



SET-Plan

3.1 Energy Consumers Implementation Plan

**Approved by TWG members – to be endorsed by
the SET-Plan Steering Group**

November 15, 2018



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Introduction

The integrated SET Plan

The Energy Union Strategy within a Forward-Looking Climate Change Policy is built in views to fulfil a fundamental transformation of Europe's energy system into a sustainable, cost-effective, and reliable system “for all”, so associated to desirable “energy” lifestyles.

The transformation will be achieved on the *technological* forefront by moving to smarter, flexible, decentralized, integrated, secured and sustainable ways of delivering energy to consumers, while securing on the *commercial* forefront the emergence of competitive and sustainable new business models, markets and Energy Value chains.

The transformation is about new knowledge, skills and competencies on the *human capital* forefront to give rise to entrepreneurs, *in company* innovators and other key human resources to Europe’s future, calling all stakeholders to participate in this fundamental change.

Moreover, the massive engagement of European citizens is a necessary condition for the success of the energy transition, ultimately leading to a “people-centered” energy system in Europe, a system that people trust, like and engage into. Involving citizens ideally at the conceptualisation stage of future projects developing energy services is essential to get their acceptance and to ensure that new technologies are properly embedded in society and respond to real social needs.

The Energy Union is enabling and paving the ways to such transformations.

The Strategic Energy Technology Plan (SET Plan) as part of the Energy Union strategy is identifying strategic priorities and actions needed to accelerate the EU energy system transformation in an innovative and cost-effective way. It focuses also on the role of all Europeans, as consumers and citizen.

This SET Plan temporary working group (TWG) 3.1¹ focuses on *Smart solutions for energy consumers*, and for that purpose proposes priorities actions to favour the emergence of smart energy solutions in Europe, as well as Key Performance Indicators (KPI) to measure consumer benefits. The present Implementation Plan also focuses on one specific KPI called the *Societal Readiness Level*, reflecting on the engagement of European citizens in the Energy Transition in general, and regarding smart solutions, proposing different steps towards its implementation.

¹ The SET-Plan key action 3 focuses on new technologies and services for consumers and is composed by SET-Plan 3.1 “Smart solutions for energy consumers” and SET-Plan 3.2 “Smart Cities and Communities”. The SET-Plan action 3.1 addresses a digitalised eco-system where consumers, companies or stakeholders can offer or use energy services for houses and commercial buildings in cities through different sources of data (energy, weather, traffic, etc.) using real-time monitoring and control. On the other hand, SET-Plan action 3.2 “Smart Cities and Communities” supports the planning, deployment and replication of 100 ‘Positive Energy Districts’ by 2025.



Europe's opportunities in smart energy solutions and increased consumer engagement

In a distributed energy system, citizens in their role as producers, consumers and storage providers should be involved in decisions on what technology to use, how to mitigate any risk involved and how to distribute any benefits, including broader local and regional strategies.

Therefore, all citizens (in households, commerce, enterprises, SMEs...) should be able to deal with user-friendly smart appliances allowing them to easily manage their energy consumption and better budget their expenses.

The TWG also stressed the privacy and data security issue linked to the deployment of smart devices and the implementation of GDPR.

Interoperability

The TWG on Smart solutions for energy consumers believes that interoperability of the smart appliance with other smart appliances in the household, smart meters, energy management applications and via Wide Area Networks with service providers – from the same manufacturer or other manufacturers - must be a basic requirement. Interoperability should allow consumers to mix appliances and other smart devices from different manufacturers, so optimising consumer choice and facilitating competition among manufacturers. Moreover, it would prevent consumers from being locked-in and tied to products of one and the same company. Smart appliances and all features of energy management which may be used in the future must be able to communicate with each other so that consumers can switch the supplier easily and move homes without having to change appliances or communication systems.

Consumer benefits

A more holistic view of the consumer (and citizen) as active subject in the energy system leads necessarily to complex questions about the approach to guide consumer behaviour.

