The Energy Smart Appliances Programme

An Overview

A programme implementing recommendations from the Standards Landscape Report on smart appliances and electric vehicle chargepoints

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1 Context and Motivations

1.1 The Smart Energy System

An "energy smart appliance" or ESA is defined as a communications-enabled device able to respond automatically to price and/or other signals by modulating or shifting its electricity consumption. Services provided to the electricity network through this consumption modulation are known as Demand Side Response (DSR). Traditionally, electricity is supplied "on demand", but DSR enables supply and demand to be balanced efficiently for both the network operator and the consumer. ESAs appropriate for DSR typically include higher-load devices with shiftable demand requirements such as heating, ventilation and air conditioning (HVAC), cold and wet appliances, battery storage and EV charge points.

The Department for Business, Energy and Industrial Strategy (BEIS) and the Office for Low Emission Vehicles (OLEV) are working with the British Standards Institution (BSI) to facilitate the uptake of safe, secure and interoperable ESAs, including electric vehicle (EV) chargepoints, for the active management of demand on the electricity network. The ESA programme, led by BSI, supports these aims while informing a wider policy and standardization approach to ESAs.

Following a public consultation, BEIS outlined four policy principles seen as critical for effective DSR through ESAs:

- **Grid stability**: the prevention of outages on the grid caused by erroneous or simultaneous operation of ESAs.
- **Cyber security**: the prevention of unauthorized access to ESAs by third-parties.
- **Interoperability**: the ability of ESAs to work seamlessly across any DSR service operated by any system player.
- **Data privacy**: the secure storing of data on the device or with any controlling party.

1.2 The Standards Landscape Report

In response to these policy principles, BSI was commissioned to carry out a review and analysis of the current standardization landscape for DSR using ESAs, including EV chargepoints. The research results were published in October 2018 as the Standards Landscape Report which provides a standards gap analysis and recommendations for possible further work required. A key finding was that the standards landscape across the four policy principles is piecemeal, with standards at different levels of granularity, scope and applicability. It was found that an overarching, integrated standardization approach is missing and currently there is no mechanism to guide, test or certify that a device can be safely and confidently placed on the market as an ESA.

The research concluded with five recommendations to enable the policy principles to be realized:

- Develop a framework standard for DSR definition, operation and management.
- Develop a standards classification for ESAs in a DSR context (framework and appliance specific).
- Research opportunities for convergence of EV chargepoints and smart appliances in standards.
- Establish a testing and certification regime for ESAs.
- Ensure an ongoing coordination of ESA standardization.

1.3 Scope of current work

BSI are now working with BEIS/OLEV to implement the recommendations from the Standards Landscape Report through this new programme of work; which engages a range of stakeholders in standards development, dissemination, implementation and strategic coordination.

The programme scope focuses on appliances used in domestic and light commercial environments as the Digest of UK Energy Statistics (DUKES) report shows that over 50% of electricity demand in 2017 was from the domestic and commercial sectors.

The programme will consider the UK smart meter rollout and the international standardization context. The standards should be compatible with the provision of DSR services over the UK smart meter network but should not require this to be the only communication method. Once published, it is the intention to promote these standards for international adoption.

2 Aims and Approach

The ESA Programme has been conceived to address current standardisation gaps and ensure industry and government liaison and oversight of future activities, while at the same time noting and following the nascent international efforts to standardize DSR in Europe in CEN/CENELEC/ETSI and internationally at the IEC. The programme covers research into EV chargepoint and smart appliance standards convergence, development of standards for ESAs and DSR, and supporting the establishment of a testing and certification regime. Throughout the programme there are opportunities for stakeholder engagement and input, alongside dissemination activities and awareness campaigns to raise the profile, trust, and uptake of ESAs in the market.

The programme specifically includes developing two Publicly Available Specifications (PASs) to:

- **specify a framework for demand side response (DSR)**
  This PAS provides a reference for the operation of ESAs in a DSR context. It specifies the functional and non-functional aspects of a DSR framework, including the responsibilities of actors and associated policies and procedures, and will set the context in which an ESA can function and operate. The DSR PAS will be used by organizations with responsibilities for operating a DSR environment. It could also be useful for manufacturers of ESAs to understand the context of device supply to the market.
- **specify a classification for energy smart appliances (ESAs)**
  This PAS specifies requirements and criteria that a device (i.e. an electrical appliance) needs to meet in order to perform and be classified as an ESA. It defines the attributes, functionalities and performance criteria for ESAs, and specifies how compliance with these can be verified. The characteristics of an ESA are symbiotic with those of the DSR framework in the sense that an ESA is able to perform in a DSR environment, and enable DSR-based activities. This PAS is intended to be used by manufacturers and maintainers of ESAs.

