forecast information into account.

Optimal and smart solution enables healthy living environments by delivering daylight and fresh air through the roof. Smart monitoring, operation and optimization enable optimal daylight conditions and natural ventilation delivering significant effects of energy balance by utilizing of solar gains and/or preventing heat losses.



1. VELUX ACTIVE indoor climate sensor: Measures temperature, humidity and CO_2 in your home

2. VELUX ACTIVE departure switch: Closes all roof windows by one touch and enables safe ventilation

3. VELUX ACTIVE internet gateway: Securely connects to cloud server through WIFI and communicates to VELUX INTEGRA® products

Taking wind from niche to 100 GW and beyond

Since starting out in Denmark 40 years ago Vestas has taken wind power to a level of technological maturity where it can now compete on price with conventional sources of energy such as oil and gas, making it a sound business investment. Today Vestas is a global company, but its foundation still lies in Denmark with research, testing and production facilities.

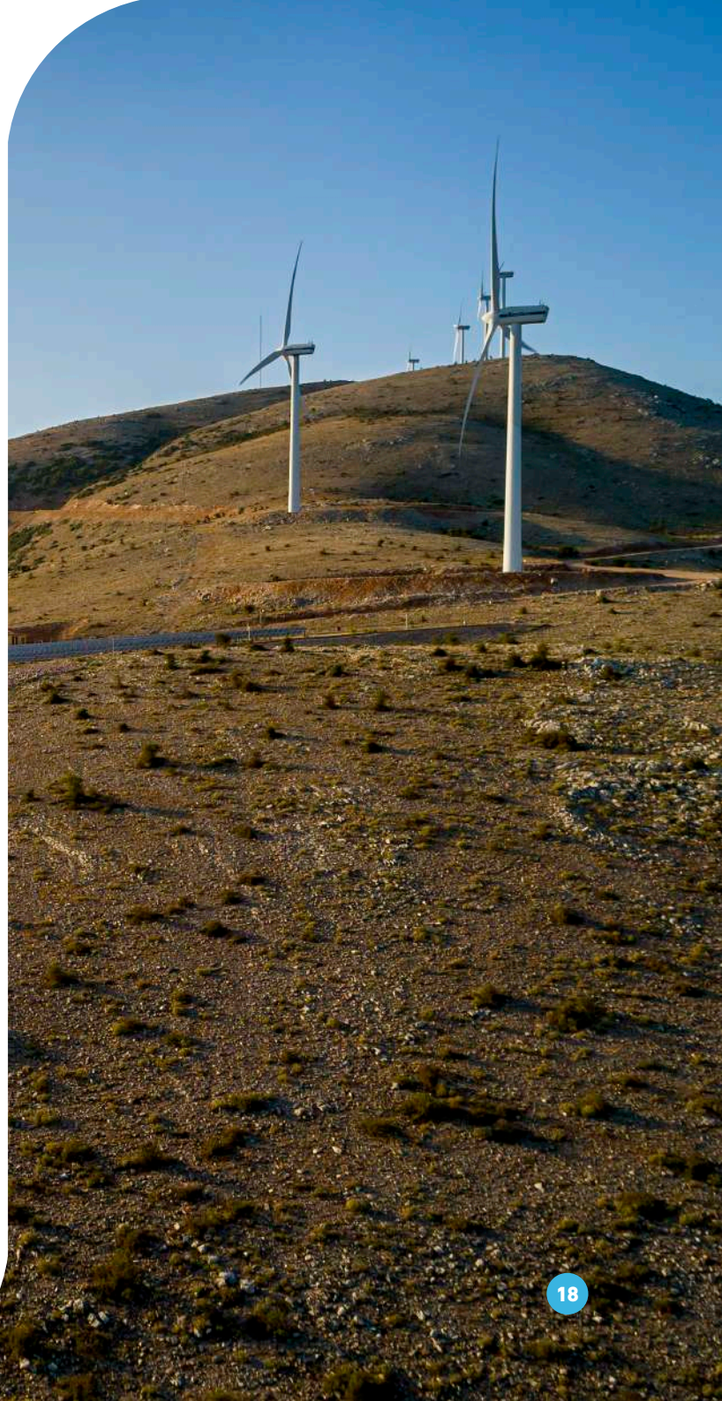
In 2019, Vestas reached the milestone of having installed 100 GW of wind turbines across more than 80 countries around the world. Now Vestas prepares to take wind energy further and become part of the baseload energy source in the world. That's why we changed our vision's focus from solely wind to sustainable energy solutions. This sets a clear direction for Vestas that highlights our aspiration to develop and offer broader solutions that can replace fossil-fuel energy, meet growing energy demand including from electrification and integrate future energy system services.