The energy consumption of residential households varies largely in nature and size and depends on consumers' needs, skills, motivations, interests, lifestyle, and equipment and so on. Therefore, the TWG on Smart solutions for energy consumers believe more research is needed on how to engage different groups of consumers with different behaviour patterns in a way that not only encourages them to engage in energy markets, but also enables different consumer groups to benefit from smart appliances and self-generation. The key lies in diversifying the approaches and tailoring them to specific consumer groups. Exploring opportunities related to the design and use phase of smart appliances and energy services enhance the behavioural change effects and, with that, smarter energy use should be further developed.

In order to be able to measure consumer benefits and engagement, the Temporary Working group, under the leadership of EERA, proposed six indicators reflecting on *self-production of energy, on consumer preferences for smart appliances, participation in demand response, market participation, and impact on energy bills*. In terms of priority action in the Consumer Implementation, the working group identifies the need *to comment and commit in defining and agreeing on KPI to measure consumer benefits*.

2 pillars: Interoperability and Consumer benefits

The SET Plan temporary working group (TWG) on Smart solutions for energy reflects on how standards for smart appliances might facilitate the accessibility of devices for consumers



focusing on 2 pillars, **interoperability of smart energy solutions** on the one hand and on **Consumer benefits** on the other hand, identifying **7 priority actions** (respectively 5 on interoperability and 2 on consumer benefits), to achieve **5 targets**.

The overall objective is to *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.*

Disclaimer

This IP is less focused on budget for R&I and more focused on the creation of market/environment that stimulates innovation and will lead to the delivery of targets.

SET Plan Strategic targets

The TWG on Smart solutions for energy consumers agreed on ambitious targets aimed to create a digitalised energy eco-system where each actor (energy consumers, companies, stakeholders) can easily access data and offer/use energy services. On the other hand, data protection is a requisite to be balanced with this need.

The agreed strategic targets (Dol) will be carried out by the involved actors (SET Plan countries, stakeholders and, within its mandate, the EC).

The overall objective is to *further develop plug-and-play energy management solutions, which 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 1 "architecture and standards":

- *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.*



- 2. 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 2 "tools for forecasting":

- *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.*

- 3. Developing user-friendly interfaces** (including apps) that turn energy management technologies into easy-to-use services, ² accompanied by the development of science-based **KPI's to measure the benefits for consumers.**

Target 3 "interfaces/tools for energy management":

- *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.*

Target 4 "KPIs and protocols":

- *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.*

- 4. 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 5 "sensors and controllers":

- *The additional cost of sensors, controllers and actuators, their installation and maintenance should have a pay-back period of maximum 3 years;*

² 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.



- *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 ICT³ in 80% of the homes in Europe by 2030⁴.*

These solutions should meet the following conditions:

- *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;*

Temporary Working Group

In line with the common principles guiding the preparation of the Implementation Plans within the Integrated SET Plan, a Temporary Working Group (TWG) on smart solutions for energy consumers was set up. It is composed of 56 members forming a balanced group of SET Plan countries, Stakeholders and EC, see annex VI

- SET Plan countries are committed to use their energy R&I national programmes and policies to implement some of the R&I activities that will be selected; and are preferably interested in developing and pursuing joint research with other countries. Country representatives in the TWG Set Plan 3.1 Consumers are government representatives, or nominated by their governments.
- Stakeholders are experts from EASME and INEA agencies, ECSEL JU ETIP, EERA e3s Joint Programme, E.ON Energy Research Center, European Consumers Organisation (BEUC)
- The EC (DG Energy, in cooperation with DG CNECT) facilitates and supports the TWG as needed in agreement with the Chair.

The nomination of the Chair took place before the first WG meeting on invitation of the EC:

Chair of the TWG 3.1 Energy Consumers: Mark van Stiphout (EC)

This TWG has met regularly during the preceding two years to draft an Implementation plan that contain concrete R&I activities, and propose relevant funding opportunities for their realisation, which are considered essential for achieving the agreed set of targets.

Priority actions

³ That uses the reference architecture and the open standards as stated in the target under 1)

⁴ The reference to 80% of the total energy and the total electricity consumption in a house is set to ensure that the main electricity-consuming appliances beyond those used for heating and cooling are included.



