Department for
Business, Energy
& Industrial Strategy

Independent Review of Electrical Engineering Standards

Government response

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Engineering Standards

What are engineering standards?

Engineering standards underpin how the GB electricity network is planned and operated. The standards are requirements specifying how the electricity and gas systems, and the assets connected to them, must be planned, designed, built, maintained, and operated. Engineering standards can be found embedded within energy codes, guidance, legislation or under the remit of non-energy specific bodies such as the British Standards Institution (BSI) and the Health and Safety Executive (HSE).

Robust engineering standards can form a critical component in reaching net zero, by facilitating new approaches and reducing costs by allowing multiple providers to compete on a common basis. Ineffective standards could however create barriers to decarbonisation, locking in propriety solutions, or blocking new technology and innovation, resulting in inefficiencies and increasing costs to consumers.

Background

Recognising this challenge, BEIS and Ofgem commissioned an Independent Review of Electrical Engineering Standards; the review report was published in December 20201. BEIS commissioned a broad scoped review to consider whether electrical engineering standards or the wider standards landscape were acting as a barrier to decarbonisation and to propose changes to the current arrangements.

The review panel consisted of a diverse group of independent engineers who had expertise in both transmission and distribution networks as well as community energy, digital and other key perspectives.

The review identified a number of shortcomings of the current arrangements. To summarise the panel's diagnosis of the problem:

- standards as currently framed will cost customers money as we move forward through the energy transition;
- standards are framed from the system's perspective, not from the end users;
- the current standards landscape is larger and more complex than it needs to be;
- ownership and management of the suite of standards (as opposed to individual standards) is lacking;
- there are critical gaps for a smart flexible electricity system, especially for interoperability, data, and operations;
- the opportunity to provide a better and more customised service at lower cost is being missed; and
- the processes for changing standards lack agility.

The panel made two sets of recommendations to solve these challenges.

the first on Specific Engineering Matters (SEM) cover specific barriers within the current standards that may be causing adverse outcomes; and

the second set of recommendations focus on reforming standards processes to support net zero by 2050.

BEIS response to Specific Engineering Matters recommendations

The panel provided eight SEM recommendations. The table below outlines the recommendations to the review and the BEIS response to these:

Table 1: Panel SEM recommendations and a summary of BEIS responses.

SEM	Recommendation	BEIS response
1	Revisit completely how the value to customers of supply reliability is assessed, to include duration of power interruptions, and take into account how customers may value reliability differently for different electrical devices. (BEIS/Ofgem)	Currently, supply reliability is measured by several different metrics such as Loss of Load Expectation from a supply perspective and Ofgem's Guaranteed Standards for Performance. We will review Value of Lost Load (VoLL) as part of BEIS' forthcoming ten-year review of the Capacity Market. We are also proposing that the FSO could have a role in ensuring security standards remain robust in future through monitoring and recommending changes it considers necessary to engineering standards. Others including P2, Security and Quality of Supply Standard and the Interruption Incentive Scheme will need to be kept under review in the coming years.
2	Create a new standard, setting out what different customer types can expect from the system's recovery from extraordinary events (BEIS/Transmission Companies/DNOs)	This new Electricity System Restoration Standard will require NGESO to have sufficient capability and arrangements in place to restore 60% of Great Britain's electricity demand within 24 hours, applied consistently across all regions, and 100% within 5 days. Additionally, regulatory incentives have driven improvements in recent years, with DNOs more in automation and remote control of low voltage networks. This means networks can be reconfigured in minutes and not hours. Furthermore, this was also a finding from Ofgem's investigation into the 9th of August power disruption2. As a result, Ofgem proposed a new licence condition to address how distribution network companies should handle customers (especially vulnerable customers) during unplanned supply interruptions ("the Licence Condition"). For Gas Distribution companies, the introduction of the Licence Condition is complete. The next price control for Electricity Distribution will start in April 2023, and it is expected that the Licence Condition for electricity distribution network companies will be in place by this time.

