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Assessment Summary of Ongoing European Projects and Community Activities (Issue 2)

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Abstract:

This deliverable summarizes the FINSENY dissemination activities of the last six months and provides an update of the smart energy landscape as it relates to FINSENY. The smart grid projects database FINSENY created has been updated and is further evaluated. Projects particularly relevant to FINSENY are summarized in this report, putting specific emphasis on what has been or will be re-used in the FINSENY project and which projects can be used for dissemination purposes.

Keyword list:

Dissemination, Smart Energy landscape, related research projects, Smart Grid, Microgrid, Distribution Network, Smart Building, Electric Mobility, Electronic Market Place.

Executive Summary

This “Assessment Summary of Ongoing European Projects and Community Activities (Issue 2)” shows that the smart grid – as a technology, an industry and a concept – has become increasingly important throughout the world. FINSENY consortium members have not only established strong connections with important European and worldwide activities, such as standardisation and R&D programs, but also have a fairly strong influence in shaping them.

In the past six months, FINSENY consortium members have become increasingly active in disseminating and networking in different fora. As first project results are shaping up now, there are plans to further increase the dissemination and cooperation activities.

The FINSENY smart grid project database has been continued to be built and cleaned up. It contains hundreds of smart grid projects, mostly in Europe. In this report, about 40 of them are described in more detail, as their results have influenced the technical work packages (WP2 – WP6) and continue to do so. Due to the large number of overlapping sources that went into the database, some more clean-up needs to be done before the database can be published. In addition, as the project progresses, still more input of consortium members is expected. The database is currently being used internally by consortium members for quick look-ups, particularly as the selection of testing facilities is one of the major tasks now.

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Introduction

WP1 is the work package within FINSENY that links the project with the external world in the following manner by:

- ensuring coherence with other research efforts in Europe;
- maintaining a close relationship with a group of external experts and stakeholders that will provide very valuable feedback to the efforts and findings being done within FINSENY during the course of the project;
- putting in place watch activities and participation to the relevant standardisation fora;
- analysing the regulation policies and preparing a set of recommendations to boost the market of smart energy in Europe;
- assuring credible exploitation plans and strategic plans of the FINSENY consortium;
- centralising the security technological framework assessment, recommendations and approaches for all scenarios in the project.

The objective of this deliverable D1.3 (within task 1.1) is to update and extend the overview of the activities of FINSENY in terms of dissemination and collaboration with other European projects and activities presented in D1.2 already. In particular, this deliverable shows, how these projects and activities have influenced the work in FINSENY and might continue to do so, and gives an assessment of the energy landscape with a main focus on ICT related issues. This general assessment, focusing on the last 6 months, is summarised in chapter 1.

There are a great number of activities and projects throughout Europe and worldwide dealing with information and communication technology (ICT) in energy networks. Even in the last six months, several new initiatives were started, with some of which FINSENY consortium members have established strong connections and continue to participate and influence (chapter 2).

One of the FINSENY project goals is to re-use as much existing work as possible, build on it and go beyond the existing results. Many projects listed in chapter 4 have influenced our work in FINSENY, for example by helping to define our use cases. Some of these projects are even candidates for our upcoming testing activities, or might be expandable for FI PPP phase 2 pilot projects.

Our project database (described in chapter 3) has collected such project information for FINSENY partners to draw from in further project activities. In the last six months, the database has been continued to be cleaned up and has been expanded as well. This database will contain several hundred distinct smart grid projects and will be more detailed than most other databases we know about. Due to its sheer size, it needs to be continued to be maintained throughout the project and possibly beyond it.

1. Smart Grid Energy Landscape

1.1 General Development

The smart grid – as a technology, an industry and as a concept – has become increasingly important throughout the world. A recently published OECD report talks about the opportunities and policy implications of ICT applications for the smart grid [1]. It looks way beyond the smart meter at new entrants and new business models and sees ICT and the Internet as a key enabler for green growth.

Companies, associations and other institutions from both the ICT and the energy industry have been setting up practices or departments around the smart grid, and continue to do so. Research advisory services have started to offer dedicated services in the smart grid arena and even executive search firms explicitly handle this area now. In addition, conferences on the smart grid topic and related areas (incl. smart metering and electric vehicles) have become uncountable. Also, IEEE, one of the most respected

technology organisations in the world (and actually having the largest membership in EMEA) has dedicated its 50th Anniversary event on March 31st in Berlin [2] to smart grid.

Surveys show that the smart grid is on the rise and enters mainstream. A recent German survey [3], for example, says that smart grid is for the first time one of the ten most important ICT trends. 24 percent of the companies surveyed think that smart grid is one of the most important technologies this year. Other topics rated high in this survey are cloud computing, security, standardisation and big data – topics that are relevant for the smart grid in general and FINSENY in particular. Coming from the other end, a worldwide utility industry survey [4] found that the number of utilities companies that have implemented smart-grid technology, increased by 25 percent over last year. The survey also shows that 28 percent of companies surveyed are in the planning phase, but 24 percent still have not started adopting any smart-grid technology. However, 63 percent of participants expect their budgets for these technologies to increase over the next two or three years.

Efforts around standardisation of smart grid technology are increasing throughout the world. The U.S. Commerce Department's National Institute of Standards and Technology (NIST) and the European Union's Smart Grid Coordination Group (SG-CG) have announced a collaboration agreement on September 13, 2012 [5]. They have agreed on a number of common positions and areas of collaboration to ensure a consistent set of standards. In Europe the standardisation process is driven under the mandate M/490, where FINSENY actually is the biggest contributor to the use case work of the Smart Grid Coordination Group (SG-CG, see chapter 2.1.3).

1.2 European Developments

In the recently published EU Energy Roadmap 2050 [6], it is re-iterated, that the distribution grid needs to become smarter to deal with the distributed and intermittent energy sources that we need to achieve the necessary decarbonisation. On the other hand, research from McKinsey & Company [7] states that existing technologies already have the potential, if deployed to the fullest, to reduce energy consumption in European households significantly. The path to a smart energy system has clearly begun in Europe. A selection of relevant, specific developments is described in the following.

1.2.1 EEGI

Supported by the Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT) and in the framework of the ERA NET Smart Grid, a member state initiative of 22 states developed a study "Mapping & Gap Analysis - Report by the EEGI Member States Initiative: A pathway towards functional projects for distribution grids". For more detail see chapter 2.1.5.

This effort will take the so called functional projects as defined in the EEGI Smart Grid roadmap (http://www.smartgrids.eu/documents/EEGI/EEGI_Implementation_plan_May%202010.pdf) one step further. The results will flow into the GRID+ project (which has been started at the beginning of 2012, see chap. 2.1.6) and help to improve the JRC data base on smart grid activities in Europe.

The initiators and active partners of the member state initiative are now investigating means to continue their cooperation to the benefit of the EEGI and to secure national interests. Resources and member state commitment need to be discussed.

1.2.2 FP 7

Under the framework programme a number of smart-energy-related calls for proposals have been published on 20 July 2011, that are in the process of being written or being decided on at the moment:

- FP7-ENERGY-2012-1: a general call focusing on research with a long-term horizon
- FP7-ENERGY-2012-2: a general call focusing on research with a short-term horizon and on demonstration
- FP7-ENERGY-SMARTCITIES-2012: a call in the framework of the SET-Plan Smart Cities and Communities Initiative

- FP7-2012-NMP-ENV-ENERGY-ICT-EeB: a cross-thematic call on Energy-efficient Buildings in the context of the EU Recovery Plan
- FP7-KBBE-2012-6: a call including a joint topic with the energy theme
- FP7-ERANET-2012-RTD: a joint call on ERA-NETs

1.3 USA

The National Institute of Standards and Technology in March 2012 published the "NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0" (NIST Special Publication 1108R2). It is publicly available from www.nist.gov/smartgrid/upload/NIST_Framework_Release_2-0_corr.pdf.

The 2.0 Framework lays out a plan for transforming the nation's aging electric power system into an interoperable Smart Grid – a network that will integrate information and communication technologies with the power-delivery infrastructure, enabling two-way flows of energy and communications.

The document reflects the consensus-based process of Smart Grid Interoperability Panel (SGIP) and other groups. The SGIP was created by NIST in November 2009 to provide an open forum for members to collaborate on standards development. Through the SGIP, NIST collaborates with the private sector in coordinating Smart Grid standards. More than 1,900 volunteer members from 740 organisations serve as technical experts, who work together to create usable standards for the Smart Grid. Hundreds of such standards – covering matters ranging from wireless communication to home energy meters to electric cars – are needed to ensure the many elements of the Smart Grid will work together seamlessly.