Smart solutions for energy consumers dealt within the present implementation plan starts from electricity application, but also applies to other form of energy, in particular heating and cooling.

As the key issue is ICT infrastructure, the priority actions focus on creating a digitalised ecosystem from which apps and tools can be developed. This will be achieved by using a common reference architecture and standards for future projects.

On the other hand, considering that the success of the IP implementation depends largely on the consumer acceptance and engagement, the TWG advocated to define a quantitative and qualitative framework to measure progress on four levels: consumers/producers, markets, households and in society at large. The selection of KPIs is presented in Annex III.

To help generate positive and constructive engagement of all citizens in the energy transition, a societal Readiness level framework is being designed by KIC Innoenergy (ongoing InnoEnergy projects to deploy the Societal Appropriation Approach).

Open standards and reference architecture for energy services (targets 1-3)

In order to achieve the target 1-3 of the DoI, the TWG elaborated a set of 5 priority activities that will allow to use a common reference architecture and standards for future R&I projects.

For each priority, ongoing and future R&I activities that support the strategic targets (conducted at national and/or at European level) have been identified.

The five priority actions to be carried out by SET Plan countries are the following:

1. To create an Overview of reference architecture and standards available for projects;
2. To commit to promote the use of a common terminology and template to identify the reference architecture and standards used in projects that address (i.e.) energy services;
3. To commit to using SAREF (Smart Appliances REFerence) as a standard ontology for Demand Side Flexibility projects;
4. To commit to developing and promoting the use of a reference architecture for energy services for consumers at smart home and city level. Therefore it was agreed to set up a Working Group composed of Member States, DG ENER, DG CNECT and JRC to develop this reference architecture. This WG will also develop a common terminology and template mentioned in action 2.
5. Based on the above, to support the development of energy services via apps and better forecasting through funding of R&I projects aimed to develop energy services dedicated to houses and commercial buildings. SMEs are specifically included in this action, since they have a large and so far untapped potential for energy savings and cost reduction

The commitments of: SET Plan countries are provided in Annex II.

KPIs consumer benefit and engagement (target 4)

In order to achieve the target 4 set in the DoI, the TWG has defined the following priority actions:



6. Member States will comment and commit to defining and agreeing on KPIs measuring consumer benefits – *concerned consumers are not only residential users, but also SMEs*. (presented in Annex III). The commitments of SET Plan countries for Actions 6 is provided in Annex IV.
7. Concerning the KPIs measuring consumer engagement, Member States will commit to using a joint framework for consumer engagement that will be developed by EERA e3s Joint Programme and KIC Innoenergy. The commitments of SET Plan countries for Actions 7 is provided in Annex V.
8. Moreover, a societal Readiness level framework is also being designed by KIC Innoenergy to help generate positive and constructive engagement of all citizens in the energy transition (ongoing InnoEnergy projects to deploy the Societal Appropriation Approach).

Further deployment of energy-related sensors and controllers (target 5)

The key requisites to meet the target of a wide diffusion and use of sensors are:

- Plug&Play and
- User-friendly capabilities.

The specificities of the target related to sensors and controllers will be developed by the Expert Group set up by ECSEL and the European Commission

Next steps

The TWG recognises that there is a need to support and monitor the above actions to progress in developing a framework for energy services. It is anticipated that the Working Group will evolve to assume the role of an implementation group, once this plan is adopted and that appropriate resources will be assigned to the administration and collation of the reporting each year for the life of the plan.

Recommendation: as the IP does not present at this stage any future Member State investments/activities, this should be developed at later stage, including a contribution of private sector.

Suggested monitoring activities are:

1. To carry out an annual overview of projects funded related to smart energy services for consumers and their use of standards and reference architecture as described in this Implementation Plan.
2. Request each MS to complete a register of funded projects and ensure that funding recipients complete a report that captures the progress of activities. The format of



reporting and details required will be developed by the working group and agreed by all Stakeholders.

3. Request each MS, Working Group for reference architecture and EERA e3s Joint Programme to report separately on their activity under each action as part of the annual review.
4. Annual report on progress in R&I in power electronics (with ECSEL)

Possible support activities can be:

1. To organise around each action a yearly workshop with participants from the private and public sector to stimulate collaboration and knowledge transfer.
2. Increased budgets on EU and Member States level for the support of Research and Innovation actions in development of smart energy services.

