EUROPEAN COMMISSION
RTD - Energy
ENER - Renewables, R&I, Energy Efficiency
JRC - Energy, Transport and Climate
SET Plan Secretariat

SET Plan –Declaration of Intent
on Strategic Targets in the context of an
Initiative for Smart solutions for energy consumers

Purpose of this document

This document[1] is intended to record the agreement reached between representatives of the European Commission services, representatives of the EU Member States, Iceland, Norway, Turkey and Switzerland, and representatives from the SET-Plan stakeholders most directly involved in smart solutions for energy consumers, on the implementation of the actions contained in the SET-Plan Communication[2], and specifically the strategic targets for the priority "Number 3 – Create technologies and services for smart homes that provide smart solutions to energy consumers" for what concerns smart solutions for energy consumers.

In the context of this action, 'consumers' includes households and also small entities which can benefits from the same smart solutions and for whom the decisions for energy matters lie with the occupant of the building.

This agreement follows inputs from stakeholders as well as a public consultation via the SETIS website[3] on an issues paper prepared by the Commission services[4]. It takes into consideration the responding input papers and public comments available on SETIS and discussions in the SET-Plan Steering Group on 20 January 2016 with the participation of the SET-Plan stakeholders most directly involved in the topic.

The stakeholders agree to the proposed approach and targets in an endeavor to progress towards a greater involvement of consumers in the energy system relying on smart solutions and, to put forward their best efforts in a coordinated way between public and private sectors, and to jointly address all relevant issues in order to attain these targets.

Brussels, 19 October 2016

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[1] This document has no legally binding character, and does not prejudge the process or final form of any future decisions by the European Commission.

[2] Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation" (C(2015)6317).

[3] Strategic Energy Technology Information System website https://setis.ec.europa.eu/

[4] https://setis.ec.europa.eu/system/files/issues_paper-action3_consumers.pdf

<u>Introduction – Smart solutions for energy consumers</u>

Our energy system is undergoing important transformations with the deployment of smart meters, smart controls, the emergence of smart appliances, their integration in home networks thanks to smart energy systems with an increasing exchange of data via internet and telecommunication networks. In addition, some of the energy consumers are becoming 'prosumers', at the same time producing as well as consuming energy. The growing share of variable renewable energy production is challenging for the grid but also opens opportunities for consumers to offer services to the grid against the possibility to generate income and lower their energy bill thanks to demand response mechanisms.

Therefore, over the last years, the role of consumers in the energy system has received more attention, as acknowledged in the Communication on Energy Union, the SET-Plan Integrated roadmap and the communications 'Towards an Integrated Strategic Energy Technology (SET) Plan', 'New deal for consumers' (COM(2015)339) and the accompanying 'Guidelines for self-consumption'.

New smart technologies and services are emerging which allows energy consumers to benefit from more comfortable, convenient and healthier living environment, to change their consuming patterns, reduce their consumption and better integrate the production of renewable energy sources. Communication, data and automation are at the core of these new smart solutions, which give a new role to consumers in the energy system and release them from sub-optimal control tasks. It is important to point out that such devices/services will be increasingly interconnected with other devices controlling e.g. the security or even features concerning directly the customer such as e-health.

In the context of this paper, smart homes means a building, whose building elements or technical building systems can communicate with other sub-systems and with the power grid, adapt in response to the needs of the occupants and the grid and interact with building operators and/or occupants to empower them with new levels of visibility and actionable information to ensure that energy use is continuously optimized.

An important economic driver for smart home technologies and systems are online platforms and the larger penetration of consumer end-devices for entertainment, lifestyle and social media; these devices provide increasing capabilities for situational awareness, context and condition monitoring and predictive intelligence. A prerequisite for energy service providers and operators to exploit these smart technologies and provide value-added services that **empower consumers** is the establishment of a regulatory framework that allows demand-response and energy efficiency services, where the availability of information for consumers is guaranteed and a secure but non-discriminatory handling of data is in place. While the scope of R&I activities is not to define the regulatory environment, experience gathered in R&I projects can nevertheless constitute a useful source of information and advice to people who are drafting regulations.