We will therefore be combining our core expertise within wind energy technology and services with other solutions such as hybrids, grid integration, and digital and financial solutions. We are changing how our products, services and solutions are designed and produced so our technologies continue to scale and are available wherever there is demand.

The decarbonisation of Europe's electricity sector has been one of the most transformative changes in the economy over the last two decades with 298 GW renewable energy added since 1995. Wind energy has been the largest single contributor, with 182 GW of capacity installed as of the end of June 2018. During that time Europe has built a world leading wind industry with 300,000 jobs.

Today, Renewable energy sources account for 30 percent of Europe's electricity demand. However, electricity only covers 24 percent of Europe's energy consumption. The vast majority of Europe's power consumption remains fossil fuel-based. Transport, heating and cooling (H&C) use most of these fossil fuels. Transport accounts for 32 percent of Europe's final energy demand, and 94 percent of it is covered by oil products. Heating and cooling account for almost half of the final energy demand, and 80 percent of it comes from fossil fuels. Today renewables make up only 18 percent of the supply in heating and a mere 8 percent in transport.

The next decisive step for Europe is therefore accelerate the electrification process by integrating more renewables in heating, cooling and transport and thereby create a renewables-based energy system that could become an engine of growth and technological leadership.



Past activities

A journey to the heart of energy innovation

“Seeing is believing” site visit to Schneider Electric and EDF

15-16 October 2018 - Paris

In 2018, Energy Solutions organised a “Seeing is believing” site visit to Schneider Electric headquarters in Rueil-Malmaison and EDF R&D lab centre in Les Renardières.

Participants included Energy Solutions Chair MEP Morten Helveg Petersen and Vice Chair MEP Bendt Bendtsen as well as various members of the Advisory Board.

During the visit, we had the opportunity to get first-hand experience of the latest innovation in the energy sector, including smart distribution networks, photovoltaics and e-mobility.

We also discussed the issue of “Innovation and its financing in the energy sector” at a high-level roundtable with Laura Cozzi, Head of Energy Demand Division, World Energy Outlook, International Energy Agency (IEA); Marc Nezet, SVP Strategy & Innovation, Building & IT Business, Schneider Electric; Pierre Todorov, Secretary General, EDF Group; and Adina Braha-Honciuc, Government Affairs Manager, Microsoft.

High-level event: “Beyond the silos – the role of sector integration for a carbon neutral EU economy’’

19 March 2019, Siemens office – Brussels

In March 2019, Energy Solutions organised a high-level debate on the role of sectoral integration as an essential component of the shift to a low-carbon economy in Europe.

The event was hosted by Energy Solutions Chair MEP Morten Helveg Petersen, and speakers included Ilaria Conti, Head of Gas, Florence School of Regulation; Florian Ermacora, Head of Unit Wholesale markets electricity and gas, DG Energy, European Commission; and Benedikt Herges, Senior Director for Energy, Siemens.

High-level events with EU Commissioners Šefčovič, Vestager and Cañete to address the future of the Energy Union

January, March and November 2017 – Brussels

2017 started with a roundtable debate with the European Commission’s Vice President for the Energy Union Maroš Šefčovič, MEPs from the Energy Solutions Steering Committee and industry leaders. The event addressed the future of the Energy Union in the context of the recently published “Clean Energy for All” package.

Energy Solutions Network also held a high-level roundtable discussion with EU Commissioner for Competition, Margrethe Vestager, to exchange views on competition rules and on how policy-makers can create the optimal enabling framework for long-term investments across the energy system.

2017 ended with a high-level conference on the importance of bridging finance and energy with keynote speaker Miguel Arias Cañete, EU Commissioner for Climate Action & Energy, and high-level industry speakers including Eldar Saetre, CEO of Statoil (now known as Equinor), among other speakers.

ENERGY SOLUTIONS

Contact

For more information about Energy Solutions Network visit:
https://blog.enersolutions.eu

For more details on how to join Energy Solutions Network, please contact us at
secretariat@enersolutions.eu