Annex I: Questionnaire on interoperability

Annex II: Commitments of SET Plan countries for Actions 2, 3 and 4

Annex III: KPIs measuring consumer benefits and methodology

Annex IV: Commitments of SET Plan countries for Action 6

Annex V: Commitments of SET Plan countries for Action 7

Annex VI: Composition of Temporary Working Group (TWG) on smart solutions for energy consumers

Annex VII: The R&I Activities (relevant to priority action 1, 5 and 7)



Annex I: Questionnaire on interoperability

<p>1. 1. What reference model do you use to define different levels of interoperability of ICT (e.g. SGAM, European Interoperability Framework, etc.)</p>
<p>2. 2. What are the different layers used in the communication architecture in your project? (e.g. OSI model https://en.wikipedia.org/wiki/OSI_model).</p>
<p>3. What standards do you use to ensure interoperability at the different interoperability levels?</p> <ul style="list-style-type: none">✓ For example the SGAM interoperability layers are (link, page 27):✓ Business Layer✓ Function Layer✓ Information Layer✓ Communication Layer✓ Component Layer
<p>4. Do you use the SAREF (Smart Appliances Reference) ontology standard? If not, what do you use?</p>
<p>5. What are you doing to ensure interoperability among cloud-solutions to avoid single-vendor lock-in?</p>
<p>6. 6. What are your recommendations on further development of standards for interoperability?</p>
<p>7. At what level the integration is made for interoperability? (by level we mean for e.g. SGAM interoperability layers)</p>
<p>8. How is interoperability assessed?</p>
<p>9. Do you use/plan to use plug&play technology to promote interoperability (easier connection of devices not requesting specialised personnel) which would facilitate users' engagement?</p>



Annex II: Commitments of SET Plan countries for Actions 2, 3 and 4

The participation remains open for all countries who wish to commit.

For **Action 2**, the parties commit to promoting the use of a common terminology and template to identify the reference architecture and standards used in projects that address (i.e.) energy services.

Parties (SET Plan countries)
Finland*
Sweden*
Portugal
Germany
Austria*
Italy

For **Action 3**, the parties commit to recommending SAREF as a Smart Appliances ontology standard for projects:

Parties (SET Plan countries)
Portugal
Germany*
Austria*

For **Action 4**, the parties commit to promoting the use of a reference architecture for energy services for consumers:

Parties (SET Plan countries)
Finland*
Portugal
Germany
Austria*
Italy
Sweden
Turkey

* To be confirmed



Annex III: KPIs measuring consumer benefits

Area	Indicator	Data availability
Involvement of citizens in energy production: Self-production of energy	Household PV production (% of total PV production in MS)	Household PV production: regional reference data (Baviera)
	Nº of bioenergy villages per MS	Nº of bioenergy villages per MS (studies on best practice for Austria, Croatia and Germany)
	% of consumers, which are member of energy cooperatives	Members of energy cooperatives: available from Cooperatives Europe and RES Coop: 1,250 cooperative enterprises, 300,000 members
Consumer behaviour / preferences - smart appliances-	Nº of smart meters with feedback function for customer per MS	Smart meters: ACER / JRC – feedback function needs greater observation
	Nº energy savings apps per capita and MS	Energy saving apps: inventory of THE4BEES project – 69 apps nº of downloads – industry data required
	Customer satisfaction with smart thermostats	Customer satisfaction smart thermostats – market reports available, industry data preferable
Participation in demand response	Degree of market opening to demand response	Market opening: observed by SEDC and JRC
	Nº of households and SMEs participating in DR	Households and SMEs: reference data in leading demand response markets?
	Nº of V2G (vehicle to grid) participating in DR	V2G – could eventually be delivered by EAFO (European Alternative Fuels Observatory)
Market participation	% of customers switching suppliers to 100% RES?	Switching rates: available from ACER (electricity and gas)
	Nº of aggregators operating in each MS	Aggregators: not yet available, only the numbers of retailers active in each country (ACER)
Impact on household energy bills	Development of final household energy demand	Household energy demand: EUROSTAT
	Development of final household electricity demand	Household electricity demand: EUROSTAT
	Development of energy poverty rates in MS	Energy poverty rates: Energy Poverty Observatory and BPIE
Societal Readiness Level	Increase in households' annual energy investment	Observatory of energy conservation and energy efficient behaviours, actions and impacts (to be created)
	Acceleration of energy conservation and efficiency actions and impacts	

