Input on draft Tasks 2-4
Preparatory study on Smart Appliances (Lot 33)

December 2015

- **Fully assess the consequences of the Demand-Response focus**

The study team, supported by the European Commission, decided to set the focus of the preparatory study on "*smart appliances and their capability and potential to support the possible range of DR business cases*". The purpose of a preparatory study is to establish a solid evidence base for the whole product group, irrespective of what may be the focus of possible regulatory measures later on in the process. Therefore, the consequences of this choice need to be fully evaluated, by including an estimation of the savings potential linked to energy-aware appliances and the potential linked to smart meters.

The Ecodesign Working Plan 2012-2014 defined smart appliances *and* smart meters as a priority product group due to their "large" energy savings potential. We therefore wonder what is the impact of their exclusion on the energy savings potential. Furthermore, the study team should include in Task 7 an explanation on the announced 802 PJ/year energy saving potential as of 2030 and compare it with their own estimations

- ⇨ **Include an estimation of the savings potential linked to energy-aware appliances;**
- ⇨ **Include an estimation of the savings potential linked to smart meters;**
- ⇨ **Detail the assumptions based on the announced 802PJ/year energy saving potential as of 2030**

- **Analyse the CO_2 savings of demand-response load shifting**

DR-enabled load shifting does not save energy, but can save cost and CO_2. Load shifting is often considered primarily as a cost reduction strategy: shifting load to periods where energy costs, both retail and system costs, are lower to avoid firing up expensive peaking plants. **The correlation of cost with CO_2 is often assumed but not proven**. In order to use demand response to reduce CO_2 emissions, it is critical that the **marginal CO_2 emissions of power generation** are known and an analysis is performed of the potential benefits of load shifting on CO_2 emissions.

Moreover, the study team assumes that mainstreaming DR-enabled appliances will "enable to avoid electricity production with expensive and polluting power plants during certain hours" (Presentation Task 5, 2nd Stakeholder Meeting.). The study team assumes an ideal scenario. However, **non-ideal scenarios** should also be considered to quantify potential negative effects on energy consumption due to a roll-out of DR-enabled appliances: the shifting and buffering effect of DR-enabled appliances will strongly depend on the capability of the grid to integrate these devices.

- ⇨ **Perform a detailled analysis of the potential benefits of load shifting on CO_2 emissions**
- ⇨ **Identify the factors which could influence and threaten the benefits of DR enabled appliances**

- **Trade-off between the benefits and impacts of smart appliances**

We believe that more emphasis should be placed on the energy savings benefits, and potential impacts, of smart appliances. DR-enabled appliances can save energy through smarter occupancy or need-based control strategies (switching off or placing appliances in low-power modes when they are not needed). The potential for this type of capability should be better covered in the study.

But DR-enabled appliances also use more energy (higher standby power), as covered by Task 4, which can offset part of or all of the energy savings and CO_2 benefits. The study should also look at the extra consumption linked to telecommunications network and back-end infrastructures. The Networked Standby regulation is often referred to as a solution to limit the extra energy consumption of smart appliances. However, the regulation, as it is now, only applies to a very limited number of domestic products (defined in Annex I). Therefore, the assessment done by the study team should be based on the current status of the regulation (and not on the assumption that its scope and ambition will be raised), and **policy recommendations should be made on how to reap the full potential of the network standby regulation**.

- ⇨ **The trade-off between the benefits and impacts of smart appliances should be properly analysed, so that policy recommendations can ensure that the net impact is beneficial from a CO_2 perspective.**

- **Energy reporting**

A huge potential benefit of smart appliances is to leverage their connected capabilities to make them capable of reporting their energy use at a high resolution (such as every minute). Reporting of devices' energy use would not only enable operational optimization, it would also help with efficiency policy by providing large amounts of field data, more rapidly and cheaply than studies are able to. On the operational side, it would enable behavior changes by informing users of which appliances use how much energy and when, and how to optimize them (switch them off, change settings, replace them, etc). It could also help making sure that performances are maintained in time and not altered negatively through updating of software.

- ⇨ **Include a discussion on energy reporting**

- **Other remarks**

Energy-saving features

It could also be investigated and exemplified on some product categories how the use of smart sensors or scalable performance features could contribute to energy savings, e.g sensor stopping the appliances from running once a set level of performance is achieved (e.g humidity sensor for tumble driers); or the more systematic use of scalable chipset for electronically operated/enhanced appliances. We are aware it goes beyond DR activation, but we would prefer that this potential is not totally neglected, and left aside totally of the options and cost/benefit analysis.

Model (Task 5)

According to the study team, the model in the upcoming Task 5 will provide the following output data: total system costs (per hour), marginal prices per hour, CO_2 emissions per hour, production mix per hour and on "optimal utilization of flexibility from smart appliances".

- ⇨ **The study team should provide output data on both primary energy consumption and CO_2 emissions.**
- ⇨ **The short-term and mid-term capabilities of the grid (due to slower or faster restructuring/modification) need to be considered as system parameters in the model.**

Interoperability

We agree with Task 2 that one of the greatest challenges will be technological fragmentation 'within the connected home ecosystem'. One of the concerns ECOS raised in the Smart Grid Task Force Expert Group 1 'Interoperability' was the lack of standards supporting interoperability within the home, for Smart Devices. This includes the interfaces between the Smart Meter and the Energy Management Gateway, the Energy Management Gateway to the Smart Appliance and, outside actors to the home. This must be resolved with some urgency to avoid interoperability and technological fragmentation becoming too great a problem.

In addition, despite the work of Smart Grid Task Force Expert Group 1, it is still not clear to what extent Member States are meeting the common minimum recommendations for Smart Meters (2012/148/EU). For example, it is unclear how Spain's Smart Meter implementation (of data provided by a web portal every 15/20 minutes to the consumer) is able to "enable energy management solutions in 'real time', such as home automation, and different demand response schemes and facilitate secure delivery of data directly to the customer" (functionality 'a'). At present, seven Member States have chosen to provide data from a web-portal to the consumer, instead of from the Smart Meter itself. These web-portals will require a standardised application interface to avoid interoperability problems.

Cyber security

In Task 4, the technical analysis of cyber security is missing. Cyber-security will be an important aspect for consumer acceptance of Smart Appliances. Synchronised bulk switching of large numbers of devices represents a risk for critical energy infrastructure due to the large potential load size and negligible inertia (therefore no gradual reduction in power, which is extremely difficult to balance).

In addition, the method of cybersecurity employed has a direct impact on energy consumption of the Smart Appliance. As discussed in the Smart Meter industry, in addition to the communication protocol used (Wi-Fi, Bluetooth, etc..), the means of encryption employed will have an important impact on the energy usage of the device; for example, asynchronous key exchange versus synchronous key exchange. The study team should provide an analysis on such options, with cybersecurity implications.

System Frequency Control

In Task 4, under the 'demand response mechanisms' for each of the products – why is frequency response not fully reflected for all appliances with an interruptible power supply?

END

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