Given their interdependencies, both PASs will be developed in parallel during the ESA Programme.

2.1 Delivering the Recommendations

The ESA Programme addresses each of the five recommendations made in the Standards Landscape Report. These recommendations are complex, inter-dependent and associated with diverse stakeholder groups.

2.1.1 Recommendation 1: DSR framework

A PAS will be developed, entitled: "Operational framework for energy smart appliances in a demand side response energy supply system". This will specify the context in which ESAs will operate and their associated dependencies and requirements such that an ESA can be specified.

2.1.2 Recommendation 2: ESA classification

A PAS will be developed, entitled: "Specification for an Energy Smart Appliance". This will specify the requirements for an ESA, in order that they can be certified to be in accordance with the BEIS/OLEV policy principles.

2.1.3 Recommendation 3: EV chargepoint and smart appliance convergence

EV chargepoints will be a focus of Recommendation 2 and accordingly, during the development of the PAS, the convergence of EV chargepoint and smart appliance standards will be a topic of research. The research will consider if EV chargepoints need particular attention in each PAS, or if a separate guidance document is required.

2.1.4 Recommendation 4: Testing and certification

The key requirement to achieving a certification and testing regime is to ensure the engagement of certification bodies in the standards development process. This will enable the certification bodies to plan and develop certification schemes. The PASs in recommendations 1 and 2 will be written as either a specification or test method so that they have explicit requirements that can be verified.

2.1.5 Recommendation 5: Coordination and oversight

BSI will set up and manage a strategic advisory group (SAG) of ESA stakeholders. This group will act as a forum for industry and government to meet and discuss barriers and opportunities, alongside other stakeholders such as certification bodies, grid side actors and consumer interest groups. Key objectives of the SAG will be to support the standards development activity, advise and steer BSI's standardization activities at both national and international level, and to be at the forefront of dissemination and awareness raising activities.

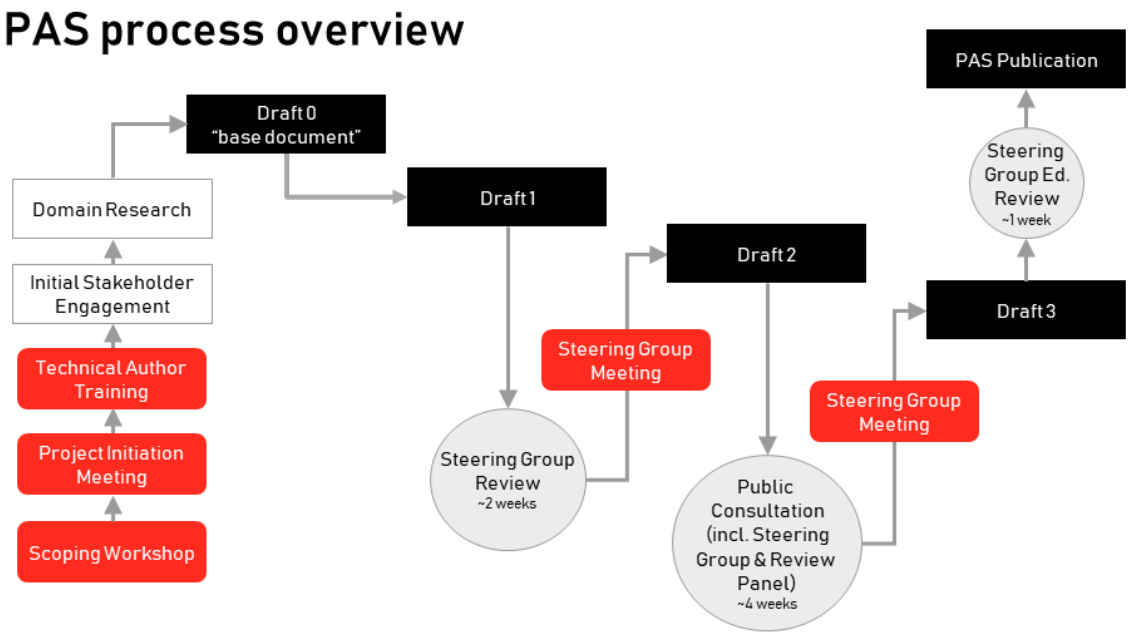
2.2 PAS Development & Stakeholder Interaction Process

A BSI PAS is a standardization document that closely resembles a British Standard in structure and format but which has a different development model. It is developed in response to an identified market need; very often this takes the form of a request from a sponsor for a standardization document that serves the needs of an emergent market, technology, service or public policy interest.