SEM	Recommendation	BEIS response
3	When new or refurbished circuits are being installed, to size this capacity to optimise system losses. (Ofgem/DNOs)	We recognise the benefits that oversizing capacity can bring in terms of reduced losses and availability to future customers and load-related growth. DNOs are already doing this at lower voltage levels where they can demonstrate a net benefit. Cost Benefit Analyses submitted by DNOs for the next electricity distribution price control (RIIO-ED2) will accommodate the inclusion of losses to help justify larger cables than needed for demand growth. During this process, Ofgem will be seeking evidence of this when reviewing DNO Engineering Justification Papers (EJPs). EJPs set out the scope, costs and benefits for major projects or aggregated investment programmes aimed at reinforcing the network or improving asset health.
4	Remove the limits in legislation for voltage to allow the industry and stakeholders to determine appropriate limits. (BEIS)	Statutory voltage limits are set in the Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR). As the review report notes, DNOs are already utilising lower voltage levels on their networks within the existing statutory voltage limits. The Energy Networks Association (ENA) has also been gathering evidence on the effects of reducing voltage levels on consumer appliances and devices beyond the statutory limits. We are engaging with Ofgem and the ENA Statutory Voltage Limits Group on this work. We recognise there may be benefits in reducing the lower limit from 216.2V to 207V (-6% to -10%), but further work is needed on how this would impact a wider range of appliances and the effect it would have on distribution network losses and total distribution network power carrying capacity. Where clear long-term benefits can be demonstrated by industry at minimal risk, we will consider whether the ESQCR could be amended in future to allow such changes. We also note that the statutory limits have not precluded the assessment of impacts of voltage limits beyond those set in the ESQCR. We encourage DNOs to continue to utilise operation of their networks at lower voltage levels, within current statutory limits, where beneficial. We will continue to engage with DNOs and Ofgem and keep the Panel's recommendation under review.

SEM	Recommendation	BEIS response
5	SEM 5: Build on the existing BEIS/BSI work on smart system interoperability to provide full coordination of smart system interoperability (BEIS) SEM 5a: Ensure the full coordination of interoperability standards development across the whole landscape SEM 5b: Develop use cases for exploiting VOLL or its successor metric, to realise consumer cost savings and other value. 5c: BEIS needs to consider how the benefits of flexibility and interoperability will be identified and used to guide the optimum whole system development of zero carbon generation. 5d: Standards to set clear performance, monitoring and assurance criteria for grid edge devices and associated services, and to provide an appropriate data driven compliance regime	With BEIS funding, BSI have published industry-led standards PAS 1878 and PAS 1879. PAS 1879 sets out a common definition of demand side response (DSR) services operating within the consumer energy supply chain. PAS 1878 specifies requirements and criteria that an electrical appliance needs to meet to perform and be classified as an Energy Smart Appliance (ESA). The standard provides recommendations to support the operation of ESAs, guided by four core policy principles: interoperability, cyber security, data privacy and grid stability. Although designed specifically for DSR from consumer level devices, most of the principles in the two PASs also apply to commercial and industrial DSR. By using such standards to assist with the market structure that the energy system is entering, consumers can be protected from new risks, such as cyber-attacks, and be encouraged to be more involved. Interoperability is the key to accessing consumer flexibility at a large scale and low cost. Additionally, by enabling DSR through common standardised interfaces, it could generate a considerable number of jobs and industry opportunity in the UK. On the point of cyber-attack, we are reviewing Critical National Infrastructure (CNI) criteria and considering whether certain entities should be categorised as CNI given the impact on the number of customers and more widely. Additionally, Ofgem plans to consult later this year on cyber-security standards to support implementation of the Network and Information Systems regulations

SEM	Recommendation	BEIS response
	5e: Development of interoperability standards should continue to maintain awareness of the need to adequately protect privacy and be resilient to cyber-attack.	
6	A methodology to be developed to use distributed resources to supply customers in power islands under outage conditions (DNOs)	This is a recommendation we would expect a FSO and DNOs to consider and coordinate. Refer to 3.2.6 Coordination with distribution networks within our consultation on the future of system operation for more detail.3 Currently the ESO is running the Distributed ReStart project that explores how Distributed Energy Resources (DER) such as solar and wind can be used to restore power to the transmission network in the unlikely event of a blackout. Additionally, SSE is undertaking the Restoration as a Service (RaaS) project. This project aims to maintain and improve reliability for remote and isolated networks whilst avoid carbon intensive standby generation. Alongside this, Scottish Power has trialled using new technology on wind turbines to provide restoration services. This highlights that using DER under outage conditions are currently at the forefront and is being actively considered regarding supply and decarbonisation.
7	Publish an annual statement of system performance and assessment of system health for the whole electricity system (System Operator)	This is a recommendation that would build on the ESO's current activities, and one that we consider that a FSO would be well placed to develop further as detailed within the consultation on the future of system operation, section 3.2.8 Future system operability, engineering standards and energy code development. The ESO submits the National Electricity Transmission System Performance Report to Ofgem annually and publishes this on its website. Additionally, the ESO also undertakes summer and winter period operational reviews. These reviews provide the ESO with the opportunity to compare factors that influenced divergence from their winter outlook forecast and considers how well challenges were anticipated and met. Furthermore, to this, network operators submit regular reports to Ofgem which details asset health.