While NIST and SGIP work on the definition and standardisation of the future grid in USA, large companies such as Cisco, Intel and IBM show big efforts and progress to provide IT solutions for the management of smart grids and smart facilities, including smart homes.

1.4 Japan

After the Fukushima catastrophe tremendous effort has started in Japan to implement a new safe and cost effective energy provision system. At the recent E-Energy congress (see chap. 2.3.9) Mr. Hiroshi Watanabe, Director of the New Energy and Industrial Technology Development Organization (NEDO), outlined the Japanese position:

- „The key solution … is smart grid technology. It can efficiently control the flow of energy and enable various new services by means of IT, including to power suppliers as well as demand side users.
- To use energy efficiently, it is important to establish a new type of social system, a smart community, which facilitates the effective use of electricity and heat energy.
- It is also necessary to establish smart community models suitable for regional needs through joint discussions with other countries."

Japanese responsible people see a clear need to develop smart communities and to underlay technology with a change in society. In terms of technology, Japanese companies are quickly developing means to operate smart homes including local storages and electric cars and to intelligently hook these to the smart grid.

At the occasion of the German Japanese Environmental Summit, various Japanese partners approached Ludwig Karg (BAUM), who represented E-Energy and FINSENY, with their ambitions to establish European-Japanese joint projects.

2. FINSENY Dissemination Actions and Relationships with other (European) Projects and Fora

2.1 Relationships with European Projects and Initiatives

FINSENY consortium members are very well connected within European projects and initiatives that are relevant to ICT of smart grids. It is very important to liaise with other European activities to ensure that ICT developments agree on important standards rather sooner than later and go forward in a similar direction.

The following chapters detail some of the important relationships, and highlight co-operations or agreements that have been attained since the last deliverable (D1.2).

2.1.1 FI PPP

2.1.1.1 CONCORD

CONCORD is the Facilitation and Support action for the EU-funded Future Internet Public-Private Partnerships (FI PPP) programme. It has formed several working groups to achieve its goals. For each group, a representative from FINSENY has been determined to contribute.

- **Dissemination working group (DWG)**
  This group has been set-up to align the dissemination strategies and activities of all FI PPP projects to achieve a broad diffusion of information and uptake of platforms and tools. Ludwig Karg (BAUM) has been asked to represent FINSENY in this group. The DWG has been in place almost since the beginnings of the FI PPP and communication channels have been established. FINSENY has contributed to the monthly newsletter and the FI PPP website, as well as to DWG deliverables and will continue to do so.

- **Exploitation and Business Modelling Working group (EBM WG)**
  The CONCORD project has started the FI PPP Exploitation and Business Modelling Working Group in order to work on a common view in a FI PPP business modelling and exploitation plan. The EBM WG has been approved at the FI PPP Steering Board (SB) of the 22nd of February, 2012. The main objective of the group is to maximise the impact and exploitation potential of the FI PPP Programme and the individual FI PPP projects. The specific goals of the WG are to:

    - provide internal and external insights into Future Internet exploitation plans and business models; and,
    - support the FI PPP projects' individual exploitation and business modelling efforts.

  This requires the participation and contribution of the individual FI PPP projects, especially of FI-WARE, to these programme-level efforts conducted within the WG, in addition to their own project-specific exploitation and business modelling efforts.

- **Standardisation group**
  Andreas Harner (VDE) has been asked to represent FINSENY in this group. The group has just recently been formed. So far the standardisation group has the following main objectives: Facilitate the projects in the identification of existing and potentially applicable standards and in the process of standards definition from pre-standardisation to compliance testing and marketing. Further they want to help maximise the outcome of the Future Internet PPP and enhance the possibilities of the FIWARE platform becoming the de facto standard in its field in Europe. A fundamental guiding principle in the work of the Standardisation WG is first and foremost to find an existing standard that can (either as-is, or with minor modifications or extensions) be used for the purposes of the FI PPP project at hand. Only secondarily should we aim at setting new standards of our own, knowing that there is usually more work involved than first meets the eye.

2.1.1.2 Infinity

For the finishing Period INFINITY was focused on developing a data base of available infrastructures in Europe for testing and experimentation and INFINITY continued participating in related events in Europe.

Therefore, the INFINITY project organized a workshop in FIA Poznan to ask the Use case Project of FI PPP regarding the scope and objectives to take into account by performing the INFINITY activities and in November 2011 they submitted a proposal for a working session in FIA Aalborg in the form of the following question: "ICT infrastructures are central to the "smartness" of cities. How can such infrastructures help foster more sustainable and modern cities, and help develop sectors such as e-government, e-health, intelligent transportation systems, and smart grids?"

1. At the same time INFINITY prepared and distributed to all FI PPP projects a questionnaire focused on detailed terms for describing infrastructures. Once finished the first draft of the Pilot Survey, INFINITY asked for contributions comments and additional information that allows them update the questionnaire. In general, the conclusions for the review phase were: The questionnaire is extremely long and requests serious amount of work to be filled. Therefore and taking into account that the answers will be provided by the infrastructure owners, not necessary related to a FI PPP project, additional confirmation of interest and willingness to actively contribute to this survey is a must.

2. The questionnaire is quite detailed in terms of describing the infrastructure consequently the owners should be asked at last about the following points:
    a. Are they interested on provide the infrastructures (give access) to externals for making experimentations and under which conditions access would be granted.
    b. Costs related to the use of installations.
    c. Confidentiality and/or privacy aspects
    d. Legislative requirements to be met by users

Starting February 2012 INFINITY completed its pilot survey and was ready for the 1st official survey with the intention to approach a large selection of infrastructure owners, using the questionnaire to gather information on their infrastructures.

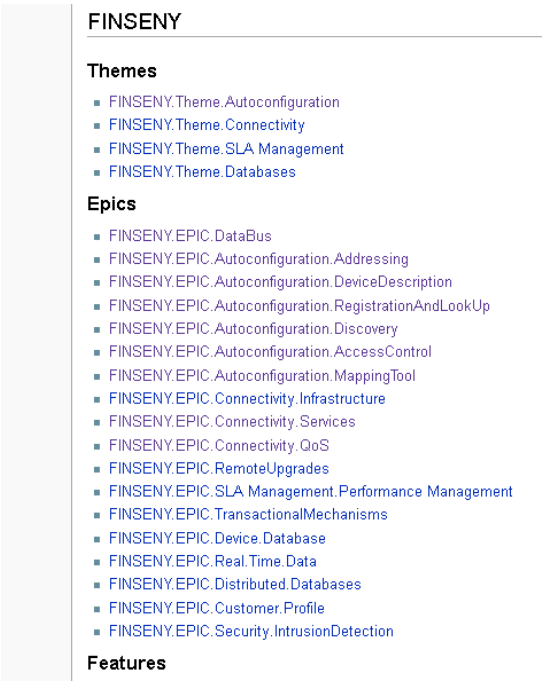
During the Use Case meeting performed on January 25 in Brussels, the Infinity project made a presentation related to: Infinity Web Repository goes online: finalisation of the questionnaire. This presentation explained the current status of the web repository, a road-map to fulfil objectives including the steps to execute to finish the related activities.

A summary of the interaction between FINSENY and INFINITY Project is the following:

- April 2011: Agreement for a communication link to facilitate information exchange.
- June 2011: Consultation Board in Brussels to clearly define the interface between the FI PPP projects and INFINITY. Therefore, the main role of INFINITY (CSA on Capacity Building) is to find and catalogue facilities that can be useful for the purpose of validation of Future Internet technologies.
- June 2011: FINSENY registered the first version of identified facilities with the INFINITY project. An INFINITY database link in the project repository was deployed to populate with contact information and information about test bed facilities.
- July 2011: FINSENY deployed a communication path with 4 partners to ensure follow-up and exchange of information with INFINITY based on more than 1 communication link.
- October 2011: first Concertation Board Workshop in Poznan, during the event FINSENY delivered to INFINITY the first version of the Consolidated ICT Requirements and the identified facilities to ensure INFINITY can produce a repository containing test infrastructures.
- November 2011: First collection of potential trial sites in FINSENY was send to INFINITY.
- November 2011: INFINITY sent the "Report from the initial survey". It contains information on how the initial survey of a dozen infrastructures was performed, as well as some preliminary conclusions.
- January 2012: INFINITY sent to FI PPP projects the questionnaire they will use for the pilot survey of test infrastructures. FINSENY review and contribute with additional suggestions.
- January 2012: INFINITY meets in Brussels and delivers the online repository for infrastructures.

