



RESEARCH & INNOVATION TO SUPPORT THE DIGITALISATION OF THE ENERGY SYSTEM

October 2022

The European Commission's 'Action plan on the digitalisation of the energy system' lays the groundwork for building an integrated energy system that can support the growing interconnectedness of the market and enable digital and energy value chains to work more closely together.

The action plan will provide strong support to **REPowerEU**, the joint European action presented in March 2022 to accelerate the switch to renewables and hydrogen, to become more energy efficient and make Europe independent from Russian fossil fuels well before 2030.



COMBINING THE GREEN AND DIGITAL ENERGY TRANSITIONS

Europe's digital transition goes hand in hand with the European Green Deal. The digital transformation of the energy system is crucial to decarbonise our energy supply, addressing our reliance on fossil fuels and promoting the uptake and integration of renewables in our energy system, while increasing its resilience. At the same time, the green transition and the digital transformation play a central role in relaunching and modernising the European economy. Digitalisation of the energy system will generate jobs, open new opportunities for European businesses, encourage the development of secure technology and enable citizens, prosumers and communities to play an active role in the energy market.

Research and innovation are key to accelerate the development, implementation and upscaling of digital solutions in energy supply, demand and transportation (transmission and distribution) to support the energy transition. **Horizon Europe**, the EU's Framework Programme for research and innovation, supports the development and integration of digital solutions in the energy system to make it more efficient, resilient and able to integrate higher shares of renewable energies. This includes actions on many levels, such as supporting circular design, development and manufacturing of individual components; component control, performance measurement, self-diagnostic, ancillary services to the power system, digital twins; integration in the built environment (to address energy efficiency and comfort in buildings); increase transport safety and efficiency; and digital tools that allow to optimise workflows (cost, time, quality, resource use).

“ Europe must leverage the potential of the digital transformation, which is a key enabler for reaching the Green Deal objectives. Innovation underpins the green and digital transitions to decrease greenhouse gas emissions, make our economies more competitive and reduce over-dependencies on suppliers outside the EU for critical technologies, raw materials and sources of energy. ”

Mariya Gabriel, EU Commissioner for Innovation, Research, Culture, Education and Youth

Research and
Innovation

EU RESEARCH IN 5 KEY AREAS OF FOCUS

Digitalisation improves the safety, productivity, accessibility and sustainability of energy systems, but it also brings new challenges for the sector, in particular with respect to cyber security. This is why the European Commission has since 2016 supported 11 research and innovation projects on this topic for more than EUR 125 million under the Framework Programme Horizon 2020. These projects cover five areas that are key for energy and digitalisation:



A EUROPEAN DATA-SHARING INFRASTRUCTURE FOR NEW ENERGY SERVICES

Future energy grids will be more open and participatory, becoming the entry point for new energy players. **CoordiNet** is taking the first steps towards a unified European electricity market platform that joins all parties across the entire electricity value chain – electricity carriers, distributors and consumers.



EMPOWERING CITIZENS TO PARTICIPATE IN THE ENERGY MARKET

Energy communities of energy-related citizens' organisations encourage consumers to have a direct stake in producing, using or sharing energy. The **COMPILE** project is creating a toolset to show the opportunities of remote areas or areas weakly connected to the grid (so-called energy islands) for decarbonisation of energy supply, community building and creating environmental and socioeconomic benefits. These opportunities will be demonstrated at 5 pilot sites.



CLIMATE NEUTRALITY IN THE IT SECTOR

Most data centres consume almost as much electricity in their cooling systems as in their servers. At a typical data centre, about 40% of the electricity is consumed by cooling systems. Data centres' use about 3% of Europe's electricity, and hence the impact on the environment is becoming a growing concern. The **BodenTypeDC** project has constructed, tested and validated a data centre that is both energy and cost efficient. It runs on renewable energy and relies on free air and evaporative cooling technologies without the need for refrigerants.



CYBERSECURITY OF THE ENERGY SECTOR

Digitalisation improves the safety, productivity, accessibility and sustainability of energy systems, but it also brings new challenges for the sector, in particular with respect to cyber security. The **EnergyShield** project has developed solutions to increase resilience against different types and levels of cyber and privacy attacks and data breaches, by adapting and integrating technologies for vulnerability assessment, supervision and protection in a defensive toolkit.



ENHANCING THE UPTAKE OF DIGITAL TECHNOLOGIES IN THE ENERGY SECTOR, AND PROMOTING THE MARKET UPTAKE OF INVESTMENTS IN RESEARCH AND INNOVATION

The EU aims to increase its offshore wind capacity from the current level of 12 gigawatts (GW) to at least 60 GW by 2030 and to 300 GW by 2050. Technology improvement and cost reductions are key to the rapid deployment of offshore wind capacity. The **ROMEIO** project has delivered a decision support system to better understand the real time behaviour of wind turbine generator systems under operational conditions, maximizing their life span and minimizing operations and maintenance costs.