TABLE 1. KPIs SUMMARY



Annex IV: Commitments of SET Plan countries for Action 6 and 7

The participation remains open for all countries who wish to commit.

Action 6

The parties commit on using and further develop KPIs measuring consumer benefits

Parties (SET Plan countries)
Finland
Sweden
Portugal
Germany*
Austria*

Action 7

The parties commit to using a joint framework for consumer engagement that will be developed by EERA e3s Joint Programme and KIC Innoenergy:

Parties(SET Plan countries)
Finland
Sweden
Portugal
Germany*
Austria*

*To be confirmed



Annex V: Ongoing R&I Activities (relevant to priority action 1, 5 and 7)*

As a pre-requisite, each SET Plan country is asked to fill the questionnaire in Annex I (Portugal, Germany and Austria's contribution are in preparation).

Table of Investment plans in projects that address:

- ✓ the creation of a reference architecture and standards (action1),
- ✓ the development of energy services via apps and better forecasting (action 5)
- ✓ consumer benefits and engagement (action 7 - *EERA can assume the commitment to push this action in the dialogue with the Member States, but has no financing available for data collection. E3s can contribute information from an EU-wide survey that is being carried out in the context of the ECHOES project, but this survey only addresses some of the proposed KPIs*)

Until now, the estimated budget in public R&I funding for the period 2018-2020 for Germany, Finland and Italy is 78 M € and the participation remains open for all countries who wish to join at later stage.

Under the Horizon 2020 programme, DG ENER in cooperation with DG CNECT allocate to new projects a total of 18 M € for projects focused on consumer engagement and 90 M € for projects intending to develop innovative services for consumers, based on innovation in grid management, IoT and big data.

Concerning ongoing projects financed by the Horizon 2020 programme, EERA e3s Joint programme is managing projects for a total of 4 M € , ECSEL JU is managing a total of 455 M € and INEA participates with 218 M €.

*(Bottom-up indication - double counting can not be excluded)



1. Finland (ongoing funding activities)

Finland - creation of a reference architecture and standards (action 1)	Timeline	Budget
Finland (VTT, coordinator) - German collaboration in DECENT (Cross-commodity Energy Management) project. No real investments but contribution to artificial intelligence and IoT-based technologies for bottom-up cross-commodity flexibility management.	2018-2020	3 M €
National project with VTT (coord.) and Finnish companies in EDES (Energy Data Ecosystem). The EDES project will define, design and demonstrate a new digital infrastructure and related reference architecture for real-time energy data management amongst companies and Finnish citizens. Example of the use cases: Cloud based Virtual Power Plant (VPP) based on e.g. big number of buildings (smart control of building automation connected building technical systems, batteries, local energy production, etc.) or big number of cloud connector heat pumps. Focus also on AI/Machine learning based forecasting of consumption and demand response potential.	2017-2019	1,1 M €
<p>National HEILA project (Integrated business platform of distributed energy resources) aims to create a business platform for the development, testing, piloting and finally also commercialization of new smart energy system functionalities. The objective is to link diverse industrial and academic pilots into a united energy system by means of an ICT infrastructure to host a wide range of possible smart grid applications that are intended to integrate DERs into novel business models of energy systems. This goal will be accomplished in the following steps:</p> <ul style="list-style-type: none"> • Definition of innovative use cases (UCs) promoting integration of DERs into active grid management and flexibility markets • Implementation of the required functionality for the corresponding use cases • Design and deployment of an information exchange architecture for the platform that would enable visibility and controllability of DERs among simulated business actors • Demonstration of innovative smart grid solutions in the platform environment <p>The HEILA information exchange architecture is decentralized and has been developed based on use case methodology and Smart Grid Architecture Model (SGAM) framework. At the first stage, the information exchange interfaces have been implemented at laboratories of research partners in the project (VTT Technical Research Centre of Finland, Tampere University of Technology and Lappeenranta University of Technology) and also real-life pilot sites will be included as a part of the platform in further work. Demonstrations associated with the flexibility management of geographically distributed microgrids are being implemented.</p>	2017-2019	1,0 M €



