FUTURE POWER SYSTEM ARCHITECTURE

MEETING BRITAIN'S FUTURE POWER SYSTEM CHALLENGES

The Future Power System Architecture (FPSA) Programme: Perspectives for the Established Power Industry

Including: SO, DNO/DSO, TNO, OFTO, Large Generators, established networks equipment vendors, key consultancies, technical media.

The power system in Britain is undergoing radical transformation. The Future Power System Architecture (FPSA) programme is taking a holistic and whole-system approach to the evolution of its architecture - considering technical, governance, commercial and societal factors. FPSA is a multi-stakeholder collaboration led by the Institution of Engineering and Technology and the Energy Systems Catapult, sponsored by Innovate UK. This short note explains the importance of FPSA to the established power industry, particularly the asset intensive electricity companies, i.e. networks and large generators, and their traditional supply chain.

Drivers

DNOs (Distribution Network Operators) are evolving into DSOs (Distribution System Operators) with system services already replacing some investment options. Customers will also respond to policy initiatives for the decarbonisation of transport and heat. Through the growth of smart technology customers will both present and expect opportunities to be rewarded for behaviour that supports the efficient operation of the energy system. System operation and its ancillary services will change fundamentally, and become more complex, with an increasing focus on more localised energy markets.

Opportunities and consequences

The growth of more complex, and market driven, customer behaviour presents opportunities for network operators to use this flexibility at all levels within the system, both to save operating and investment costs, and to provide new value streams for customers. It will also change the nature of the existing ancillary services market, requiring existing ancillary service providers to adapt. Existing industry players will need to increase their co-ordination and streamline their joint management of the overall system.

Forward looking businesses will want to anticipate these changes appropriately and position themselves to guide the development of new services etc. and to ensure that customers are not frustrated in terms of the services that they implicitly or explicitly expect from the energy sector. This is a particularly important opportunity for developments that will occur quickly, and at scale.

Increased demand that is attendant on decarbonisation, along with flexibility that customers will bring via smart appliances etc. also brings new risks to power system operation. For example, smart appliances and EVs are capable of co-ordinated actions via market or other signals. This presents some operational risks, but also opportunities to assist the management of the system during emergencies. Particular efforts will be needed in developing appropriate protocols, taking into account customer privacy and cyber security requirements.

How can the FPSA functions help?

The FPSA project has shown that the challenges of future electricity system operation are contained in *thirty-five* functions. Two thirds of these functions exist today, although in a more skeletal form than that which will be required by the 2030s. The challenges of decarbonisation, ever increasing customer requirements, and flexibility, means that the *thirty-five* functions need to be progressively introduced over the next decade.

These functions provide clarity on what sub-functions and processes need to be developed, and highlight the regulatory and governance challenges in doing so. The functions provide a clear base on which detailed approaches, protocols and standards can be developed.

The Network Operator/Large Generator perspective:

The energy sector will change enormously over the next couple of decades. Traditional business boundaries are likely to be swept away, and even where future market services remain similar, there will be a huge shift in the requirements of, and the value placed upon them by, customers of those services. Customers, through smarter appliances etc. will have flexible demand. Without the co-ordinated vision of FPSA it is unlikely that all the value can be unlocked, either for customers or for industry players. Governance of the sector needs to change. The FPSA vision is for a new governance model, known as Enabling Frameworks that is agile, inclusive and timely in enabling the delivery of the *thirty-five* new functions.

Call to action:

The FPSA functions provide a robust and co-ordinated framework to rise to the challenges of the energy trilemma. There is much to do to develop the frameworks etc. within which the functions need to operate. The industry needs to coalesce behind the FPSA vision and work collectively on the technical, legal, regulatory and market changes that the FPSA framework needs.

For more information and to get involved please visit: **es.catapult.org.uk/fpsa** and **www.theiet.org/fpsa**