This approach offers an effective means of quickly introducing standardization in such cases, and for testing the value or validity of a particular approach or methodology. It can also serve as the basis for subsequent development towards more formal standardization at UK, European or international level.

A PAS is generally intended for unrestricted use within any markets for which it appears to be relevant and useful. It is not restricted to application within the UK, nor is its development model restricted to UK stakeholders.

The PAS development activities follow the process summarized in the figure overleaf:



Every standard published by BSI begins with a scope. The scope is a definitive statement of the type of standard, the subject being standardized, and its application. It should also indicate subject matter that a user might expect to be included but which is in fact excluded, and, where possible, direct users to where the subject is covered.

The purpose of a scoping workshop is to examine the draft scope, established during the project inception, to ensure that it accurately sets out the intended subject matter of the proposed PAS. A range of expert stakeholders are invited to participate in the scoping workshop, including representatives from industry, academia, certification bodies and consumer groups. A subject specialist Technical Author is then responsible for drafting the PAS, based on the domain research and scoping work. The writing process includes the draft PAS documents being reviewed and commented on by a Steering Group of stakeholders with technical expertise.

The public consultation stage usually lasts for four weeks and is undertaken through an online forum open to anyone who chooses to register an interest. BSI technical committees and members of the review panel are encouraged to scrutinize the draft and to pass details of the consultation to any colleagues or contacts who are likely to have an interest. The consultation is seen as a vital stage in validating the draft and therefore a major factor in establishing the authority and credibility of the published PAS.

3 Benefits and impact

The ESA programme of work aims to implement all five of the recommendations from the Standards Landscape Report. The programme is robust and inclusive, making use of BSIs well-established PAS method to build and document consensus in order to achieve rapid standardization outcomes.

The ESA Programme is expected to have the following benefits and impacts:

- To empower companies and investors to develop products and processes that are aligned with the transition towards clean economic growth.
- To achieve a consistent, integrated, flexible and forward-looking standards infrastructure for ESAs, including EV chargepoints. This infrastructure will support the realization of policy principles and provide guidance to industry developing and deploying ESAs in the market.
- To produce standardization of ESAs across the four policy principles highlighted by BEIS of: interoperability, grid stability, data privacy and cyber security. This will enable the establishment of a mechanism to guide, test and certify how an appliance can be safely and confidently placed on the market as an ESA, inspiring consumer confidence.
- To ensure collaboration between key stakeholders engaged in the design and manufacture of ESAs, including EV chargepoints. This will enable consensus to be established on how to deliver devices suitable for DSR that align with the BEIS policy principles.
- To build upon existing international standardization efforts, while addressing standards gaps and needs acknowledged by industry, Government, academia, and other stakeholder groups. This will ensure avoidance of duplication and overlap, and efficient use of available resource and technical expertise.
- This is an international market and the ESA Programme promotes and disseminates the UK approach internationally. Internationalization of the PASs for example, with the support of established committees feeding into ISO IEC, CEN, CENELEC and ETSI standardization, will allow the export of UK know-how and will secure the increased global influence and trading capabilities of UK manufacturers and innovators.

4 About the British Standards Institution

The British Standards Institution (BSI) is a global leader in the development of standards of good practice for business and industry. Formed in 1901, BSI was the world's first National Standards Body (NSB) and a founding member of the International Organization for Standardization (ISO). Over a century later, BSI is focused on business improvement across the globe, working with experts in all sectors of the economy to develop codes, guidance and specifications that accelerate innovation, increase productivity, boost international trade and support economic growth.

Renowned as the originator of many of the world's best known business standards, BSI's activity spans multiple sectors including aerospace, automotive, built environment, energy, food, healthcare and ICT.

Over 95% of BSI's work is on international and European standards. In its role as the UK National Standards Body, BSI represents UK economic and social interests across the international standards organizations ISO, IEC, CEN, CENELEC and ETSI, providing the infrastructure for over 11,000 experts to work on international, European, national and Publicly Available Specification (PAS) standards development in their chosen fields.

BSI operates in accordance with a Memorandum of Understanding with the UK Government and offers Government a business-led tool for delivery of its policy objectives. BSI's robust standards development process requires open and full consultation with stakeholders to build consensus-based outcomes. BSI, as the UK National Standards Body, has a public interest responsibility to develop and maintain the standards infrastructure to support UK emerging industries at home and internationally.