BEAMA Position

Eco Design Preparatory Study on Smart Appliances

BEAMA is the trade association for the UK electrotechnical industry, representing over 200 companies in the power, electrical and building services sectors. Our members, who range from multinationals to SMEs, manufacture the wide range of equipment required for end-to-end electrical systems.

BEAMA therefore represent a wide range of manufactures in the connected homes and smart controls sector. This includes but is not limited to consumer access devices, heating controls, heat pumps, ventilation equipment, and the multitude of smart devices and communication platforms designed for connected homes and buildings.

BEAMA are taking a strong interest in the preparatory study on smart appliances as it opens up new questions with regards to energy efficiency and smart control, as well as opening the debate up to incorporate system design. BEAMA have worked with our members to develop this initial position paper as guidance to the commission and consultants developing the preparatory study, in answer to some of the initial questions posed to stakeholders. BEAMA attended the recent stakeholder event on the 10th of March in Brussels and were also made aware of some areas that may be misunderstood, and we therefore use this paper as opportunity to provide clarity on important elements of the connected homes architecture, namely the role of the smart meter.

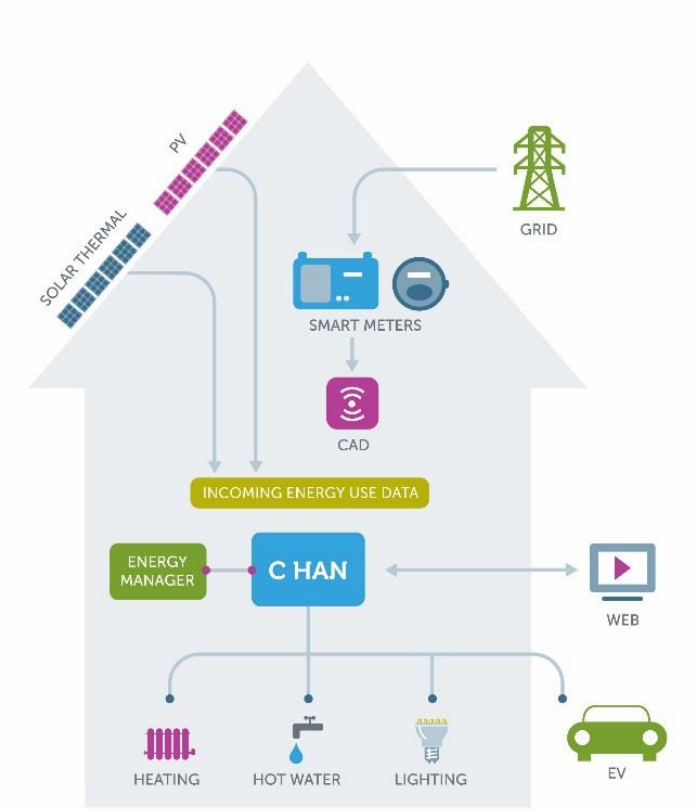
Summary of BEAMA views

Crucially BEAMA feel the scope needs more work and clarification . What do the commission define as a smart appliance? While the commission state that this will maintain an energy efficiency scope, the market needs to be clear on whether we are still considering product design in isolation or considering measures that would have wider benefits for system efficiency. BEAMA agree that in order to determine smart control requirements for appliances you must take into account wider system applications, and this goes beyond just energy efficiency and includes controls for flexible loads. The risk is we set measures under eco design for smart appliances that will be in conflict with future Demand Response applications. The measures assumed for reducing demand are not always going to allow for the shifting of demand.

Furthermore BEAMA are concerned that we are looking to set measures for product design in a market that is not yet established, and therefore we may risk adding cost and slowing down early uptake of smart appliances. The effect on market growth therefore needs careful consideration in the preparatory study process, this should include a review of what is currently available on the market today.

BEAMA agree that it is too early to select a common protocol for the market, and this is not necessary to ensure interoperability. Over time the market will decide on clear leaders with regards to the communication protocols and layers in the system. The fundamental element of the smart home architecture today is not the communication layer, but the information layer. Before we can review the suitability of protocols and communication platforms manufactures need to understand what type of data they need to send and read. Any focus on European regulation and standardisation should therefore be on this, and there are already technical committees leading on this in the standardisation arena (CENELEC TC 205 WG18).

1. What is a connected home?



A connected home enables a consumer to have full control of their primary services, through the application of simple controls. The architecture of a connected home system include devices, sensors and controls all liked and managed centrally, using common communication channels (wired, wireless, or over the mains) to deliver 4 key benefits (comfort, lifestyle, safety and security and savings).

