

FUTURE POWER SYSTEM ARCHITECTURE

MEETING BRITAIN'S
FUTURE POWER
SYSTEM CHALLENGES



The Future Power System Architecture (FPSA) Programme: Perspectives for Domestic & Micro SME Customers

Including: Domestic/micro-SME customers (and/or representatives thereof), Suppliers and NTBMs (Non-Traditional Business Models) the smart metering community, smart home and energy management services

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 considers the view from the grid edge, particularly from homes and small business premises. It includes those who live and work there, those who supply them with energy, and those who offer new 'smarter energy' products and services.

Drivers:

The future power system must allow the creation of new value: firstly, for customers by enabling them to have closer engagement with the energy they buy, use and perhaps sell; and secondly for the new product and service providers. Customers need assurance of simple to use and satisfying new services and technologies, whilst providers need confidence in a seamless and reliable interaction with the power system.

Collective action within communities, alongside family, friends, neighbours, or work colleagues, has the potential to increase engagement by creating new social norms that draw people to something that they wouldn't otherwise have considered. Community Energy Enterprises and Smart Cities may generate greater trust amongst groups of customers by offering local control and a sense of ownership.

Opportunities and consequences:

The extensive opportunities will only become a reality if there is 'joined-up thinking' between the parties and across the sector's many technical and commercial boundaries. The FPSA project has identified *thirty-five* functions needed for the future power system and many of these are directly relevant here.

FPSA analysis identifies drivers for change through the provision of: smart energy choices, energy arbitrage opportunities, options from new low carbon energy applications and resources, added-value services to network operators, and services to Community Energy enterprises.

Without these services, opportunities will be lost across many areas. For example, through lack of understanding of customer preferences and energy usage trends, under-utilisation of smart metering functionality, and opportunities foregone for energy flexibility, there will be loss of value to customers and indirectly increased power system costs through the need for capital investment that could be avoided.

Cross-boundary, whole-system aspects have great importance for these opportunities. New technologies and services require access to data and communications, which may be a local exchange of information say with the local network operator, or may require signalling across a wide area, for example offering flexibility to the national system operator. These data transfers will require a 'common language' (open data protocols) and must be secure against cyber intrusion and ensure data privacy. The FPSA *thirty-five* new functions address these critical issues.

How can the FPSA functions help?

Many of the *thirty-five* power system functions must be fully implemented if these new opportunities are to be rolled out at scale for customers. Proof of Concept trials may usefully be conducted ahead of this, but mass deployment needs scalable systems (e.g. for data handling), which require co-ordinated design, sometimes termed a 'system architecture'. Relevant functionality includes: provision for necessary operator intervention, monitoring of trends and emerging risks, establishing local trading mechanisms, flexible (e.g. half-hour tariffs) and settlement for domestic customers, in-home energy automation, and aggregation of flexibility services including home storage and 'Vehicle to Grid' capabilities.

The home customer perspective: what does this mean for me?

The energy world is changing rapidly and this could offer customers in their homes a huge range of new opportunities. These include much greater clarity of energy use, 'Time of Use' tariffs with home automation to take best advantage of energy price movements, generating their own electricity and storing it or selling it, being rewarded for providing flexibility of their demand or their delivery of power from their home storage or their electric vehicle (Vehicle to Grid). If these new opportunities are to be delivered seamlessly, reliably and backed with top quality service, the wider power system must be equipped for the job - in other words, provided with the necessary new functions identified as key to a smart energy future and to be delivered with a new process, Enabling Frameworks, that is agile, inclusive and timely in enabling their delivery.

Call to action:

For this future to become a reality, many parties must step up and engage with change. This includes existing and new parties, it requires active participation of those who make policy and regulations, and it spans technical, commercial and governance challenges. Home customers have much to gain - and their voice needs to be heard in discussion of the best way forward.

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