2.1.1.3 FI PPP Architecture Board

The FI PPP Architecture Board consists of the technical managers from all FI PPP projects. The responsibilities of the board include the technical and architectural discussions in the FI PPP which affect more than one FI PPP project. It should facilitate the cooperation between the FI PPP projects on technical matters. The FI PPP Architecture Board meets monthly, alternating between face-to-face and virtual meetings.



The most prominent task is to collect ICT requirements from the use case projects and identify generic and domain-specific enablers. The generic enablers will be provided by the FI-WARE project whereas a domain-specific enabler has to be realized in the use case project. The Architecture Board defined the tools and the process how to submit and handle the requests for unclassified enablers. It was decided that FusionForge and a Wiki, which are also used in the FI-WARE project, are the most suitable tools. Use case projects can submit their enablers by creating a Wiki page per enabler and issuing a ticket in FusionForge. To illustrate this process, we provide figures showing a list of the submitted enablers by FINSENY (Figure 1), the description of one enabler (Figure 2) and a screenshot of the ticketing system (Figure 3).

Figure 1: Overview of FINSENY's requested enablers (in Nov. 2011)

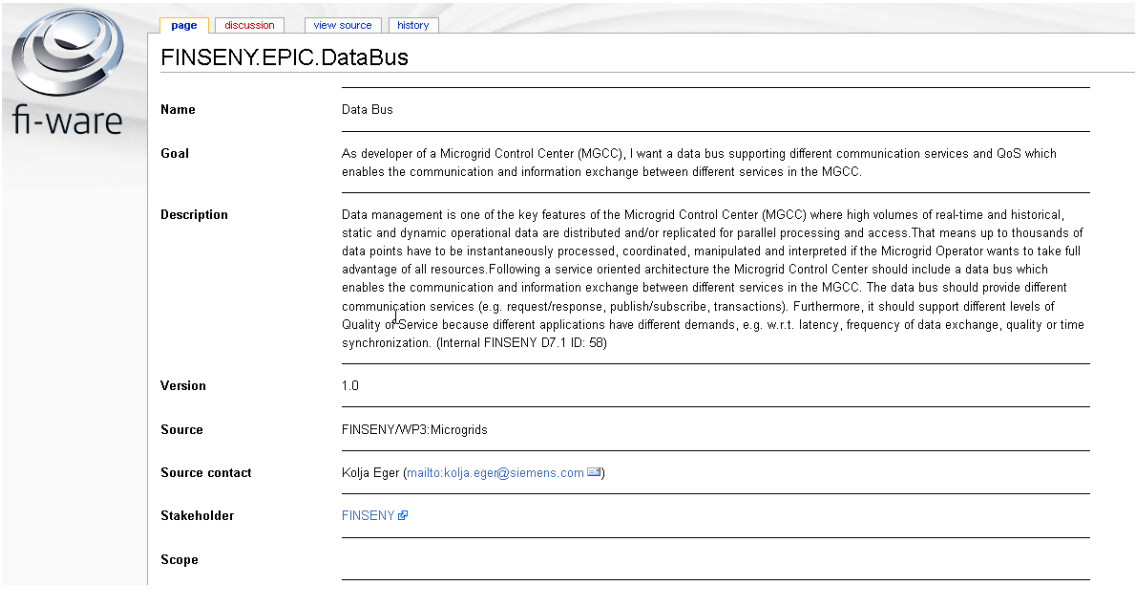


Figure 2: Description for an unclassified enabler submitted by FINSENY

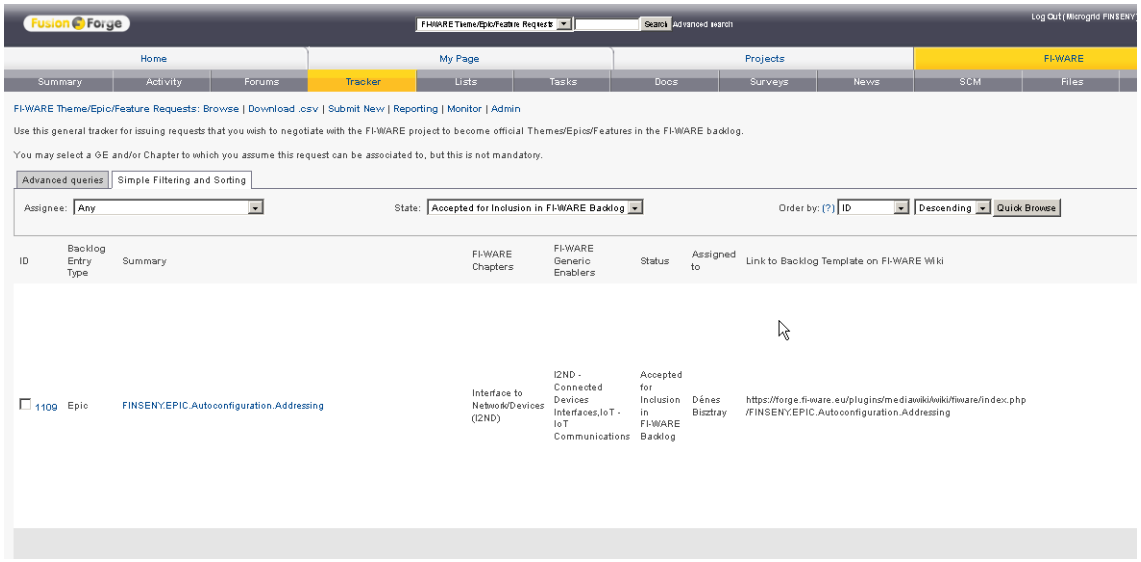


Figure 3: Screenshot of FusionForge ticketing system

To see the current list of submitted enablers we refer to the Wiki page which is publicly available (https://forge.fi-ware.eu/plugins/mediawiki/wiki/fiware/index.php/Unclassified_Enablers).

In the FI-WARE project, which implements the core platform in the FI PPP, the budget is reserved to fund specific generic enablers which are currently not realized in the project. The Architecture Board discussed several topics that were proposed by the different use case projects and decided to address the topics

- Middleware for efficient and QoS/Security-aware invocation of services and exchange of messages,
- Business Models and Business Elements (BM & BE) Definition and Simulation

in the first open call. Further topics are under discussion for the second open call. Further information about the FI-WARE Open Calls can be found on the FI-WARE webpage (http://www.fi-ware.eu/open-call/).

FINSENY has been collaborating with FI-WARE. They have been invited to attend some FINSENY meetings:

- 2nd Smart Grid Stakeholder Group (SGSG) meeting: on 1st February 2012 in Berlin. FI-WARE project presented their vision and approach to realize the Future Internet core platform.
- FINSENY general meeting: on 29th February 2012 in Madrid. Open discussion about a set of questions provided by FINSENY to FI-WARE in advance, and presentation on FI-WARE architecture deliverable.

Next collaboration will be the workshop between FINSENY and FI-WARE dealing with the practical use of generic enablers by developers. This workshop is planned for May 2012.

2.1.1.4 Discussions with FI PPP Use Case Projects

The FINSENY project has started discussions in the FI PPP for the preparation of a new set of proposals for Phase II with a focus on trial preparation for early trials. These discussions take into account the constraints from the FP7 Work Program 2011-2012, where five use case projects are foreseen. It has to be expected that in the open call with a due date in October 2012 in minimum one new use case proposal or constituency will be successful. Therefore, it is recommended to reorganize the most promising scenarios for Phase II trial preparation in order to prepare fewer proposals out of the ongoing use case projects in order to maintain as many scenarios as possible for future trials. These discussions are going beyond the established cooperation on FI PPP level in the Architecture and the Steering Board.

2.1.2 SGSG (Smart Grid Stakeholder Group)

Formed in June 2010, the Smart Grid Stakeholder Group (SGSG) is an open group of industrial players interested in the Smart Energy arena. The number of participating organisations has grown to over 60 organisations. Further developing the SGSG and organising the information exchange between the SGSG and R&D projects is a major activity in FINSENY. A close link with the SGSG has been established to foster the information exchange between the whole European Energy and ICT community. Once more this became obvious on the 6th SGSG meeting which was held on February, 1st in Berlin.