In addition, the development of these smart energy solutions should be performed together with inclusive strategies to engage consumers and not be two separate independent processes.

From the stakeholders' consultations, it is clear that a strong emphasis should be put on engaging consumers and responding to their needs. Therefore, it is proposed to put the R&I effort emphasis on smart solutions and technologies which have the potential to engage energy consumers.

The following issues need to be addressed in R&D&I:

Promoting the uptake of new energy services and business models, based on intelligent and connected devices, whose control and performance is ever improved and optimised based on self-learning algorithms, and based on sensors and controllers that are easy-to-use, easy-to-install and easy-to-maintain.

This requires developing cost-effective solutions that ensure interoperability and data sharing between different heterogeneous home devices and systems that encompass a.o. on-site renewable energy generation (e.g. photovoltaic), appliances, lighting (natural and electrical; solar shading), heating and cooling, domestic hot water, ventilation (air quality). Future solutions should be based on a shared reference architecture model (agreed between different vendors) that defines the interfaces for open connectivity based on standard protocols (e.g. M2M, Bluetooth, near-field communication, cloud-based communication), semantic data models (such as SAREF), processing and analytics and user interaction (e.g. voice control or avatars). It should promote the development of new services for different actors (DSO, TSO, suppliers, aggregators etc) e.g. through aggregation, based on the flexibility in local energy systems that makes the overall energy system more resilient. It should also enhance the possibilities for self-consumption and for peer-to-peer (community-based) supply of services and/or electricity.

This also requires developing user-friendly interfaces, such as applications that work on mobile devices (apps) that turn energy management technologies into easy-to-use services.[5] The interfaces and technologies will allow increasing awareness of energy consumption and better respond to users' needs and preferences, and define the appropriate degree and strategy of user control.

This needs to be accompanied by the development of a methodological framework to evaluate the consumer benefits of and consumer's (long-term) engagement (their experiences and results in practice) in the use of enabled services, including their acceptability and replicability. The method should include a set of KPIs together with protocols for KPIs quantification and monitoring of data needed for KPIs quantification. This will facilitate the conduction of detailed cost-benefit analysis, that takes into account consumer behaviour and engagement, for each stakeholder involved (consumer, DSO\TSO\city level, ICT service providers) for both services and technical solutions, especially in those cases, in which the introduction of these services increase the cost of energy for the final consumer.

This also needs actions that further promote the deployment of robust and interoperable advanced energy-related sensors and controllers (e.g. building automation & IoT-supported) attached to or integrated in home energy devices (e.g. on-site renewable energy generation, appliances, lighting, solar shading, heating and cooling, domestic hot water, ventilation appliances, lighting, solar panels, electric vehicles, home energy storage, etc) that can be easily integrated into smart home management systems, enable smart energy

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[5] Smart energy apps should be driven by an ecosystem of vibrant apps developers that aim at providing innovative services for home user comfort and well-being. Future solutions must ensure interoperability and should be closely integrated with open smart home platforms addressing services in the field of building automation, demographic change, energy efficiency, security that are open to applications from various manufacturers and also Third Party developers.

management based on upgradable and wider spread software and APIs (e.g. plug and play, self-configuring, maintenance free and easy to re-use).

Agreed strategic targets for smart solutions for energy consumers:

The overall objective is:

Further develop plug-and-play energy management solutions that will lead to more comfortable, convenient and healthier living environment at lower energy cost for consumers. Based on ICT and energy technologies, these services need to be deployed in houses using innovative business and service models. They will also increase energy efficiency, create new demand response opportunities, optimise building operation and ensure RES integration in houses.

