Input on draft Tasks 5-7
Preparatory study on Smart Appliances (Lot 33)

June 2016

Comments on Task 5

To quantify the economic and environmental benefits of smart appliances from an energy system perspective, the study team defined the following key performance indicators (KPIs):

- Total energy systems costs: Avoided costs related to the more efficient use of the energy system due to the achieved flexibility;
- Total CO_2 emissions with regard to the considered time period;
- Energy efficiency of the utilised generation mix over the considered period (see p. 5-6).

We believe that the amount of primary energy consumption - and not solely CO_2 emissions - should be considered in order to evaluate the benefits and impacts of smart functionalities. We therefore ask the study team to add a KPI on the total primary energy consumption and do not agree it is sufficient to extract the value from the results of the KPI on energy efficiency.

> ⇨ **Include a KPI on the total primary energy consumption**

We welcome that the study team does not only consider input parameters, such as hourly profiles of electricity demand and those of renewables or fuel and CO_2 prices, but also the network topology and transmission capacity. These parameters might be one of the limiting factors for the integration of renewables and also appliances with DR-functionalities. For the purpose of the model, the study team assumes that there is an integrated EU-28 energy market, while arguing that the "*European electricity network is developing towards a more integrated system*". We find this assumption overly optimistic, lacking a detailed description of the underlying assumptions.

> ⇨ **Describe to what extent the ideal assumption of "one integrated EU-28 energy market" differs from the actual market typology and assess the impact of the non-ideal EU energy market on the model output.**

A price of 48€ per tonne of CO_2 in 2030 is assumed. While strongly supporting ambitious carbon pricing, we would encourage a range of CO_2 price projections to be considered, from business-as-usual to high, bearing in mind the historical lack of progress in this area. The same comment applies to the presented prices for natural gas.

> ⇨ **Introduce a range of CO_2 & natural gas price projections from business-as-usual to high. Assess the robustness of the data presented.**

The report does not make any evaluation of the additional electromagnetic fields (EMFs) generated by smart appliances. EMFs are a concern for a part of the population and some scientists recommend limiting the exposure. How much more EMFs would be generated by wifi-enabled appliances, at which frequency, etc.? The Ecodesign Directive clearly stipulates that health impacts should be considered.

> ⇨ **Include a section on the additional electromagnetic fields generated by smart appliances and health-related considerations.**

The study does not address the issue of DSF-enabled appliances that could be installed in homes or places where DSF service is not available. DSF functionalities should not be by default, and only become activated if the service is available. Otherwise, standby waste and unnecessary EMFs will be generated for no reason.

> ⇨ **Introduce a scenario in which DSF-enabled appliances installed in homes or places where no DSF service is available and assess the relevance of the above proposals.**

Comments on Task 6

As stated during the meeting, we encourage the study team to fully investigate the potential benefits of system frequency control. Claims that existing regulatory barriers prevent this investigation are not justified, given that other forms of Demand-Side Flexibilty are assessed with a number of current energy market barriers and projected carbon prices.

> ⇨ **Fully investigate the potential benefits of system frequency control**

Because the calculation methods are not disclosed, it is not possible to judge the validity of the model. We recommend disclosing the way assumptions are translated into the respective input data and model parameters.

> ⇨ **Clarify which input data correlates to the assumptions which are described qualitatively only and disclose the calculation methods used in the model.**

Discussing "rebound constraints" in section 6.1, the study team states that there will not be any additional energy consumption due to operating smart appliances. The validity of this statement can be questioned and we ask the study team to modify it.

In the same section, the assumption that the home battery market will only develop in Germany because it is only subsidised there today looks strange. National subsidy schemes could very well change in the years to come, meaning that focusing solely on the present case for a 2030 assumption is flawed.

Table 1 (section 6.2.1) gives an overview of the percentage of smart enabled appliances per benchmark year. In section 6.2.5, the study team assumes that there is "one appliance per household". It is not clear how the estimation of one appliance/household was derived and how this number correlates to the data given in Table 1.

> ⇨ **Clarify how the figures given in Table 1 relate to the assumption of one smart appliance per household.**

In task 6 p.17, it is stated that smart appliances '*lead to an average decrease of marginal electricity prices of almost 5%, which is a significant decrease'*. First, it appears to be 4%, not 5%, according to the figures in table 8. Is this truly a '*significant*' decrease? It represents less than the natural increase in price over one year, meaning the whole DSF system would only offset one year of price increase.