The workshop presented the current status of different Smart Grid activities in Europe including the CEN/CENELEC/ETSI Smart Grid Coordination Group, ISGAN, GRID+ and FINSENY. One focus of the workshop was to discuss in different break-out sessions challenging requirements on today's information and communication technologies from the Smart Grid perspective and how a Future Internet can solve these. Also the FI-WARE project presented their vision and approach to realize the Future Internet core platform.

A detailed report of the 6th SGSG meeting is given in the deliverable D1.4.

2.1.3 Smart Grid Coordination Group

SG-CG has been setup by CEN, CENEELC and ETSI in response to the EU Commission mandate M/490 and the recommendations of the CEN, CENELEC and ETSI joint working group on standards for the Smart Grid. The SG-CG will advise on European requirements relating to Smart Grid standardisation, and assess ways to address them. This group will not develop standards itself, but:

- Further develop the initial report on smart grid standardisation in Europe;
- Provide a suitable platform for discussion of smart grid standardisation-related issues with the European Standardisation Organisations (ESOs) and European Commission;
- Provide comments and recommendations to the ESO, related to smart grid standardisation;
- Provide the list of proposed European Standards and other consensus based deliverables to be developed by the ESOs for smart grid functionalities;
- Make proposals for the allocation of work on the proposed European Standards and other consensus based deliverables to be developed by the ESOs;
- Take into account other similar initiatives on national, regional and international level.

SG-CG consists of 4 working groups:

- **First set of standards (FSS)**
  The group is analyzing the current state and gaps in standardisation as well as the involved standardisation bodies.
- **Sustainable Processes (SP)**
  The groups focus is on collecting Smart Grid use cases including the definition of the processes for a sustainable use case management. From the large set of use cases that have been provided to the group a number of generic use cases has been extracted and will be further advanced.
- **Reference Architecture (RAWG)**
  The group is preparing a technical reference architecture, which will represent the functional information data flows between the main domains and integrate several systems and subsystems architectures
- **Smart Grid Information Security (SGIS)**
  The group will answer the technical and organisational needs for sustainable “state of the art” Smart Grid Information Security, Data protection and privacy, enabling the collection, utilisation, processing, storage, transmission and erasure of all information to be protected for all participating actors.

FINSENY has contributed its use cases to SP. Most of the FINSENY use cases are included in the generic use cases selected by this group and FINSENY participates in the ongoing review of these generic use cases. SP has completed their first interim report. For this report, a general use case collection was completed. The target was not to completely describe a smart grid, but to evaluate it in general. The group identified areas which were covered by the use cases and correlated them to the domains and zones of the architecture model (SGAM). The evaluation of the more than 450 use cases, of which around 100 were contributed by FINSENY, consisted not only in grouping and analysing them but also in summarising,

harmonising and compiling them into generic use cases. These generic use cases which integrate essential functions do improve not only the transparency, but are also a base for further development of use cases. So new use cases can use the generic use cases as a base or starting point, also enhancing the structure as a side effect. The WG SP also analyses management tools for use cases and has described a creation process for generic use cases. Also a software tool supporting a structured approach including an actors list etc. is being developed.

FINSENY did not only contribute more than 100 uses cases, but remains involved in further actions of this group. FINSENY will use the report and the generic use cases created by this group, and evaluate them for further project work.

In addition, several FINSENY partners participate in the Reference Architecture working group and the Smart Grid Architectural Model frame work developed by this group is also the base for the architecture development in FINSENY.

FINSENY already provided specific information to the current interim report and will contribute further to the SGIS work. This is possible, as within FINSENY, a threat and risk analysis for the 5 use cases has been performed and is available as internal report IR 1.4. The way to the final deliverable D1.6 targets the description of security architecture elements addressing specific needs identified in IR1.4. There will be an interim deliverable focussing on state of the art security means, while the final report targets the use case specific functional architecture(s).

The Smart Grid Coordination Group has completed the first milestone in its work to create a standardisation framework for a Smart Grid. In this milestone all Working Groups have completed their interim reports and have either completed or distributed them for comments: The Working Group First Set of Standards (WG FSS) has completed and submitted their report to the European Commission. The other working Groups have distributed their reports for commenting. The four Working Groups have a coordination Meeting planned for March 2012. One of the challenges aside from further developing reports is in fact the coordination of the Working Groups. For example, the integration of the use cases and security into the architectural map, as well as the integration of security into the use cases themselves needs to be further detailed.

The FINSENY deliverable D1.6 “Standardisation Strategy” will provide more background on the standardisation projects overall, which would go into too much detail in this report.

2.1.4 EC Smart Grid Task Force

The EC Smart Grid Task Force has been originally set up by the Commission in 2009 to support them in decision making on Smart Grid standards, regulation and security and privacy issues. One result of that work was Mandate M490 on Smart Grid standards. The task force has been re-launched early 2012 to further provide guidance on the implementation of Smart Grids in the European market.

The task force consists of 4 experts groups:

- EG1. Reference Group for Smart Grid Standards

  The objective of this group is to ensure timely adoption of the Smart Grid-related standardisation work under Mandate M/490 to European Standardisation Organisations, i.e. CEN, CENELEC and ETSO.

- EG2. Expert Group for Regulatory Recommendations for Data Privacy and Data Protection in the Smart Grid Environment

  The EG shall develop a proposal for Privacy and Data Protection Impact Assessment Framework for Smart Grids in order to guarantee privacy and protection of personal data for consumers throughout the EU and a cyber-security assessment framework, in order to guarantee the appropriate management of vulnerabilities and threats, based on the review of possible technical solutions and on the collection of best practices.

- EG3. Expert Group for Regulatory Recommendations for Smart Grids Deployment

  EG3 shall define a reference market model, options for viable business models and suitable instruments for accelerating the roll-out of Smart Meters and foster the deployment of Smart

Grids and to examine the potential implications for the regulatory frameworks to efficiently facilitate the roll-out.

- EG4. Expert Group for Smart Grid Infrastructure Deployment

  Define the process of identifying projects of common interest on an informal basis and identify a first preliminary list of projects during 2012. The output of this group also be used by the Commission to identify and implement projects of common interest under the regulations on guidelines for Trans-European Infrastructure (COM (2011)658 and 657).

FINSENY members have been invited to participate in several of these EGs.

2.1.5 EEGI

The European Electricity Grid Initiative (EEGI) was initiated by electricity transmission and distribution network operators to accelerate innovation and the development of the electricity networks of the future in Europe, the smart grid. According to EEGI the smart grid will be a user-centred, market-based, interactive, reliable, flexible, and sustainable electrical network system. EEGI proposes a 9-year European research, development and demonstration (RD&D) programme. In particular, the EEGI intends to be an enabler of all EC SET Plan low-carbon technology initiatives. EEGI's key publications are the Roadmap 2010 – 2018 and Detailed Implementation Plan 2010 – 2012.

Representing FINSENY partner BAUM has been involved in a pan European EEGI initiative driven by the Austrian Federal Ministry for Transport, Innovation and Technology and the Austrian Institute of Technology (AIT). This initiative did an EU wide survey to identify all smart grid relevant projects on an international and national base. Key projects found in that research have been entered in the FINSENY database and will be further assessed.

A report of the above mentioned activity ("Mapping & Gap Analysis- Report by the EEGI Member States Initiative: A pathway towards functional projects for distribution grids") will be available soon. As it will be available it can be obtained from the responsible authors of AIT (Austria) or from FINSENY partner BAUM. As a result of the assessment done in that project the following picture shows the identified research need for the functional projects defined by EEGI:

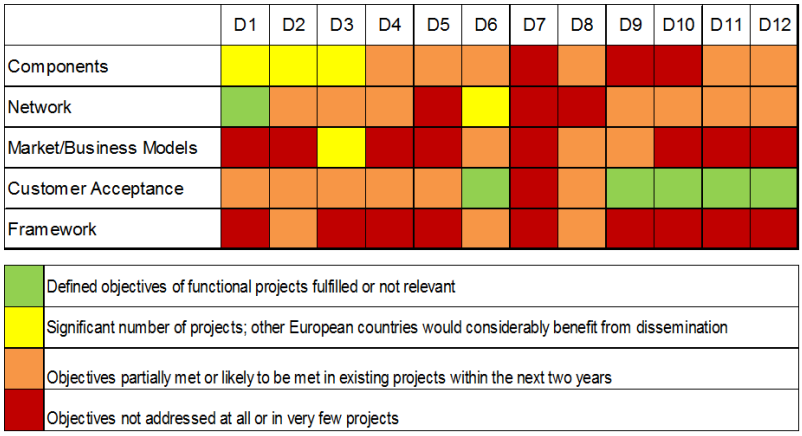


Figure 4: Research need for the functional projects defined by EEGI

The latest call of the 7th Framework Programme explicitly refers to the mentioned EEGI initiative when describing the scope of future research projects. Under this framework projects will be soon started to do research on customer involvement and DER integration.

