

*Joint Programme
“economic, environmental and social impacts of energy policies and technologies”
(e3s”)*

COMMENTS to SET-Plan Action 3.1) Smart solutions for energy consumers

Referring to Issues Paper No.3 – DRAFT
(Version 17/12/2015)

The following e3s members have contributed to this response:

Daniela Velte, TECNALIA (editor)

Valeria Jana Schwanitz, HISF

Tiina Koljonen, VTT

Carlo Aall, VESTLANDSFORSKING

Francesco Rizzi, SSSUP

Klaus Kubeczko, AIT

Jean-Francois Gruson, IFPEN

Summary of contributions

The main concerns raised by the e3s members with regard to Issues Paper N° 3 refer to omissions, which we consider highly relevant for achieving the final goal of the action: that of lowering energy consumption in a sustainable way. The paper’s exclusive focus on electricity use by households and small businesses – heat, gas, fuel, transport are not mentioned – is contrary to the necessarily much more holistic view of behavioral change and the complex and often conflicting purchase and investment decisions, which consumers have to make. We are not sure if this more holistic view is covered in other Issues Papers, but it should have been considered under the “consumer” section as well. Citing from a relevant source¹, we summarize that “an [end-user centered] approach should address both conscious (e.g. buying smart appliances) and habitual (e.g. energy related practices) forms of behavior and the enablers and barriers that may apply.”

There is some, but not yet sufficient evidence from Norwegian and Danish case studies², that individual behavioral change can bring electricity consumption for certain appliances down by 20%, but that other choices, for example that of living in smaller homes, have a much greater effect on total energy use of households.

¹ Valkering, Pieter; Laes, Erik; Kessels, Kris; Uytterlinde, Matthijs; Straver, Koen; Sarkadi, L. et al. (2014): How to engage end-users in smart energy behaviour? In EPJ Web of Conferences 79, p. 4003. DOI: 10.1051/epjconf/20147904003

² Aall, C. (2013): Why has the level of household energy consumption stopped increasing in Norway — and how to make it decrease? In: Hansson, L., Holmberg, U., Brembeck, H. (Eds.). (2013). *Making Sense of Consumption*. Göteborg: University of Gothenburg. ISBN 978-91-974642-6-0

Joint Programme
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One of the key elements of future change is that of giving new action power to the customer, as recognized in the Issues Paper. So why not explore more radical changes to the regulatory and market environment, which would enable greater collective action, for example the possibility of a single grid connection for multi-story houses with advanced energy management systems behind the meter?

A more holistic view of the consumer (and citizen) as active subject in the energy system will lead us necessarily to complex questions about when, how and why people become active and make decisions within their scope of action, in response to which type of incentives or preferences and on the basis of which type of information. “Energy literacy” in a broader sense is a key element here, but also the role of displays, investment capacity or organization of time (all gender-related!).

Further relevant aspects of the Issues Paper are related to economics, sustainability, assessment and the need for actions, which are better targeted to specific groups of consumers.

Critical behavioral issues of “smart solutions” for consumers are overlooked in the introduction as well as in the intended actions. A lot of nice adjectives are put in front of “smart solution”, e.g. cost-effective, consumer-centered etc. It seems that the positive impact is taken as granted. How high is the risk of stranded investments for the society if smart solutions are installed at large scale but behavior does not change as intended? How high are the costs of transformation to achieve behavioral change? What about ex-post evaluation in actual households about the achievements of installing smart grid solutions w.r.t. energy use and usability of all the smart functionality?

There is also a lack of methodologies and data to carry out an **ex-ante analysis** to determine the potential benefits of smart systems in the low carbon society. VTT’s preliminary scenario studies with energy system models showed that it was very difficult to prove that smart city concepts bring any further cost reductions compared to a low carbon economy with more centralized energy systems. The added value is therefore related more or less to increased comfort and services. In the short term, increased shares of distributed generation and prosumers could even reduce the low cost flexibility options, i.e. the energy bills could even increase.

Suggestions:

- To stress the need for ex-post evaluation of actual consumer behavior
- To stress that causes and effects need to be separated when evaluating the links between consumer behavior and smart solutions
- To support research about the cost of transformation
- To support research about those mainly benefiting and those not (burden-sharing)

The Utilities’ positioning towards decentralization of the energy system should undergo scrutiny, along with that of suppliers of smart appliances

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New business models emerge from complex system changes and entail pathways of evolution of the organizational environment that are far from being understood. As a consequence, citizen empowerment, collective entrepreneurship etc. are for sure interesting issues, but they do not represent all relevant dimensions that deserve further investigation. In fact, we should not overlook transformations of incumbent organizations and their impact at the system level. In particular, special attention should be paid to current manufacturers and providers so as to understand the conceptual models that explain 1) how their business models evolve and 2) how new ones are created (see the recent evolutions of the innovation ecosystems in ENEL and General Electric to appreciate the changes that are occurring in the business environment). One important issue to be discussed with smart grid appliance providers, but also utilities, is the idea of a “default option” (i.e. that machines, tariffs etc. are designed and programmed in such a way that you automatically get the most efficient / green solution or mode, unless you do something to change this).

Suggestion:

- We suggest including an in-depth analysis of the trials and errors that are in progress among these actors so as to better understand the micro-foundations of sustainable energy transitions.
- Explore opportunities related to the design and use phase of smart appliances and energy services, which enhance the behavioral change effects and, with that, smarter energy use.

Sustainability issues of smart solutions are not well addressed. There is a need for integrated assessment: What about transformational rebound effects and economy wide-effects, e.g. crowding out, winners and losers of smart solutions? What about material flows and resource use (e.g. critical or rare materials)?³³

Further rebound effects to be explored are impacts on security (i.e. security of energy supply, cyber security, etc.) and GHG emissions (i.e. especially indirect emissions).

Suggestion:

- To strengthen the need for integrated assessment by addressing links to material and resource use, economy-wide and transformation aspects.

Finally, we would like to point out that the document mixes goals and tools. Smart solutions are a tool to achieve the goal of energy saving and to bring benefits to the consumer (cost-reduction, active participation etc.). Goals and tools should not be mixed. Therefore, the second target (coverage of households with smart meters etc.) should be revised.

Suggestion:

- Quantification of targets for goals, only.

³³ See CRM-InnoNet Roadmap report on the substitution for critical materials, which foresees the increase of the consumption of gallium arsenide in electronic components or a strong demand increase for materials such as fluoride in Lithium-Ion batteries.

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Some of the **targets and intended actions** are not focusing on the two groups of 1) energy consumers and 2) building/district level with Smart Cities & Community initiatives. Many intended actions take the realization of potential merits of smart technologies for granted.

Suggestion:

- To better streamline actions with target groups. Introducing goals for how much behavioral change per target groups has taken place (energy use, enabled participation as prosumer etc.).

Readability can be improved by simplifying sentences and avoiding abbreviations.

Suggestion:

- Removing abbreviations or including a list of abbreviations.