Finland - development of energy services via apps and better forecasting (action 5)	Timeline	Budget
<p>mySMARTLife is a project funded under the European Union's Horizon 2020 research and innovation programme. 28 partners from 7 countries (incl. Germany) are collaborating to make sustainable cities with smart people and a smart economy a reality. The mySMARTLife project aims at making the three lighthouse cities of Nantes, Hamburg and Helsinki more environmentally friendly by reducing the CO2 emissions of cities and increasing the use of renewable energy sources. One small part of the project is piloting smart heat demand response in Viikki Ympäristötalo utilizing Helen's district heating based demand respond info, Fourdeg's smart thermostats and VTT's individual demand based thermal control boosted by end user smart phone based feedback of experienced thermal comfort. Also predictive and adaptive control algorithms and monitoring of performance will be studied.</p>	2016-2021	
<p>Smart Otaniemi Pilot initiative is to plan and implement a new type of smart energy piloting area and ecosystem in Otaniemi, Espoo in Finland. Smart Otaniemi aims to be a living lab with real customers involved. Focus will be especially on utilizing all types of data (energy, weather, traffic etc.) for new applications and services and on making Otaniemi more real-time monitorable and controllable area. The pilot platform serves both experimental research activities as well as close-to-market proofing of concepts and products.</p>	start 06/2018	6,6 M€



2. Italy (ongoing funding activities)

Italy - Investment plans in projects that address action 1, 5, 7 - NATIONAL RESEARCH PROGRAMME -	Timeline 2016-2018	Budget € 7.8 million
ICT architecture, tools, KPI and dashboard for the management of Smart Districts - Specifications and guidelines; implementation and testing of the Smart District prototype		
Smart systems and services integration/interoperability for buildings - Development of aggregated services for district consumers concerning optimized management for homes, buildings and building complexes ; definition and implementation and testing of an assisted living system for Smart Home; development of a prototype management of a smart mini-district		
ICT architecture, tools and KPI for the security of critical district infrastructures - Definition and implementation of a Decision Support System (DSS), based on a Territorial Data Infrastructure (SDI), specifically designed as a platform for the security of critical infrastructures (electrical network, ICT network, transports, water networks, etc.) of the district; development of a demonstrator based on multi-helical drone technology, aimed at energy monitoring of energy-consuming buildings and the environment		
Smart Community District co-governance - Definition of an innovative model for district economy based on a circular economy; Smart Community development infrastructure within the district; sustainable urban management system based on a smart model for waste and water management		
<p>Integrated and interoperable model for a smart urban smart district:</p> <ul style="list-style-type: none"> • Specifications, architectures, tools and KPI for smart platform(dashboard of the district • Development of methodologies and preliminary implementation of a Smart Homes Network • Critical infrastructure security dashboard • Methodology for the smart community and district co-governance - ENEA • Definition, at the macro level, of the reference semantic model for the ICT Platform • Development of a residential building network simulator and preliminary implementation of a smart district model • Development of aggregation and benchmarking methodologies for building energy data and feedback models for the involvement of residential users • Analysis of risk forecast / assessment through meteorological and hydrological modeling: definition of hydrological alarm indices • Methodological protocol for the construction of urban collaborative neighborhoods and communities (the co-city protocol) • Study of a model of aggregator of a smart district - CITERA (Center of Interdepartmental Research Territory Building Restoration Environment) Sapienza University of Rome 		