2.1.6 GRID+

The GRID+ project has the aim to implement and support the networking process of the European Electricity Grids Initiative (EEGI) over the years 2012-2014, both within and beyond the European borders. Its scope includes not only international but also national initiatives and projects. As such

GRID+ will play an important role in networking national projects and initiatives. (For more information in the project see www.gridplus.eu).

FINSENY partner B.A.U.M. is about to receive a small contract from GRID+ to establish good communication channels between GRID+, FINSENY, E-Energy and other European initiatives. That is especially necessary to not loose contact between the IT driven smart grid initiatives (e.g. from DG INFSO) and the initiatives driven by the energy industry (e.g. EEGI and DG ENERGY).

GRID+ work is divided in multiple work packages:

- WP 1 will deliver, for each year of the duration of the project, an updated map of RD&D activities in Europe and abroad, mapping the data against the priorities and goals of the EEGI roadmap (i.e. the functional projects).

- WP 2 coordinates a process for exchange of information, in order to avoid duplication of work and point out gaps under EEGI projects, other related European initiatives, worldwide initiatives and other grid stakeholders. It also tries to establish bi-directional interactions between projects within EEGI and other initiatives.

- WP 3 develops a KPI and labelling system with the goal to provide a portfolio of possible schemes to define and finance EEGI activities. GRID+ deliverable D3.1is due end of March 2012 and will contain a proposal list of projects qualifying for the EEGI label to be developed under this WP.

  NB: FINSENY will carefully monitor this process to avoid double work and to create synergies between EEGI and FI PPP trials.

- WP 4 will fund means to determine the scalability and replicability of the smart grid projects of the EEGI.

- WP 5 will disseminate rules and tools assessed by GRID+ within the EEGI initiative and beyond it.

FINSENY WP 1 will maintain the link between GRID+ and FINSENY dissemination activities. As a first step Ludwig Karg (BAUM) presented GRID+ at the SGSG meeting in Berlin on February 1 to the FINSENY partners and stakeholders.

2.1.7 SEESGEN-ICT

SEESGEN-ICT was a Thematic Network project under the CIP-ICT PSP Programme of the European Commission and brought together 24 partners from 15 different EU Countries. SEESGEN-ICT developed awareness raising actions and provided scenarios and roadmaps for energy efficient distributed power generation grids, with the goal to facilitate the integration of distributed energy resources through identifying the best ICT-based solutions. The project has identified a set of recommendations on interoperability, intelligent embedded ICT components, EU large-scale demonstrators & test facilities and other areas, addressing the policy makers: the EU Commission, energy regulators and standardisation bodies. Some of the project work and its findings have influenced the work in FINSENY, in particular when defining the FINSENY use-case scenarios and ICT requirements, as VTT, INPG, ENEL and SAP have been partners in both SEESGEN and FINSENY.

2.1.8 Energy Hills: Intelligent Energy

Regular meetings of the Energy Hills network where continued within the working committee „Intelligent Energy“, headed by Prof. Monti (RWTH), such as working group meetings on the 29/09/2011 and the 07/02/2012. Participants were Peter Laing (FIR) and Jonas Fluhr (FIR). Energy Hills is one of the biggest energy clusters in Europe consisting of companies as well as research institutes. The aim of the working group “Intelligent Energy” is currently to identify possibilities to support producing small and medium sized enterprises on their way to reach a higher integration in the smart grid and therewith profit from a more sustainable production. For the sub-working group “smart objects in production”, a first step was taken by a small group by preparing the project “PoLar (Production facilities with intelligent load and

energy management)", funded by German Federal Ministry of Economics and Technology, starting presumably mid of 2012.

2.1.9 COST IC0806 (IntelliCIS)

COST IC0806 (IntelliCIS) is the COST Action on Intelligent Monitoring, Control and Security of Critical Infrastructure Systems, with COST being an intergovernmental framework for European Co-operation in the field of Scientific and Technical Research.

RWTH Aachen University is a partner organisation of IntelliCIS with Prof. Antonello Monti acting as Management Committee Member for Germany.

Prof. Monti (RWTH) participated to the last meeting in Milan, giving two presentations (also mentioning the FINSENY project). He is currently leading a working group that organizes a one-week training school to take place this spring on the topic of IntelliCIS including topics covered by FINSENY.

2.1.10 D-A-CH

Germany, Austria and Switzerland have decided to join forces in promoting research and development projects geared toward the creation of ICT-based energy systems of the future. This international co-operation focuses chiefly on the development and testing of strategies for introducing smart grids. For the German side, the Federal Ministry of Economics and Technology has taken on the lead responsibility for this tri-national co-operation effort. Its partners are the Federal Ministry for Transport, Innovation and Technology (BMVIT) in Austria and the Swiss Federal Office of Energy (BFE). A corresponding Memorandum of Understanding was officially signed at the annual e-energy conference on 26 November 2009.

Three task forces have been established in order to ensure quick and practical progress toward the common goals of the three partners. These task forces pool the findings and innovations from each country and exchange them with their counterparts in the other two countries. In addition to jointly investigating standardisation needs and IT security issues the DACH initiative will concentrate on joint views as to the electrical and ICT architecture of a future smart energy system.

FINSENY partner BAUM is involved in all 3 taskforces and the steering group of the DACH cooperation and continuously refers DACH-partners to the findings of FINSENY.

2.1.11 E-Energy (Smart Grids made in Germany) and ICT for Electric Mobility

E-Energy is a research programme funded by the German Federal Ministry of Economics and Technology (BMWi) in partnership with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

The objective is to create an "Internet of Energy". The BMWi has coined the phrase "E-Energy" for this new field of innovation. As in the case of E-Commerce or E-Government, the term stands for the comprehensive digital networking and optimisation of the energy supply system, encompassing everything from generation and distribution right up to consumption. The project will ensure more effective utilisation of the existing supply infrastructure, expand the use of renewable energy resources and reduce CO2 emissions.

A technology competition identified six model regions to carry out research and development activities with support from the BMWi and the BMU. They follow an integral systematic approach that spans all value adding segments. It includes all energy-specific business activities both at the market level and the technical operational level. Close contact is also maintained to the other finalists of the technology competition and other initiatives. The E-Energy beacon projects will be the impetus for widespread development in the fields of smart energy and smart grids.

The E-Energy projects will come to an end by end of 2012. The ancillary research (lead by FINSENY partner BAUM) will present a final report by mid 2013. There are preliminary plans to establish an "E-Energy II" program. Two main topics are under discussion to form the core of that funding programme:

- IT security
- Integration of power, gas and heat grids (e. g. „Power-to-Gas" method to "store" wind energy)

For further reading – especially to download a brochure that summarizes the main architectures and findings of the E-Energy projects – see www.e-energy.de/en.

In close relation with the E-Energy programme, BMWi and BMU set up another R&D programme on "ICT for Electric Mobility" (ICT-EM). Within the framework of a nation-wide technology competition, seven projects until the end of 2011 developed prototypes and economically viable solutions for the use of ICT in electric mobility systems. A total of 47 companies and scientific research institutes were involved in the projects. Thus the "ICT for Electric Mobility" programme forms a key pillar of the German government's National Development Plan for Electric Mobility. The projects focused chiefly on (i) ICT-based charging, control, and billing infrastructures for various vehicle types and (ii) effective business models, services and potential standards that can be developed to include electric vehicles in the overall mobility system. Project results have been presented at an international conference in Manheim in September 2011 (see www.lebenswelt-elektromobilitaet.de). A final report will summarize the results of all projects.

German Ministry for Economics and Technology (BMWi) selected more projects for funding under the "ICT-EM II" program. These projects will further develop and test technologies in three action fields related to electric mobility:

- Smart Cars
- Smart Grid
- Smart Traffic.

For further reading www.ikt-em.de/en.

