Flexibility markets

With regards flexibility markets in particular, there are many challenges to implementing **functional** and **effective** flexibility markets, ranging from the policy and regulatory environment to practical operational elements. Allowing smooth operation of flexibility markets includes consideration of challenges such as:

- Data: Understanding and sharing necessary data between different systems,
- Visibility: Visibility of the network at all levels to understand assets / constraints / needs,
- Decision making: Systems to make the correct decisions to efficiently realise flexibility,
- Communication: Communication of needs to market participants,
- Verification and settlement: Dispatch of required flexibility and confirmation thereof,
- The creation of these market functions to unlock value for consumers and to allow for greater participation of generators,
- Review or revision of existing codes; exploring the need for looser frequency or voltage standards, etc,
- The need to explore multiple tariffs that can both benefit consumers and the operation of the system enabling that the value can flow where it needs to, driven by market forces.

With these come a variety of other issues, including but not limited to the engagement of consumers, consumer protection, cybersecurity, standardising communication links between DSOs and TSOs, and giving appropriate long-term investment signals for the market.

Prior to the creation of the Flexibility Markets Working Group, ESC led a study to explore the justification for its creation (https://www.iea-isgan.org/scoping-study-for-isgan-working-group-9/) This study conducted stakeholder engagement and an extensive literature review, and identified numerous gaps related to flexibility. These include:

- Integration of trading with dispatch / monitoring of balancing actions required on a sub-settlement period basis,
- Understanding actors' (aggregators, consumers, retailers, generators, physical network owners, system operators) requirements for flexibility and the commercial implications,
- A need to identify the different characteristics that different flexibility options provide and how to access them (e.g., active power, reactive power, inertia, responsiveness, duty cycle, repeatability, continuous duration etc.),
- Interoperable market development. For example, future flexibility is determined by investment and infrastructure decisions made today, yet there are no links between flexibility markets and long-term investment decisions in the markets meaning that investors cannot get confidence on the commercial aspects of their decisions,
- Consumer focussed flexibility. The industry often talks about paying customers for the inconvenience flexibility will cause, rather than demonstrating how flexibility is giving customers what they want at a price point they want to pay for it,
- Utilising digitalised flexibility offerings to avoid the risks of coincident responses to control signals and lack of diversity, integrated with critical national infrastructure.

Another publication by ESC "A Zero Carbon Energy System: The Operability Challenge" (https://es.catapult.org.uk/report/zero-carbon-energy-system-the-operability-challenge/) also revealed key findings and challenges faced by zero carbon systems emphasising the need of flexibility. These include:

- Identifying long term storage solutions to solve the intermittency issue associated with renewables,
- Researching smart LC technology devices and how they should act under certain system conditions, EV acting as storage, V2G for frequency stability, etc,
- Further research on stress testing potential changes to security standards, and simulations on grid behaviour during extreme events to gauge potential effects of low carbon technology adoption in future years.