The Consumer Home Area Network (C HAN) enables the various actions and technologies to be initiated together to deliver the different aspirational benefits to the consumer.

The smart meter is part of this architecture.

In designing smart appliances and devices in the connected home the benefit to the consumer is evaluated on a number of factors, including health, lifestyle, and security. The connected home is not just for the control of energy and many of the controls and devices relevant to the discussion here have functions beyond just energy management.

Currently manufacturers are designing platforms for connected homes that enable the integration of multiple devices in the home, these may use different protocols.

2. What role does the smart meter play in the application of smart appliances in the domestic premises?

The scoping work so far implies that the smart meter could take up the role of a central energy manager, provided it supports sufficiently timely and reliable back ended communications, which today is often not yet the case.

In the UK this will never be the case. The GB smart meter rollout places strong emphasis on consumer engagement but the metering system is never intended to be a home energy manager. The smart meter however has a key role in providing real time consumption and tariff data into the home. GB rollout allows for the connection of Consumer Access Devices (CADs). CADs are trusted physical or virtual (a chip in a device or control) devices, paired with the Smart Metering HAN (SM HAN) that provides a gateway for data from the SM Han into the C HAN. A CAD could form part of a central energy manager that receives data from the SM HAN, as well as other incoming sources of energy data, including onsite PV generation. It is the role of the home energy manager to interpret this information and can therefore make informed decisions on the most efficient (cost, energy, time) use of appliances[1].

3. Do you perceive missing interoperability as a problems for your specific area/ product/ system?

At the moment BEAMA perceive no interoperability problems for the effective use of smart appliances. This will be dependent on a number of important market deliverables, e.g. smart meter specification and rollout (The GB rollout allowance for CADs already sets a standardised approach on the SM HAN side of the CAD - the C HAN of the CAD is proprietary). The design of smart meter programs and the allowance for consumer access to data does vary across member states and this is likely to guide the architecture of connected homes systems.

The problems will potentially arise when consumers start integrating or replacing individual appliances that may not be compatible with the whole house system they installed initially. Chasing this requirement now could set back the development of

[1] For more information on the connected home architecture and the role of CAD devices please refer to the BEAMA Guide to Consumer Access devices http://uksmartgrid.org/consumer-access-devices-a-beama-guide-articles/

smart homes for several years. The key to success is to promote systems that can be installed in existing properties on a step-by–step basis. Consumers as individuals have different needs and we therefore need to ensure the infrastructure is adaptable and can be implemented in a step-by step basis.

The key to ensuring this is to define a common language so you can provide integration on an open framework. Referring to the diagram below, as published in the initial discussion paper, standardisation work is most effective in the information layer. A common language (data) will ensure multiple proprietary APIs (Application Platform Interfaces) can talk to each other, and effectively read the same message. This will ensure innovation in the sector continues.

BEAMA do not support standardisation of the communications layer in the consumer HAN at this stage in the market development of consumer energy devices and appliances. Especially when we are already working on defining an effective language. Any attempt at this stage to define the communication layer will only limit innovation and potentially jeopardise the existing smart meter rollouts and their defined systems.

The future model for interconnectivity

Only a small segment of modern consumers require fully functional home automation systems today. Most consumers are purchasing one smart device/sub-system at a time. Therefore it is essential that the value proposition linked to this particular purchase is clear and well delivered. The system integration benefits are, for now, not very clear for consumers but manufactures are already working to develop systems that can interconnect with other devices.

Use case example:

IFTTT are now offering early adopters affordable ways for sub system integration. This model is one example of where platforms are emerging onto the market to allow for device integration and manufactures are looking to ensure compatibility. IFTTT is a first step, one of many solutions, and manufactures are developing platforms that will be able to accommodate for increasingly complex systems and devices.

It is BEAMAs opinion that we do not need to mandate the communication layer by which these devices interconnect as the market is already doing this in alignment with the work being undertaken by CENELEC.

The successful value proposition of the energy manager concept will drive manufacturers to provide compatibility. The positive feedback here is that the successful energy manager will have to be open to provide affordable integration option for many different systems.

