**BEIS - Smart Flexible Energy System**
**Call for Evidence – WHP Telecoms Response**

WHP Telecoms welcome the opportunity to respond to the BEIS 'Call for Evidence' in relation to a Smart, Flexible, Energy System for the UK. WHP Telecoms provides end to end professional telecommunications consultancy and infrastructure support services to the utilities sector along with the mobile and fixed telecommunications community.

We are responding to this Call for Evidence in the context of an organisation wishing to see advances in power infrastructure (through Smart Grids) and moves to decarbonising Britain's energy sector as far as possible. Such advances will bring huge benefits for consumers and 'UK PLC'. WHP recognise that there are a plethora of very large organisations capable of responding comprehensively to the electrical plant elements of the CFE (switchgear and transformer manufacturers, DNO's, academia etc.). However, we feel that little attention has been given so far regarding the underlying communications infrastructure which will be required to facilitate the new 'smart grid'. Our response is therefore in a short, generalised, 'free text' format relating to telecommunications elements of smart grid deployment rather than answering multiple specific points in the CFE which are probably more effectively answered by other organisations.

# Introduction

The Call For Evidence presents innumerable aspects relating to the move to a smart energy system which are affecting and altering the architecture of Distribution Networks, including the move to embedded generation, electrification of transport and the use of smart technology. The consultation acknowledges that to enable this will require much greater [electrical] connectivity to the Distribution Network and much greater flexibility in relation to generation output and in intervention to modify consumption patterns.

# The importance of data to smart energy systems

Intrinsic to many of the aspects discussed in the CFE will be the requirement for availability of data to aid smart decisions – such as tariff and switching decisions and, more importantly, to ensure the continued quality and stability of the electricity network within this more dynamic energy model. Network evolution and the distributed nature of new generation connections will place ever-more reliance on the ubiquity and reliability of this data, without which, the smart energy system will not be realised.

Availability, access and usage of this data will be key to realisation of smart energy systems and will become even more essential in future in regards to balancing generation with demand, in improving transmission efficiency and ensuring both power quality and system reliability.

The importance of communications infrastructure to the predicted explosion in network data to support the smart energy system can be left in no doubt and it is felt that greater visibility is required regarding current shortfalls to ensure that a resilient, secure, high availability communications infrastructure will be available in the correct timescales to meet smart energy system requirements.

## Use distinction

If it is accepted that availability and ubiquity of data is fundamental to stability and efficacy of a smart energy network, distinction then needs to be made between real-time data which is essential for Network stability & availability, and that data which is used for efficiency improvements (such as tariff and appliance switching decisions). Further to this, consideration needs to be given regarding the resilience, security, availability and autonomy required from communications infrastructure to support each distinct use and the consequent risk to network stability and reliability posed through the use of shared communications infrastructure procured and managed on a Service-Level basis.

Focusing on the more critical of the two uses of data – that being real-time data to support stability and reliability of the Distribution Network, consideration needs to be given in relation to performance of communications service to ensure that these continue to perform irrespective of the status of the associated electrical system.

## Historical position

Historically, communications resilience and availability for critical real-time data requirements has been assured through the use of defined communications infrastructure implemented through a mix of self-provided systems and private circuits provided by Public Telecommunications Operators. Through careful implementation, the following objectives were assured;

- High level of power resilience and autonomy (typically 96 hours),
- High levels of security (in line with Critical National Infrastructure guidelines),
- Assured communications performance objectives,
- Support for legacy interfaces and protocols of remote devices,
- Long-term future support in cognisance of long technology lifespan expectations.