3. Germany (ongoing funding activities)

Germany – national investment plans in projects that address action 1, 5, 7	Timeline	Budget
<p>Program "energyoptimized building and communities" (renamed in "Energiewendebauen" in 2017) - as part of national Energy Research Program of federal ministry of economic affairs and energy</p> <p>Buildings and districts have a key function in the transformation of our energy system. One focus of the program among others is the digitalisation of the energy system and integrated concepts for smart buildings, smart districts and smart city considering the coupling of the sectors of electricity, heat and electromobility. Furthermore is underlined to consider consumers need and engagement within energy management research.</p> <p>Comprehensive projects within the initiative "Solar building/energy Efficient City" make it possible to address the various energy-related aspects in the neighborhood from a systemic point of view, from basic research through technology development to demonstration involving socio-ecological aspects.</p> <p>Ongoing projects consider aspects of interoperability and standards, digital service plattformen, tools for energy services and efficient energy management and KPIs to evaluate energy consumption.</p>	2017-2022	20 M €
<p>SINTEG program - Showcasing smart energy systems</p> <p>The activities in the showcases involve more than 200 companies, universities, research centres and other stakeholder. The total funding budget is € 200 million, whereby the participating companies provide more than € 300 million own funds which amounts to an overall SINTEG budget of more than € 500 million in total. The part of the budget referring to the SET Plan 3.1 aspects of the actions is 20 M €.</p> <p>The SINTEG programme and its objectives which can be summarised as follows:</p> <ul style="list-style-type: none"> • Transformation to smart networks for connecting generation, demand, storage and grid • Developing scalable solutions as blueprints for a future smart integrated energy system and for mass markets • Implementing solutions in large pilot (showcases) • Gathering information on necessary adjustments to the regulatory framework by creating "regulatory sandboxes" 	2016-2020	20 M €
<p>The Copernicus project ENavi by the ministry of education and research is creating a navigation model to simulate and assess the effects of political decisions. ENavi creates a grid of criteria that can be used to evaluate energy transition technologies. One of ENavi's objectives is to assess household and business investment decisions in building renovation, energy efficient renewable energy technologies and e-mobility, taking into account incentives and social impacts.</p> <p>Part of the project ENSURE is a comprehensive analysis of the socio-economic influences that all stakeholders, including prosumer,</p>	2016-2019	4 M €



integrate. Socially acceptable scenarios are elaborated, on the basis of which scientific and technical innovations for the future energy system are to be developed and demonstrated. Demand side management is a research topic, demands on ICT another, as well the creation of IT tools and the assessment of success.		
Within the research initiative “Smart Electricity Grids” topics of network planning and network expansion, decentralised network, information and communication technology and system services are the main focus with the goal to connect producers, consumers, storage facilities and network structures. Ongoing projects consider investigations on prosumer cooperation on grid stability and consumer behaviour, as well as deploying an app for prosumer to control and manage energy available in the grid.	2014-2018	4 M €
Germany - international R&I activities		
Second Finnish German joint call Finland and Germany collaborate in a project called DECENT in the field of cross-commodity Energy Management with contribution to artificial intelligence and IoT-based technologies for bottom-up cross-commodity flexibility management.	2017-2021	3 M € for projects about grid integration
SIT4Energy (german-greece Cooperation): Demonstration of how integrated energy management for prosumer scenarios can be realized through a smart IT solution that considers both efficiency potentials in the local energy production and consumption.	2018-2021	0.5 M € for Germany
ERA-Net Smart Grids plus It supports the coordination of funding partners, enabling joint funding of research projects. Beyond that ERA-Net SG+ builds up a knowledge community, involving key demo projects and experts from all over Europe, to organise the learning between projects and programs from the local level up to the European level. Ongoing projects consider aspects of action 4 and 5.	2015-2020	7 M € for Germany
mySMARTLife is a project funded under the EU’s Horizon 2020 research and innovation programme. 28 partners from 7 countries (incl. Finland) are collaborating to make sustainable cities with smart people and a smart economy a reality. The mySMARTLife project aims at making the three lighthouse cities of Hamburg, Nantes and Helsinki more environmentally friendly by reducing the CO2 emissions of cities and increasing the use of renewable energy sources. For the German part, 12 partners with different focus develop joint solutions for a digital city Hamburg taking into account the active participation of citizens and involved actors.	2016-2021	