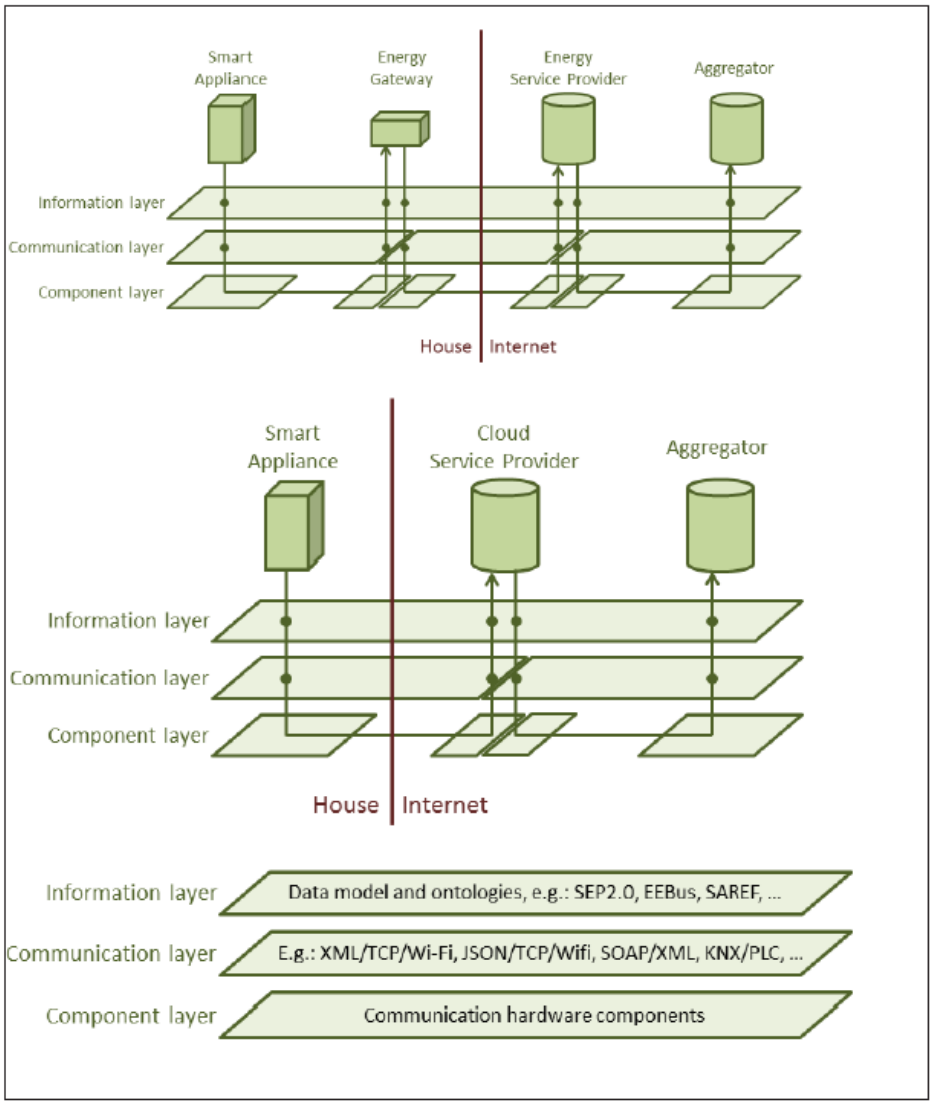


Figure 5: Details of communication transfers, with BRP split up in service provider and aggregator

4. What could be the basis for interoperability? This could be in the form of a common data model and if so, is it possible and feasible to achieve such a common data model? What further steps needed to achieve the common data model?

A common protocol/ API is therefore not the vision. CENELEC TC 205 WG 18 is already working on developing a common language which everyone can work to. There are risks in addressing interoperability through the adoption of one standard protocol and data model, and applying this to the technologies defined under eco design, especially where no consideration of the wider ecosystem is made. BEAMA are aware that communication in the C HAN is often referred to as direct

communication from the outside world to the appliance, it is often forgotten that the interaction and value of optimising onsite energy use and storage provides potentially more benefit to the consumer. Any review of eco design requirements must therefore consider wider system dynamics and the benefits to the customer.

From this perspective BEAMA favour the 'energy manager' model, where there is one central control / platform able to acknowledge all the external and internal variables (PV generation on site, tariff, storage capacity, customer needs, weather etc) .

BEAMA members have considerable experience is complying to Eco Design and ERP. We are aware of some implementing measures that don't provide additional benefit to the consumer or manufacturer, and this is a result of a lack of consideration for the overall system application. BEAMA foresee similar issues arising for smart appliances due to the complexity of their potential future system application and the current lack of certainty around the type of energy services customers will have access to.