Following "E-Energy" and "ICT for Electric Mobility" partners are involved in FINSENY and contribute their expertise above mentioned projects, as well as feed back insights and results from FINSENY to the E-Energy family of projects:

- BAUM: head of ancillary research for E-Energy and ICT for Electric Mobility (FINSENY WP1, WP3, WP5, WP7)
- FIR: Smart Watts and Smart Wheels (FINSENY WP5)
- RWTH Aachen: SmartWatts and Smart Wheels (FINSENY WP2, WP3, WP5, WP7)
- SAP: MeRegio, Future Fleet, e-mobility and MeRegioMobil (FINSENY WP1, WP5, WP6)
- Siemens: RegModHarz, E-DeMa, Harz.EE-mobility (FINSENY WP1–WP8)
- STAWAG: Smart Watts and Smart Wheels (FINSENY WP2, WP3, WP5)
- VDE/DKE: Competence Centre E-Energy (FINSENY WP1–WP8)

2.1.12 EIT ICT Labs

EIT ICT Labs, the EIT Knowledge and Innovation Community on the future information society, is a new initiative intended to turn Europe into a global leader in ICT innovation. It aims to fulfil this mission by a twofold strategy, based on establishing a new type of partnership between leading companies, research centres, and universities in Europe, focusing on transforming its co-location centres initially in Berlin, Eindhoven, Helsinki, Paris, and Stockholm to world class innovation hotspots, and catalyzing a sustained transformation of education, research, and business activities to an integrated and mutually reinforcing whole that can respond to societal challenges and realise business opportunities with ICT innovations.

EIT ICT Labs will initially build upon five nodes and turn these already excellent regional clusters into world-class innovation hotspots. The nodes represent five leading European countries in ICT including global companies, leading research centres, and top universities. Strong CEO-type management with clear policies for open innovation will achieve the cohesion across these nodes.

Each of the ICT Labs defines its thematic action lines focus on deploying the competences in themes addressing major societal challenges with high potential for innovation and new business generation. For this, they must address a significant application domain with a long-term business objective; have a clear Strategic Ambition which includes a vision and measurable objectives; have a clear leadership; and cover activities in several nodes.

Under the ICT Labs key means to act as a research catalysts are

- catalyzing innovation-oriented empirical, experimental and explorative research by an experience / Living Lab catalyst giving access to interesting users, contexts of use, and problems;
- close liaison with European and national programs, facilitating the preparation of carrier research activities specifically aimed at EIT ICT Labs.

FINSENY established a close relationship to the EIT thematic action line 'Smart Energy Systems' within the Activity 'Future Scenarios and Smart Energy Experience Labs' (EIT ICT Activity 10831 TSES). The Thematic Action Line "Smart Energy Systems" of EIT ICT Labs has set itself the task to develop a Europe-wide joint approach of academic and industrial resources in the ICT sector in Smart Energy Management and Green ICT Management. The FINSENY project is one of the mayor research sources for this EIT activity.

2.1.13 EIT InnoEnergy

The EIT Knowledge and Innovation Community on the Sustainable Energy, is a new initiative intended to turn Europe into a global leader in Sustainable Energy development. It aims to fulfil this mission by a twofold strategy, based on establishing a new type of partnership between leading companies, research centres, and universities, focusing on transforming its co-location centres initially in Sweden, France, Benelux, Spain, Poland, Germany to world class innovation hotspots, and catalyzing a sustained transformation of education, research, and business activities to an integrated and mutually reinforcing whole that can respond to societal challenges and realise business opportunities with Sustainable Energy technologies and innovations.

EIT InnoEnergy was initially build upon six collocation centres, representing six leading European countries in Sustainable Energy including global companies, leading research centres, and top universities. Each of these collocation centres defines its thematic action lines focus on deploying the competences in themes addressing major societal challenges with high potential for innovation and new business generation.

InnoEnergy Sweden's mission is to develop prerequisites, technology, and services for Smart Grids and achieve a breakthrough in Energy Storage. Sweden already has an extensive partnership working with Smart Grids, excellence in ICT, and a unique capacity to develop innovations and companies in the electric power sector.

InnoEnergy Sweden is a unique partnership between KTH Royal Institute of Technology, Uppsala University, ABB, and Vattenfall. Moreover, associated and network partners currently include Elforsk, Ericsson, Fortum, Logica, Nova Högskolecentrum, Power Circle, Seabased, Science partner, Sting, STRI, and Svenska Kraftnät and Technion.

This EIT InnoEnergy collocation involves the following technologies:

- **The Sustainable Energy of the Future**: Electricity production in the future will be change as we get more solar, wind, and wave-produced electric energy in the system as we are going to have surpluses when the sun shines or windy days. We must learn to adjust consumption or store the energy. Smart Grids and Energy Storage are two central areas of research addressing those issues and in which Sweden is at the forefront.

- **Smart Grids**: they can meet the demands of the future. They are more flexible and make it possible to produce electricity both locally and remotely. The concept is based on active consumers.
- **Electric Energy Storage**: It deals with the integration of variable energy sources in the current electricity grid and ensuring fast and reliable access to a large output reserve in order to stabilize the electricity grid.

Following, running sub projects linked with FINSENY are introduced in brief:

- **Controllable and Intelligent Power Components (CIPOWER)**: The vision of CIPOWER is to develop innovative power components with advanced control and monitoring in order to pave the way towards an optimal transmission and distribution grid. This field includes the ability to extend the operating limits of components, increasing the robustness, safety, and reliability of the components, environmentally benign designs, and components with reduced losses and good energy quality. The target of this project is to disseminate intelligence and controllability of the power components used in power supply, transmission and distribution of electrical energy. This may be in the form of new features or new design of components. Partners involved are ABB, AGH, Eandis, INP Grenoble, IST Lisbon, KTH, K.U. Leuven, Seabased, Technion, Tecnalia, UPC, Uppsala University, Vattenfall.
- **ICT solutions for active distribution networks and customer interaction (INSTINCT)**: The overall goal of the project is optimal design of ICT systems that enable control of active distribution systems with retained or increased levels of reliability as well as enabling energy-user empowerment. The objective of the project is therefore optimal design of robust, secure, interoperable and scalable ICT solutions that enable active distribution networks and facilitate new models for customer involvement. Partners involved are ABB, Elforsk, Ericsson, Fortum, IREC, KTH, KUL, STRI, Svenska Kraftnät, Tecnalia, TUE, UPC, Vattenfall
- **Smart Grids from Power Producers to Consumers (SMART POWER):** The electrical energy system is facing a number of emerging technologies. These have to be integrated into the existing power transmission system in a “smart” way to alleviate the future changes the grid is exposed to. These aspects of the power system constitute a number of challenges for the power system development that are addressed within Smart Power. The objectives of the project are to develop innovative methods for efficient design and operation of a smart grid and to coordinate applications of innovative smart grids. Partners involved are ABB, Grenoble, IREC, IST, KTH, KUL, Scottish Power, STRI, Tecnalia, TUE, UPC, Vattenfall.

2.1.14 EC Workshop for Electricity Utilities and Telecom Companies

The European Commission Information Society and Media Directorate General is organising a series of workshops on Smart Grids. The workshops bring together representatives from electricity utilities, telecom companies and energy solution providers with the objectives of:

- exploring synergies and opportunities to put in place broadband infrastructures for the rollout of smart grids
- designing the policy framework to support the deployment of the ICT infrastructure needed for smart grids
- examining business, regulatory, and technological issues

FINSENY has been presented in these workshops by several project partners. The issues discussed in these workshops like Security an resilience of ICT infrastructure for Smart Grid, ICT infrastructure for mission critical services, shared use of ICT infrastructure and spectrum policy for the Smart Grid are considered in our work and the FINSENY results will contribute to solving these issues.

2.1.15 ICT4SMARTDG: A Thematic Network on ICT Solutions to Promote Large Scale Distributed Generation

This project was awarded by DGINFSO early in 2009 with the objective to create a thematic network to explore the ICT solutions which could promote the large scale implementation of distributed generation. The project commenced with 15 partners representing utilities, ICT vendors, ICT service companies,

building developers, software providers and trade associations from the renewable energy sector. Four work packages addressed the core objectives of the project:

- **WP1** led by Iberdrola: Exchange of information and experiences
- **WP2** led by Telefonica: Achieve consensus on benefits of available ICT solutions
- **WP3** led by Samares: Identification of non-technical barriers for large scale deployment
- **WP4** led by Alcatel-Lucent: Definition of steps forward for promotion of large-scale implementation

The project is now completed and the final report will shortly be posted to the ICT4SMARTDG web site. Progress reports and PPT presentations relating to all of the deliverables throughout the project are available on the web site www.ict4smartdg.eutc.org. Partners: EUTC (coordinator) Alcatel Lucent, British Telecom, Ericsson, Deutsche Telekom (T Systems), Nokia Siemens Networks, Telefonica, Iberdrola, EDF, Acciona, Eutelsat, Disenco, Samares, EREC and COGEN.