SEM	Recommendation	BEIS response
		This alongside the reports published by the ESO would encompass the assessment of the whole electricity system.
8	Move forward quickly to publish granular data on customer service, loads and power flows and connected active equipment (BEIS/Ofgem/industry)	In June 2019, the Energy Data Taskforce published its findings which explored how the use of data could be transformed across our energy system. The outcome of this included five recommendations that include the following: the energy sector to adopt the principle of digitalisation; maximising the value of data; ensuring the visibility of data; the coordination of asset registration and the visibility of infrastructure and assets through a system map. BEIS is currently working with Ofgem and Innovate UK to implement the vision of the taskforce alongside industry. In August, the Energy Data Visibility project will complete its alpha phase and Modernising Energy Data Access (MEDA) will complete its beta phase, and we will than take a view whether further steps are needed for both projects. The MEDA competition was designed to enable energy data to be publicly accessible for the benefit of society through a standardised data governance framework, following the blueprint of Open Banking. We recognise there are significant gaps in current distribution network and DER monitoring, and that enhanced monitoring and associated comms equipment are required to enable the active management of distribution networks, and for flexibility providers to bring forward commercial proposals to manage system and network constraints. Under RIIO-ED2, DNOs have been requested to bring forward network monitoring proposals for assessment where there is demonstrable value for consumers. The Open Networks Project has been tasked with completing a CBA of enhanced DER monitoring, which will report in December 2021.

BEIS Response to the Review's Net Zero Framework Recommendations

The panel's recommendations on a future framework for engineering standards are to:

- reframe the system of standards around what customers can expect from the system, and what they are expected to provide in return;
- improve transparency and accessibility of the system of standards;
- drive coherence, consistency and coordination through appropriate and agile governance;
- fill critical gaps in standards for a smart flexible electricity system, especially for interoperability, data and operations; and
- put in place agile change processes.

Government agrees that there is merit in exploring a new governance framework for engineering standards. Our consultations on the future of system operation and on energy code governance are both relevant to this future governance framework. Across these consultations, it is our view that there are three high level areas in which standards development needs to focus.

The first area is horizon scanning, that is identifying and providing insight on: gaps in standards; where new standards may be beneficial; and where standards may be acting as a barrier to the transition to a net zero system. We believe this will be an important role for the FSO.

The second area is setting a strategic direction for the development of engineering standards. We believe that for those standards that are in scope of the energy code reform, this role could be overseen by the strategic function that we are proposing to create for codes. We propose that this role would either be carried out by Ofgem (our preferred option) or the FSO as an Integrated Rule Making Body (our alternative option). For more detail refer to chapter 2.1.2 within the consultation on the Energy Code Reform.

However, different standards will need different approaches. For example, some standards are used by network licensees for wholly internal purposes, such as those overseen by the BSI and the Institution of Gas Engineers and Managers (IGEM). Since these standards have no direct impact on consumers, and the model itself has proven to be successful, we do not propose to change the way in which they develop over time. They are also not included in the scope of the code reform. However, there are other standards, such as those related to engineering planning, that have direct effects on consumers and that we believe should be treated more like energy codes. These standards include the Grid Code, the Distribution Code, SQSS and their subsidiary documents, such as P2, G98 and G99. For these standards, we propose that the strategic function would be responsible for ensuring that standards are considered in its strategic direction. This should ensure that these standards develop in a coherent, consistent, and co-ordinated way.

Third, there will need to be a party responsible for managing changes to the relevant engineering standards. Their role would be to develop a plan of potential changes, based on guidance received from the strategic function for codes, as well as to manage the change

process and to take steps to improve transparency and accountability. We believe that this role could be fulfilled by the code management function we propose for codes. In our preferred option, this would be one or more code managers (dependent on the outcome of the code consolidation review by Ofgem). In our alternative option, this would be the FSO in its role as an Integrated Rule Making Body, as proposed in the codes consultation.