3. EERA e3s Joint Programme

EERA e3s Joint Programme - Investment plans in projects that address consumer benefits and engagement (action 7)	Timeline	Budget €
EERA e3s Joint Programme: VTT has been a sub-programme leader and member of the management board since the beginning of the JP and thus supported the formulation of the KPIs that has been proposed for the TWG members of this Action.3.1	ongoing	-
ECHOES (Energy CHOICES supporting the Energy union and the Set-plan) aims to unlock the policy potential of an integrated social science perspective bounded by central socio-cultural, socio-economic, socio-political, and gender issues that influence individual and collective energy choices and social acceptance of the energy transition in Europe. ECHOES will therefore foster the implementation of the European Strategic Energy Technology Plan (SET-Plan) and advance the Energy Transition, in addition to the decarbonization of the EU's future energy system.	2016-2019	4 M €

4. INEA – Innovation and Network Executive Agency

INEA - Innovation and Networks Executive Agency - Projects in activities related to SET Plan 3.1 Smart solutions for energy consumers	Timeline	Budget €
The aim is to facilitate consumers' participation in a new, interactive energy system. The focus is on developing easy-to-install, easy-to-use and easy-to-maintain energy management and demand-response tools that create the conditions for a more comfortable and convenient living environment. In order to accelerate the development and rollout of novel energy services and business models, interoperability along the whole value chain should be ensured.	ongoing	218 M €



Annex VI: Composition of Temporary Working Group (TWG) on smart solutions for energy consumers

National Representatives (Countries)

Country	Representative
AT	Michael Huebner
CY	Efthymiou Venizelos
DE	Doris Klostermann
FI	Koljonen Tiina
IT	Paola Clerici Maestosi
TR	Cagri Yildirim İlknur Yilmaz,
NO	Eline SKARD Astrid STAVSENG
SE	Mimmi Magnusson Emina Pasic Kasja Stina Benulic
NL	Otto Bernsen
PT	Rui Frazao

Composition of Stakeholders:

BEUC – The European Consumers Organisation	
CEDEC - European Federation of Local Energy Companies	Gert Deblock
Smart Innovation Norway AS	Dieter Hirdes
CECED – The European Committee of Domestic Equipment Manufacturers	Candice Richaud
EHI - European Heating Industry association	Geert DE COCK
Energy Cities – The European Association of local authorities in energy transition	Frederic Boyer
EHPA - European Heat Pump Association	Thomas Nowak Maja Denoyette
EPEE – European Partnership for Energy and Environment	
EERA e3s Joint programme on economical, environmental and social impacts	Daniela Velte
European Innovation Partnership on Smart Cities and Communities	Maria Sangiuliano
European Technology Platform Smart Grids – WG Demand and Metering	Maher Chebbo
ANEC - European consumer voice in standardization	
EUA-EPUE – European University Association, European Platform of Universities engaged in Energy Research	Llennart Stoy
SEDC - Smart Energy Demand Coalition	Frauke Thies



ESMIG – European association of Smart Energy Solutions providers	Willem Strabbing
EU-BAC – European association for Building Automation and Controls	Simone. Alessandri
Eurovent association - European Committee of Air Handling and Refrigeration Equipment manufacturers	Felix Vaneyken
Knx Association / CEN CENELEC	Joost Demarest
KIC Innoenergy	Celine Jullien
DANFOSS	Claus Thybo
BOSCH	Michael Arndt
PHILIPS	Kay Rauwerdink
ORGALIME	Sigrid Linher
SCHNEIDER	Juergen Kuhnert
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.	
RTE (TSO)	Jean-Philippe Bonnet
SHELL	Marc Decorte
ENTSOE	Laurent Schmitt
ENEDIS (DSO)	Remy Garaude-Verdier
ETIP SNET (EUROGAS)	Tim Cayford
CEDEC (European Federation of Local Energy Companies)	Ludovica Sara Fondi
BAUM (Energy management services)	Alexander von Jagwitz
FIWARE Foundation	Ulrich Ahle
E.ON Energy Research Center	amonti@eonerc.rwth-aachen.de