At the end of Task 6, the comparison between benefits & costs (or pros & cons) of DSF is not made in a systematic and coherent way. On one hand, a thorough model is developed to assess the (financial and CO_2) benefits of DSF, but on the other hand the costs and negative impacts are covered much less thoroughly, and without sufficient quantification: on p. 24 and 25, there is no holistic approach and a confusion between DSF aspects and other aspects (such as user-friendliness of appliances) with several unsubstantiated statements (such as: '*the operational mode which is advised by the smart setting is expected to be more energy efficient compared to the setting the end-user would choose manually*'). A robust cost-benefit analysis should fairly compare the environmental and financial gains from DSF (e.g. the data in table 6 and table 10) with the environmental and financial losses from DSF with a similar level of detail.

For the negative environmental aspects, the analysis should take into account and quantify elements such as:

- the electricity lost in standby due to DSF-readiness. A level of 2W per appliance could be considered (as this is the 2019 regulatory level for non-HIna standby). Over a year it represents 17.5 kWh/year/appliance;
- the electricity spent in the DSF system outside homes (servers, communication devices, etc.);
- the amount of CO_2 emitted by this extra energy use;
- the end-of-life impact of home battery systems (omitted in the report).

Due to uncertainties on the evolution of electricity grids and systems, it may very well be that many appliances become DSF-ready but are not shifted at all during the year because there is no need to. In this case the additional energy use will be for nothing at all. Just as an illustration, if in 2030, 50% of the installed stock of appliances is DSF-enabled (should they actually be used or not for demand shifting), it would mean a 17.5 kWh of electricity use on 500 million products, that is 9 TWh[1]. This is comparable to the CO_2 gains expected from DSF mentioned in table 6, and is far from negligible.

> ⇨ **The analysis of the benefits & costs of DSF needs to be reworked, in particular to fairly cover the costs and negative impacts.**

[1] Task 2 estimated that about 1 billion appliances would be installed in the EU in 2030 (incl. dishwashers, washing machines, driers, fridges, freezers, water heaters, electric heaters). If half of them are DSF-enabled with a 2 W networked standby power, it means 17.5 kWh/year of standby consumption per year over 500 million products, that is close to 9 TWh of annual electricity consumption.

Comments on Task 7

The following comments are based on the slides presented during the stakeholder meeting on 30 May 2016 only. They are therefore preliminary and will be adapted after the report on Task 7 is available, if needed.

We tend to support the following proposals:

- Appliances that are marketed as DSF capable and interoperable should be required to follow a defined test standard.
- Maximum energy consumption of smart features should be set.
- Appliances that are <u>marketed as</u> DSF capable should fulfil certain requirements.
  The Ecodesign Directive could stipulate some mandatory requirements that appliances marketed as DSF-enabled have to fulfil, in particular the need for the DSF functionality to be off out-of-the-box mode and not add any background energy consumption as long as the functionality is not used. Specific requirements limiting the power of the DSF functionality (on top of existing networked standby requirements) are also welcome.
- Appliances that are <u>marketed as</u> interoperable should fulfil certain requirements.
- Appliances that are DSF enabled and interoperable should be recognisable as such by their potential buyers. An agreed logo on the energy label could be the best solution.

On the contrary,

- It is not recommended to force manufacturers to make all their appliances DSF-enabled through the Ecodesign Directive, as it is not an intrinsic energy-saving feature that leads to a guaranteed life-cycle benefit. It is up to the market to demonstrate the potential benefits of DSF. If there is a business case, then consumers will follow. If not, there is no reason to impose it, as it would contradict the least life-cycle cost principle. DSF should be thought of as a *possible to enable* feature, not a *default* one.
- As DSF is not an energy-saving feature (and on the contrary adds energy consumption to the appliance), it is inconceivable that smart appliances get a better energy class on the energy label.

Finally, we invite the study team to investigate the option of DSF as an additional modular feature of products.

We are also looking forward to reading the results of the quantification of the savings related to energy aware appliances as announced in Task 1 footnote 24: *"A further, rough estimation of the saving potential through energy awareness will be provided in the Task 7 report although energy awareness is not subject to any policy options to be assessed under this study."*

END

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