Summary of Side Event

Enabling systemic energy efficiency improvements and accelerating implementation of the 2030 Agenda through the energy system digitalization

3 May 2023, 8h30–9h45 EDT / 14h30–15h45 CEST

Background on the event

Achieving higher level of energy efficiency in production, transmission, distribution, and consumption as much as it proves operationally, technically, and economically feasible, must be fundamental for a broader energy strategy. In this context, attention should be turned to digital technologies that offer an array of opportunities benefitting energy consumers, prosumers, suppliers, grid managers and the energy system as a whole: improved efficiency, cost savings, better reliability, and ultimately energy security. However, digitalization of the energy system is a complex process with multiple interdependencies, which poses considerable challenges for management of potential economic, social, or environmental issues. These require robust preventive and corrective measures. The side event took a system-level perspective and explored the role of digitalization in helping to unlock sectoral opportunities 'from source to use', along with side-effects and related challenges.

Key Issues discussed

- Economics and policy are driving sustainable energy transition, and the energy system is fundamentally changing: from centralized to decentralized, from fossil-based to renewable, thus challenging energy policy triangle: energy security, affordability, and environment;
- To reach set climate goals, it was argued that 90 per cent of electricity will have to come from renewables by 2050, adding much complexity to power systems that must become more flexible to manage this intermittent generation, as well as the influx of electric vehicles (which will have as much impact on the design and operation of the electric grid as it will on transportation systems themselves) and other smart assets at the grid edge;
- Increased power sector complexity requires a combination of digital innovations to manage it. With its benefits, digitalization is an enabler to (1) a cleaner electricity system by easing integration of renewables, improving grid reliability and resilience, and allowing for a smarter bi-directional grid enabling new role for energy users as energy producers through energy storage and demand-side flexibility, (2) increased systemic efficiency through analysis of energy use patterns and identification of anomalies (e.g. wasted energy) and efficiency improvement potentials (e.g. via digital twins and simulations), (3) reduced costs in a longer term through efficient operation of equipment and infrastructure, and (4) optimization of energy resource use in light of weather, environment, prices, and priorities, via improved connectivity and cross-sector integration of services, data, processes and systems for broader application and better digital inclusion, tracking of materials supporting circularity; moreover, digitalization is the catalyst for expeditious and more effective action for decarbonization and achieving Sustainable Development Goal 7 and non-energy Goals of the Agenda 2030;
- Opportunities, value proposition and key benefits of digitalization in energy, along with the key challenges of data management and analytics, cybersecurity and data privacy, technology compatibility and need for skilled workforce were discussed, including

infrastructure challenges, limited technical expertise, insufficient policy and regulatory frameworks, challenges linked to electricity sector monopolies and limited participation and investment from the private sector, political and economic instability, relatively high costs, and limited public awareness and acceptance;

- Digital innovations and solutions that are offering new ways of looking at the existing energy challenges and finding exceptional ways to address them, while providing opportunity to take up energy efficiency to the next level by improving regulatory and solutions, were highlighted; in particular, blockchain was argued to be one of the solutions that can be used for decentralized project finance, renewable energy provenance, carbon certification, renewable energy certificates trading, automated (self-executing) smart contracts, decentralized energy markets, and others. Once of the presented case studies for the use of blockchain, has evidenced trusted audit trail and streamlined processes.

Key recommendations for action

- Ways forward to enable adoption of digitalization in energy include, and are not limited to the following steps: (1) Create a roadmap for the implementation of digital technologies, including blockchain, in the energy and related sectors to encourage private sector participation and investment, including through public-private partnerships; (2) Identify, adapt, and adopt best practices from around the world; (3) Restructure energy markets and invest build out the required infrastructure, including digital infrastructure and related technologies, to enable smart grids with multidirectional flow of power and data; (4) Empower consumers to become prosumers by enabling smart metering; (5) Promote digital skills, re-skilling and up-skilling, and education;
- Integrity, availability, and confidentiality for data are key focus areas in data and analytics. Systems that address these aspects can master the challenges faced with data curation, data integration, data democratization, cybersecurity, and grid resiliency, and can ensure more accurate load forecasts benefitting from dynamic market signals and making timely decisions aligned with strategic orientations. Frameworks for data management and data analytics maturity models shall be developed to drive standardization across sectors and bring 360-degree considerations of the use of data.
- Digitalization is not a goal but a journey that is transforming societies starting from energy behaviours to building trust amid compounding crises, and, if properly managed, brings benefits for a balanced energy system transformation, regardless of the starting point.
- Unleashing the digital transformation potential will, while addressing climate change, help to advance towards sustainable energy, and impact rapidly and positively on sectors that are key for decarbonization and increased energy efficiency. The ECE Task Force on Digitalization in Energy will continue providing a platform for constructive dialogue for cross-industry experts and will continue to shape policy agenda by exploring opportunities, assessing challenges, risks, and trade-offs of digitalizing the energy system, and addressing the barriers to digitalization in energy.