2.1.16 Low Carbon Network Fund (LNCF) – UK Energy Regulator

As part of the electricity distribution price control arrangements that run from 1 April 2010 to 31 March 2015 in the UK, Ofgem established the Low Carbon Networks (LCN) Fund. The Fund allows up to £500m support to projects sponsored by the distribution network operators (DNOs) to try out new technology, operating and commercial arrangements. The objective of the projects is to help all DNOs understand what they need to do to provide security of supply at value for money as Great Britain (GB) moves to a low carbon economy. There are two tiers of funding which are available under the LCN Fund. The First Tier is designed to enable DNOs to recover a proportion of expenditure incurred on small scale projects. Under the Second Tier of the LCN Fund, Ofgem facilitates an annual competition for an allocation of up to £64million to help fund a small number of flagship projects.

To date 27 Tier 1 project registrations have been made and there is a total of 10 Tier 2 projects. Information on the objectives and output of projects which attracted funding are reported and published every six months on the Ofgem web site and there is an annual seminar each year where presentations are given on progress. Those wishing to review projects under this funding initiative should visit the web site http://www.ofgem.gov.uk/networks/elecdist/lcnf/pages/lcnf.aspx.

2.2 FINSENY Relationships with Projects outside Europe

2.2.1 ISGAN

Launched in July 2010 at the first Clean Energy Ministerial, the International Smart Grid Action Network (ISGAN) creates a multilateral mechanism for governments to collaborate with each other and other stakeholders on advancing the development and deployment of smarter electricity grids around the world.

Figure 5: ISGAN participating countries

Supported by more than 20 national-level governments, ISGAN focuses on those aspects of the smart grid where governments have regulatory authority, expertise, convening power, or other leverage. ISGAN activities cut across five principal areas: policy, standards and regulation; finance and business models; technology and systems development; user and consumer engagement; and workforce skills and knowledge.

ISGAN serves as a government-focused complement to the Global Smart Grid Federation and other international efforts that support the accelerated development and deployment of smart grid technologies. ISGAN Participants have promised to work closely with the Federation on joint public-private projects that capitalize on the strengths of each sector.

ISGAN has defined four work areas (called "annexes") and split work to achieve following goals through projects of international organisations or consortia:

Annex 1: Global Smart Grid Inventory Objectives and Approach

- Develop a unified ISGAN framework for assessing smart grid features and technologies
- Prioritize this framework for each participating country (i.e., what are the motivating drivers and specific technology interests)
- Map this framework against existing inventories, surveys, and assessments
- Identify gaps, opportunities, synergies, and inconsistencies and make recommendations, if appropriate
- Expand framework to take into account key metrics and indicators
- Develop appropriate tools for disseminating results (complement, not duplicate existing platforms)

Annex 2: Smart Grid Case Studies Objectives and Approach

- Assess best practice examples of case studies
- Develop and apply a common case study template & methodological framework

Annex 3: Benefit-Cost Analyses and Toolkits Objectives and Approach

- Assessment, modification, and application of methods to measure the present level of maturity of networks (i.e., the "smartness")
- Assessment, modification, and application of existing benefit-cost methodologies and tools, as well as development of new ones
- From these analyses, develop appropriate toolkits (including KPI definition)

Annex 4: Synthesis of Insights for Decision Makers Objectives and Approach

- Develop a platform that compiles smart grid concepts from high-quality sources and makes them accessible to policymakers (e.g., online glossary)
- Produce brief, timely analytical reports that clarify important issues or raise key questions in smart grid policy and deployment
- Establish platforms (or augment existing ones) for knowledge management and collaboration among ISGAN participants
- Develop other tools for collaboration and information sharing

As part of its CONCORD liaison task, Ludwig Karg (BAUM) stays in close contact with ISGAN president Michele de Nigris and his deputy Michael Hübner (Austria).

2.2.2 ZigBee

The **ZigBee Alliance** is "an association of companies working together to enable reliable, cost-effective, low-power, wirelessly networked, monitoring and control products based on an open global standard". It counts 400+ member companies across all worlds that collaborate to define a set of technical specifications for a large set of applications based upon low-power wireless communication technology. Thanks to its worldwide adoption, ZigBee specifications often become de-facto standards adopted by majority of industries. In some cases, ZigBee also liaise with official de-iure standardisation bodies in order to improve acceptance and value of its achievements.

Figure 6: ZigBee components

All ZigBee activities are founded upon the **ZigBee protocol stack**, a low-cost, low-power, wireless mesh network communication protocol. It operates in the industrial, scientific and medical (ISM) radio bands: 868 MHz in Europe, 915 MHz in the USA and Australia, and 2.4 GHz in most jurisdictions worldwide. Maximum data rates are 250 kbps @2.4 GHz, 40 kbps @ 915 MHz, and 20 kbps @868 MHz. ZigBee builds upon the physical layer and medium access control defined in IEEE standard 802.15.4 for low-rate WPANs. The specification goes on to complete the standard by adding four main components: network layer, application layer, ZigBee device objects (ZDOs) and manufacturer-defined application objects grouped into so-called Application Profiles.

Application Profiles are one of the main reasons for the high relevance of ZigBee to FINSENY. They in fact identifies and defines in a standard way the list of devices and the syntax and semantics of all the application-level messages which sum up into a complete application fully-interoperable across many vendors. Smart Energy, Home Automation, and Commercial Building Automation are the three profiles most relevant to FINSENY.
ZigBee was also selected by **NIST** in its short list of standard relevant to Smart Grid definition and On World reported that *"In 2014 ZigBee will make up about half of the global home energy management market at this time (this includes wired and wireless systems)."*

ZigBee Smart Energy is the world's leading standard for interoperable products that monitor, control, inform and automate the delivery and use of energy. It includes support for time-of-use and dynamic pricing, load shedding, prepayment, over-the-air updates. 40+ million ZigBee electric meters are being deployed by over 11 utility companies in the USA, 2.5 million in the State of Victoria, Australia, and in Europe also British Gas selected ZigBee Smart Energy for its multi-million meter roll-out in the UK. The ZigBee Smart Energy working group is also working with other for a, in particular WiFi Alliance and Home Plug Alliance, in order to define an IP-based standard named Smart Energy Profile 2.0 (**SEP 2.0**) that could be based on IETF and W3C specifications and could be used independently on the transport layer, be it IEEE 802.1.5.4, WiFi, PowerLine or others.

ZigBee Home Automation addresses the home side of the smart grid by providing a standard way to enable smart homes that can control appliances, lighting, environment, energy management as well as security by guaranteeing interoperability between products from different vendors. The ZigBee site reports already 40+ products from 15+ different vendors certified to comply with this standard, products which include plugs, DIN power meters, remote controls, lighting controls, dimmers, thermostats, buttons, relays, smart locks, occupancy and door sensors, and also complete end-to-end systems.

ZigBee Building Automation is finally the profile for monitoring and control of commercial building systems. It is the only BACnet® approved wireless mesh network standard for commercial buildings.
In this short overview of ZigBee standards, it is also worth to mention the **ZigBee Network Device** specifications because it is relevant to FINSENY as it provides a standard interface to a ZigBee Gateway, here meant as the device that connects the IP Internet-based service provider platforms with ZigBee networks and ZigBee devices. In the scope of the Home Area Network and the FINSENY WP4 activities, this standard interface guarantees in fact that service providers can interoperate and manage customers' home devices independently of the provider of the gateway.