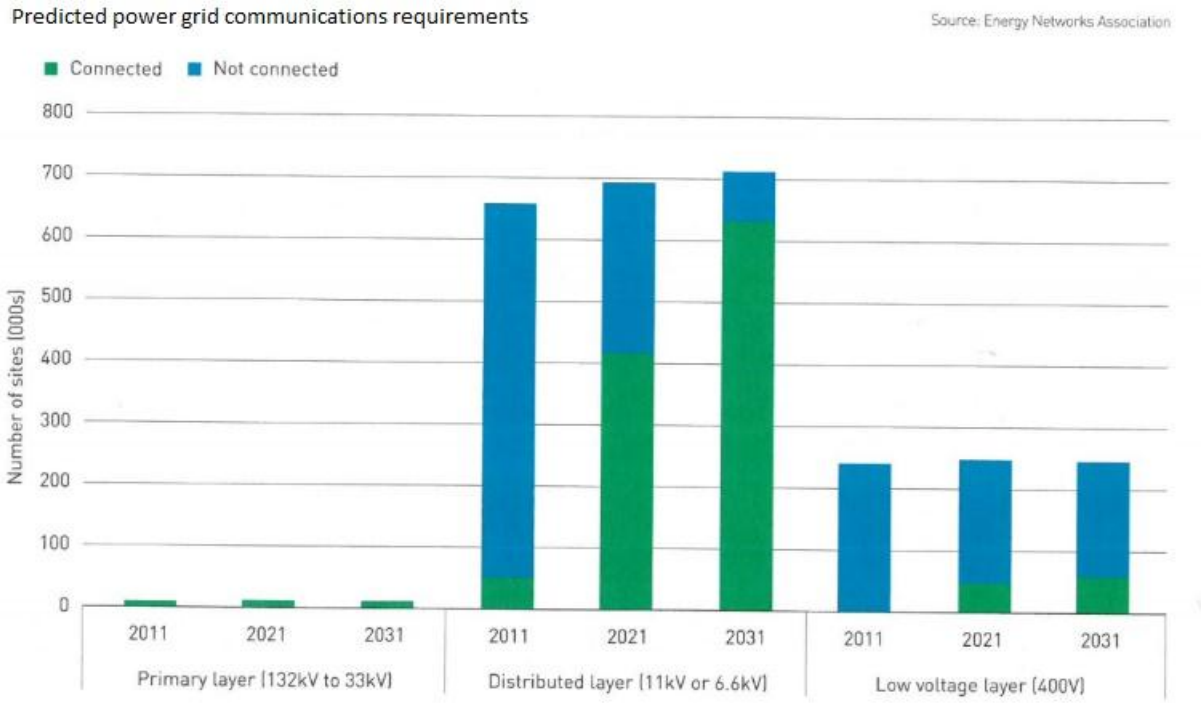
Such strategy allowed for assured routing of data and sufficient physical separacy from shared infrastructure and will remain essential to ensuring the stability and reliability of the electrical system going forward.

## Problems going forward

Existing communications infrastructure is however unlikely to meet demands imposed by the smart electrical system for the following reasons;

- Compared to the number of remotely addressable devices in today's electricity network, the number of devices requiring connection in realising the smart energy network is predicted to increase several-fold as presented in the following Energy Networks Association chart,
- The data rate required to each connected device is predicted to rise several-fold,
- As the demand side becomes more critical to balancing services, the associated remote data device should be considered as critical to network stability with corresponding consideration to communications objectives,

- Migration to IP Broadband service as a replacement for Very Low Bandwidth services may pose an increased cyber- security and availability risk to the electrical system.




**Energy Networks Association; Predicted power grid communications requirements**

Presented all together, the above issues necessitate an increase in several orders of magnitude over the capability of existing communications infrastructure both to support the number of remote devices and the predicted data rates.

## Facilitation of communications for smart energy systems

There are numerous technology options for smart electrical system connectivity at this point (including traditional and “bleeding edge” solutions) and there is a generally held consensus that no single solution will satisfy every requirement which is likely to comprise of a hybrid of 3 or 4 technology options.

Significant obstacles exist in relation to modernising the supporting communications infrastructure and in relation to this CFE, both the Government and Ofgem can help create the right environment to enable this once-in-a-generation transition to a smart energy system through address of the following points:

1. Recognition by Ofgem of the importance of communications infrastructure as being fundamental to realisation of smart electrical systems and the consideration of such communications systems as Critical National Infrastructure, particularly in relation to security (physical and cyber), resilience and reliability,

2. The need to incentivise greater collaboration between Distribution Network Operators with a view to promoting the definition and standardisation of communications requirements for smart electrical systems to meet requirements for CNI,

3. Many of the technology options for smart electrical system communications depend on access to protected (regulated / coordinated) Radio Spectrum and currently available appropriate spectrum is insufficient to meet future demand. Through the HM Treasury Public Sector Spectrum Release Programme, potential spectrum has been identified within the MoD band 406 – 430MHz, although there remains significant work ahead in determining the feasibility and limits on spectrum sharing and the mechanisms to enable spectrum management. Ofcom support and involvement will be critical to the timely maturation of this programme towards enabling spectrum access within this band.

4. Due to favourable Radio propagation characteristics, the 1.4GHz band (1356.5-1375MHz paired with 1498.5-1517 MHz) is invaluable to Distribution Network Operators for fixed Point-to-Point link assignment for connection of Distribution assets located in challenging terrain. This band is currently under consideration by Ofcom for reassignment to enable additional downlink capacity for Mobile Broadband (IMT). Loss of this band without the allocation of equivalent spectrum affording similar propagation characteristics would be deleterious to those operators.

Through support of Government and Ofgem, the UK can make the most of innovation and new technologies to help realise a world class robust smart energy system.

Although the UK government and its executive agencies are now taking action to address the power infrastructure requirements in terms of electrical plant and DNO / TSO interaction, the telecommunications requirements of such network evolution are receiving no attention whatsoever. North America and several other European Nations have already begun deployment of enhanced, dedicated communications networks to support their Smart Grid electrical infrastructure plans – having satisfied themselves that publicly available telecommunications services on shared networks will not generally satisfy their requirements.

Without an underlying, assured communications fabric, the effectiveness of smart energy systems will be extremely limited and in the worst case scenario could represent a risk to the stability of the UK electricity supply.

We would welcome further dialogue on this subject with key stakeholders.