By 2030 R&I should contribute to the key enabling smart home technologies by:

1. Demonstrating new services based on **innovative organisational and services models** based on interoperability and data sharing between different devices and systems with monitored performance, cost-effectiveness, acceptability, replicability and serviceability, by:

   Target:
   - *Demonstration and application of an interoperable reference architecture and a set of open interface standards as soon as possible, so that they will be the default architecture and standards that are used by new services by 2020.*

   Improving control and decision-making strategy based on better use of the data coming from devices and systems through more adaptive and accurate energy usage models combined with self-learning algorithms (e.g. in the form of open-source cloud-based applications).

   Target:
   - *Improve the performance of the tools for forecasting the electricity consumption of the smart home so that is within 80% of the real consumption 1 hour in advance.*

   Developing **user-friendly interfaces** (including apps) that turn energy management technologies into easy-to-use services[6], accompanied by the development of science-based KPI's to measure the benefits for consumers.

   Target:
   - *Making available in the market 5 user-friendly interfaces/tools for energy management (including apps), in every MS, developed by start-ups and innovative service providers, that are part of a smart home service bundle.*

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[6] Smart energy apps should be driven by an ecosystem of vibrant apps developers that aim at providing innovative services for home user comfort and well-being. Future solutions must ensure interoperability and should be closely integrated with open smart home platforms addressing services in the field of building automation, demographic change, energy efficiency, security that are open to applications from various manufacturers and also Third Party developers.

- *Making available an agreed methodology (KPIs and protocols) to measure the consumer benefits and the success in use of tools and appliances that are deployed in the market.*

2. Further deployment of robust and interoperable advanced **energy-related sensors and controllers** attached to or integrated in home energy devices that can be easily integrated into smart home management systems, and are easy to maintain and update.

Target:
- *The additional cost of sensors, controllers and actuators, their installation and maintenance should have a pay-back period of maximum 3 years;*
- *Increased penetration of advanced energy sensors and controllers so that at least 80% of the electricity consumption and at least 80% of the total energy consumption is controllable through ICT [7] in 80% of the homes in Europe by 2030[8].*

These solutions should meet the following condition*s:*

- *Proof of acceptance of services by EU-wide representative consumers*
- *Ensure that legal privacy, safety and security requirements are respected according to relevant EU and national legislation;*

Next steps

The stakeholders agree to develop within 12 months a detailed implementation plan for the delivery of these targets, e.g. determine joint and/or coordinated actions, identify the ways in which the EU and national research and innovation programs could most usefully contribute, identify the contributions of the private sector, research organizations, and universities, identify all issues of technological, socio-economic, regulatory or other nature that may be of relevance in achieving the targets, and report regularly on the progress with the purpose to monitor the realisation of the targets and take rectifying action where and whenever necessary.

The stakeholders intend to rely on the entities consulted for the issues paper '3.1) Smart solutions for energy consumers' as the main vehicle for discussing and agreeing on the implementation plan. These are:
BEUC – The European Consumers Organisation
CECED – The European Committee of Domestic Equipment Manufacturers
EHI - European Heating Industry association
Energy Cities – The European Association of local authorities in energy transition
EHPA - European Heat Pump Association
EPEE – European Partnership for Energy and Environment
ESMIG – European association of Smart Energy Solutions providers
EERA - Joint Programme on economical, environmental and social impacts
Solar Power Europe - European Photovoltaic Industry Association

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[7] That uses the reference architecture and the open standards as stated in the target under 1)
[8] The reference to 80% of the total energy and the total electricity consumption in a house is set so as to ensure that the main electricity-consuming appliances beyond those used for heating and cooling are included.

European Innovation Partnership on Smart Cities and Communities

EUA-EPUE – European University Association, European Platform of Universities engaged in Energy Research

EU-BAC – European association for Building Automation and Controls

Eurovent association - European Committee of Air Handling and Refrigeration Equipment manufacturers

Knx Association / CEN CENELEC

European Technology Platform Smart Grids – WG Demand and Metering

SEDC - Smart Energy Demand Coalition

ANEC - European consumer voice in standardization

AIOTI (Alliance for Internet of Things Innovation) – platform launched by the European Commission to develop and support the dialogue and interaction among the Internet of Things (IoT) various players in Europe.

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