

A Smart, Flexible Energy System

Consultation Response from John Cowburn CEng FIEE

This response is based on 30 years experience in the design and manufacture of Electrical Energy Measurement and Control Equipment and through close involvement in the development of smart metering standards as Chairman of BSI PEL13, CENELEC TC13, member of the EU Smart Meters Coordination Group and convenor of IEC TC13 working group 15 (Smart Metering Functions & Processes).

EU Smart Metering & Smart Energy Coordination Groups.

The EU Smart Metering Coordination Group held a dissemination day on 7th December 2016 from which the presentations are available.

Many of the proposals contained within the OfGEM consultation were discussed and several countries are already implementing them as part of their smart metering roll out.

The Smart Energy Grid Coordination Group has produced documents detailing how energy suppliers and energy managers will have access to smart metering data via two independent channels to prevent consumers being locked in and allow competition. The architecture has been adopted by several countries but not the UK. We are already seeing the consequences for UK householders fitting smart controls that only work with their energy supplier's systems.

OfGEM/BEIS should be more active in monitoring the work of SEG-CG and SM-CG as many of the issues raised in the consultation have already been dealt with and in some cases implemented already. The groups have produced cross references for standards that can be used to define smart grid systems and reports on cyber security and data privacy with recommendations for implementation and certification.

There are also the EU Smart Grid Task Force Expert Groups that have produced a series of reports that OfGEM/BEIS should review – they can be found here:

<https://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters/smart-grids-task-force>

IEC SyC

The IEC has established the SyC technical committee that covers all aspects of smart energy for all fuel types and coordinates standards development to meet the emerging requirements for smart energy grids.

The following standards map may be useful: <http://smartgridstandardsmap.com/> It provides a complete view of a smart grid system and provides references for all associated standards.

My Energy Data

The European Smart Grid Task force is working on the free movement of energy data to allow smart grid control to be better developed and to give consumers better tools with which to take advantage of smart tariffs.

https://ec.europa.eu/energy/sites/ener/files/documents/report_final_eg1_my_energy_data_15_november_2016.pdf

Smart Grid Requirement for Voltage Measurement

The network operators require accurate voltage measurement to enable better control of the network. Currently, smart meters (SMETS2) are not specified to measure voltage. The MID and the supporting standards (EN50470 series) require that electricity meters measure power consumption (kWh) to a specified accuracy class. Voltage measurement is not a legal requirement.

Smart meters measure kWh to an accuracy of 2%. If the same accuracy were to be specified for voltage measurement, the meter would measure to an accuracy of 5v. This is not sufficient for network operators who need 1v.

In order for smart meters to be of use in a smart grid application, they need to be specified to measure voltage to an accuracy of 0.5% (which most metering devices can achieve). (See IEC 60051 series)

Smart Tariffs – Price Signals for Flexibility

Proposals for real time pricing are contained within the European Energy Efficiency Winter Package 2016. The Commission proposes that all consumers should have access to real time market pricing and this will be achieved through smart metering with appropriate tariff capabilities together with smart appliances

Smart appliances (or smart demand response/load control devices) will be required to support flexible tariffs. It is those devices that would react to price signals. ZigBee Smart Energy Profile supports such devices but the UK version has had some of the functionality removed from the specification by BEIS and may no longer support this functionality.

CENELEC TC205 has developed a smart home control protocol as part of the work for EU Mandate 441 (smart meter interoperability). This protocol (EN50491-11) supports the 'H1' interface as specified in TR 50572. (OfGEM should review the contents of this report.)

TC205 is also producing the interface standard for the H2 interface for smart grid control applications.

Smart Energy Manager Services – Aggregators

The EU Smart Energy Grid Coordination Group (SEG-CG) envisages the emergence of energy manager services (aggregators) to provide energy efficiency services using the smart meter gateway

(generic device referred to in the Smart Grid Architecture Model). This device could be the Consumer Access Device (CAD) in the UK that could provide an alternative channel to the home via the internet. Innovation in this area is restricted today as the DCC has sole rights to obtain meter reading data. This restriction creates a barrier to entry for companies wishing to provide services that could take advantage of such data. The DCC will charge for data that could be collected via the CAD for free.

Call for evidence para 68 mentions the risk of simultaneous switching but smart meters have the facility to randomise switching times (as does the Radio Teleswitch System) to overcome such issues.

OfGEM/BEIS should review these documents:

https://ec.europa.eu/energy/sites/ener/files/documents/xpert_group3_energy_grid_services.pdf

https://ec.europa.eu/energy/sites/ener/files/documents/xpert_group3_ceer.pdf

Smart Meter Security

OfGEM should be aware of the work of the European Smart Grid Task Force, Expert Group 2 (Security). They are soon to publish a 'Best Available Techniques' document for smart grid security. Section 13 of that report covers the issue of fitting meters with switches and raises concerns about security and reliability. It recommends that further evaluation is required as the inclusion of such functionality will have the effect of compromising the security of supply and as such some member states have not included it.

The output of the European Smart Energy Grid Cyber Security & Privacy group should also be reviewed when considering the system as a whole. The Smart Grid Architecture Matrix should also be considered. (https://ec.europa.eu/energy/sites/ener/files/documents/20140409_enisa.pdf)

Privacy issues associated with half hourly settlement

There are serious privacy issues associated with half-hourly data and most European countries have strict rules on its use given that the data can provide details of the life style of the consumer including when they are at home or out, a pattern that they cannot change in the short term.

The privacy issues could be overcome by making full use of the smart meter's tariff capabilities, processing data at the meter rather than sending half-hour data to the supplier. Daily 'smart' tariffs could be downloaded for smart appliances to react to. This would depend on the DCC having sufficient bandwidth to be able to send down daily tariffs. The Radio Teleswitch network could be used if not.

For evidence of privacy issues associated with half-hour readings, see the Dutch experience. Also in Germany, such data must be anonymised to preserve consumer privacy.

4.16.b – data privacy states that customers must be in control of their data but as soon as they give any data to a third party control is lost as demonstrated by TalkTalk and other recent events. Such

issues can easily be mitigated against. The data flow must be from the supplier to the consumer. Smart appliances can take tariff data and make decisions; there is no need for consumer's data to be sent out to facilitate such functionality.

Smart Meter Reliability

In answer to question 41, OfGEM already has evidence from the smart meter switch issue in 2012. The failure rate was considered too small to be significant in percentage terms but would have resulted in 500 homes per week being cut off.

Smart meters can compromise the energy supply to consumers' homes through mal operation of the supply switch/valve. There have been numerous instances of prepay meters, smart meters and radio teleswitches malfunctioning and switching off the supply. These have been limited to relatively small proportions of the population due to their limited use but with the national roll out of smart meters the risk is significantly increased. The biggest risk comes from meters that switch off and cannot be switched back on and require a visit. If just 0.1% of the population suffered such an incident, 27,000 homes would require a visit which would take a significant length of time. There is no regulatory body to oversee the performance of the additional functionalities in smart meters, OfGEM and NWML are only interested in metrology and HSE only cover incidents after they occur. There are cyber security risks arising from many potential sources and SM-CG Privacy & Security working group has stated that the risk of power cuts arising from mal-operation of the meter switch cannot be fully protected against.

There are no industry standards relating to the reliability of the switch / valve and the drive circuitry, no requirements for manufacturers to provide reliability data with the exception of the mechanical endurance tests specified in IEC 62055-31. There are no standards for the quality of firmware that controls the switch; WELMEC codes of practice only cover metrology.

OfGEM needs take responsibility for specifying and monitoring the smart metering additional functionalities, not just the metrological functions.