Example: Lessons learnt from the water heating sector:

- Electrically heated storage water heaters can benefit from the application of "Smart" controls. However, these are controls that influence the operation of the water heater at a product level only. The control will "learn" the usage pattern of the household and adapt its energy use to optimise operation to hot water demand. This is not related to available off peak tariffs and no connectivity with external demand side energy management is assumed. Essentially the control is dedicated to the water heater with no outside electrical supply influences. If minimum criteria are shown to be met an uplift in the product efficiency can be claimed. However, any uplift can only be over one class band so benefits are limited.
- Electrically heated water heaters are subject to a "fuel factor" applied to their measured efficiency. The theoretical maximum efficiency is 40% after applying this factor, however due to the influence of other operating factors most will be in the range of 36 to 38% efficient which will place them in Band C. Application of "smart" control as described above may lift a product into B, but this is the highest an electrically heated water heater will achieve. Hence there will be very little differentiation between products if the energy efficiency label is used as a comparator.
- There is no mechanism within ErP for water heaters for "smart grid control", i.e. allowing the electricity provider to take control of the energy input to the water heater to help optimise the grid load. Hence there is no benefit to a manufacturer at this time, to incorporate such functionality - it will add considerable cost to a basic water heater and the infrastructure does not yet exist to integrate such a product. Incentives will be needed to persuade an end user to install such products and allow their energy provider to take a degree of control over the energy input to the water heater.
- From a manufacturers perspective there is currently little clarity about what feedback and degree of control an energy provider would want from a water

heater in able for it to be integrated with a demand side management scheme.

- Indirectly heated water heaters (those heated by a remote heat source) will be rated purely on their heat loss. Based upon practical levels of insulation in domestic situations will mean the majority of indirectly heated water heaters will be rated as C. As an indirect unit is heated by a remote heat source there is unlikely to be a direct connection between it's control system and the energy supply which, in most cases, would be a fossil fuel heat source anyway (gas or oil boiler).

5. Which steps are needed for implementing the data model for the communication layer protocols and how broadly should the communications layer protocol be covered? E.g. which steps are further needed for the implementation at the communication Layer (Bluetooth, ZigBee, WiFi etc)? Should all existing and future protocols be covered and how would it be possible? What would be the next steps to progress towards standardisation? A large number of standardisation initiatives exist. The Standards should be able to work on top of various possible hardware carriers, and carry commonly defined status and common data, such that all possible use cases are supported, e.g. variable tariffs, balancing reserves, grid support, etc. Therefore, wouldn't it be preferable to limit the number of agreed upon communication standards?

BEAMA strongly disagree with this question, it would not be preferable to limit the number of agreed upon communications standards. To do this at this stage in market development would be very damaging for manufactures and BEAMA do not support an implementing measure at this level. Vital standardisation work is already underway to understand the requirements for interoperability and the focus of this is at the information layer which will ensure continued innovation in the communication layer of the architecture model, while ensuring interoperability.

The focus at this stage should be on market incentives and developing the market framework for customer energy services, this will drive the market for smart appliances.

6. What kind of support for interoperability is needed? E.g. incentives, framework, policy measures, energy labelling, voluntary agreements, products information, packaging information etc.

It is hard to know at this state what kind of support would be needed with regards to labelling, voluntary agreements, packaging information etc for the reasons we have mentioned above.

National policy measures and incentives will be the key driver at this stage in the market. BEAMA members call for regulatory stability in the market and are therefore keen to avoid unnecessary regulation, especially during the early stages of market development. It is BEAMA's view that energy saving recognition on smart controls for all types of energy using products could be applied in national policies, in the UK this would include SAP (Standard Assessment Procedure) for new build and rdSAP for current buildings using EPC (Energy Performance Certificate).

How can we help?

BEAMA recently developed a model as part of a demonstration facility for a conference in the UK. This model simulated the behaviour of the connected home in a DSR contract with a DSO or aggregator. We are developing this model further to enhance our understanding of the benefits, in terms of energy efficiency and DSR, that can be derived from smart controls with heat and hot water, as well as at the appliance level and for EV charging. It may therefore be helpful for us to discuss what you are using for the modelling to support the Eco Design preparatory study and whether the work we have been doing with our members may be helpful. Please follow the link below to get an overview of the demonstration work we have already undertaken.

https://www.youtube.com/watch?v=A7F82JIvD9Q

BEAMA would be very happy to discuss any of the points made above and will develop further guidance as the preparatory study develops. In meantime if you have any questions regarding the above please contact Yselkla.farmer@beama.org.uk , Manager Emerging Markets.