Within the scope of the FINSENY project the following **standardisation strategy** is being pursued towards ZigBee standards:

- Firstly, Home Automation Profile 1.2. There is a combination of favorable events that can be exploited by FINSENY in order to introduce in this standard most of the use cases defined in WP4 which relates to home energy management, including communication with smart meters and smart appliances. Home Automation is in fact revising its specifications and the following Home Domain use cases of WP4 falls within the scope: monitor and manually control energy use, optimize home energy globally, optimize home energy locally. According to the schedule of ZigBee, this standard is expected by 2Q2012 and, at the time of writing this deliverable, FINSENY is already actively contributing with technical documents and active participation, an interoperability event was also organized partly supported by FINSENY in order to test interoperability of the ongoing new features of the new standard.
- Then, harmonisation between Smart Energy and Home Automation. Smart Energy is in fact a profile mostly driven by requirement of utilities and, for some use cases, it suffers from the need of requiring a technician in order to install devices and let them join the ZigBee network. While that is perfectly reasonable when installing a smart meter, in the home domain this is perceived as a weakness as a self-installation model is more suitable: the user buys a device and then he/she should be able to install it and let it join the HAN and successfully operates without the intervention of a technician. Proper actions should be taken by FINSENY to awaken ZigBee of the value of making a Smart Energy Network to interoperate, under the proper degree, with a Home Automation Profile Network.
- Communication between the gateway and the service platform. Proper actions should be taken by FINSENY to harmonize ZigBee Gateway API with ETSI M2M gateway interface and with the specifications of Home Gateway Initiative when the gateway functionality is expected to be embedded into a home broadband device.
- Lastly, viability analysis of a full-IP solution for the Home Area Network. FINSENY should collaborate with ZigBee Alliance, as well as with WiFi and Home Plug Alliances and IETF, with the purpose of analyzing the viability of a full-IP solution for the so called wireless embedded part of the Future Internet, e.g. low-power home area network technology. Even if IP is welcomed by every company in the world to simplify deployment and management of embedded devices, there are still many factors that limit the per-node capabilities compared to today's typical Internet nodes. Request-response protocols like HTTP are still in fact a poor fit to a communication model with battery-operated, mostly sleeping nodes. In addition, the usual data formats (both headers and body) are too chatty for the short payloads possible in these networks and they require too much code for the low-power processors used for these devices. FINSENY, in collaboration also with FI-Ware, is expected to collaborate to overcome all these perceived limitations.

2.2.3 Home Gateway Initiative

The Home Gateway Initiative (HGI) is a non-profit organisation that defines guidelines and specifications for broadband Home Gateways; its core mission is to translate Broadband Service Providers' near and mid-term service plans into published and agreed sets of requirements for home network equipment and technologies addressing the home gateway and all digital home building blocks: hardware and software in the digital home that connect consumers and services.

As a matter of fact, HGI is very concerned with Home Energy Management Services, and in August 2011, HGI published the document "Use Cases and Architecture for a Home Energy Management Service", a public document that describes use cases and an architecture to support Home Energy

Management services. The document is part of HGI's Release 3 specification family and it was produced by the Energy Efficiency Task Force (ENG) and Business Group (BG) of the Home Gateway Initiative (HGI). As reported in section 3.1 of the HGI document itself, much of the detailed starting point for this work was received from contributions received by HGI from the Energy@home (via Telecom Italia) and BeyWatch (via Telefonica) projects.

As an excerpt of the HGI document well describes, "in energy management systems, domestic appliances […] would communicate through a local network while terminal devices (e.g. fixed and mobile phones, home gateways) act as gateways to telecommunication networks. Connection is established with both external platforms (e.g. via the broadband connection) and local agents able to optimise energy usage in the home. This optimisation requires an Energy Gateway Function somewhere in the home which is able to monitor/control the consumption of equipment. […] The HGI architecture supports different scenarios, but focuses on the case where this function is embedded in the Home Gateway." Therefore, HGI is very relevant to FINSENY as it is going to define the requirements and functionalities of the Energy Gateway Function when embedded in the Home Gateway. In the document HGI addresses the following use cases from FINSENY WP4:

HEM Use Cases
7.1 Use Case 1: Visualisation of current energy and power data
7.2 Use Case 2: Visualisation of historical data
7.3 Use Case 3: Alarms
7.4 Use Case 4: Home Domain Overload management
7.5 Use Case 5: Optimize energy cost
7.6 Use Case 6: Demand response
7.7 Use Case 7: End User Control
7.8 Use Case 8: Consumer/Prosumer tariff simulator

In August 2011 HGI also signed a liaison with the ZigBee Alliance. Telecom Italia strongly contributed to support and realize such a liaison in order to let the two groups discuss the application of ZigBee standards to the Home Energy Management (HEM) services under specification within HGI. In fact, in September a next phase of the work was underway by HGI with the goal of defining the set of specific requirements on the Home Gateway for support of these services. Telecom Italia is contributing with particular focus on requirements based upon the usage of the ZigBee standards and the implementation of the FINSENY use cases.

In the HGI Energy Efficiency Task Force, Telecom Italia is promoting the following strategy:

- adoption of a solution coherent with the ETSI M2M specifications for out-of-process gateway-to-cloud communication by considering the Home Gateway an instantiation of the ETSI M2M Gateway for the vertical Home (Figure 7);
- definition of a new OSGi in-process API to expose Home Area Network Gateway API functionalities to OSGi bundles installed on the Home Gateway.

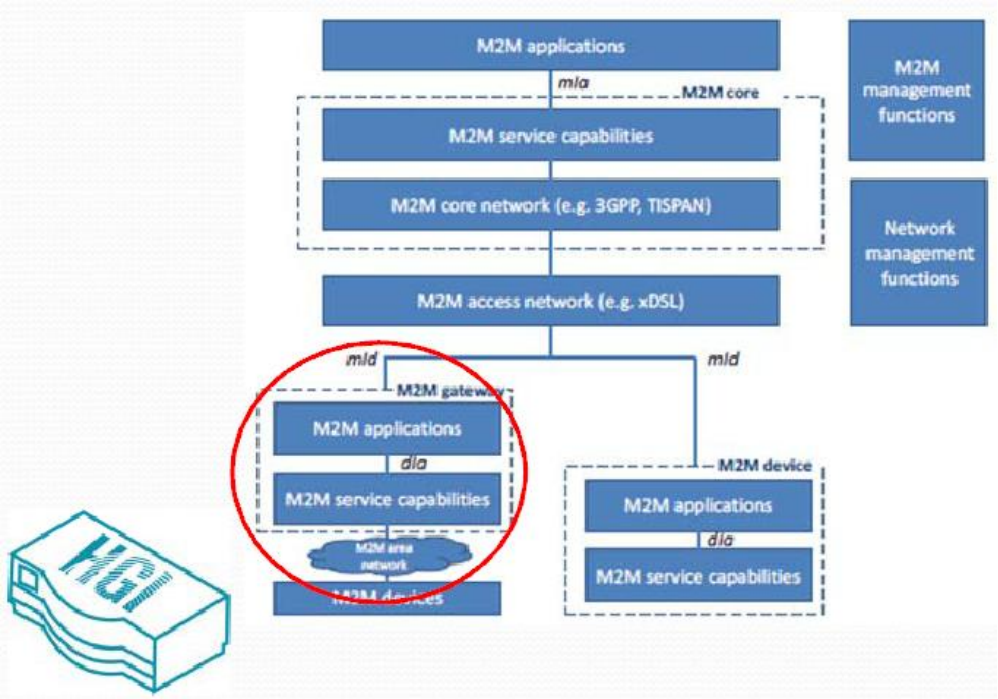


Figure 7: The Home Gateway as an instantiation of the ETSI M2M Gateway for the vertical Home (courtesy of HGI, December 2011).

2.3 Dissemination and Relationship Building on Conferences and Workshops

FINSENY partners have continued to present and represent FINSENY on various conferences and workshops. The following selection is listed by date and gives an overview of the key meetings where FINSENY has been present since the last report.

2.3.1 BMWi AG Intelligente Netze und Zähler, Berlin, Oct. 12, 2011

In this working group (WG) the legal framework for smart grid and smart meter is under discussion. The WG is organised and hosted by the Federal Ministry of Economics and Technology, organised under the „Plattform Zukunftsfähige Netze“ (platform “Future Sustainable Grids”). A broad range of stakeholders, represented by their associations (around 60), take part in and provide input for discussions. At a meeting in October 2011, the functionality of a smart grid was discussed, and the WG accepted the offer to present the use case approach in standardisation and especially the work of the Smart Grid Coordination Group (SG-CG) and its WG Sustainable Processes (WG SP). At that time the WG SP just had started the collection of use cases (to which FINSENY provided many of their use cases). Therefore, the FINSENY approach and an overview of FINSENY use cases as best practice example had been presented by Johannes Stein (VDE) to show the practical relevance of the theoretical use case methodology. The audience was guided to the published FINSENY deliverables.

The Ministry adopted the use cases approach and will collect own high level use cases, taking note of existing ones, in order to analyse the legal framework and the development of future legislative initiatives.

2.3.2 ICT for Sustainable Homes Conference, Nice, Oct. 24–25, 2011

The first three-hour workshop of the FINSENY project took place on October 25, 2011. The workshop was part of the “ICT for Sustainable Homes” conference and moderated by Michaela Ballek (B.A.U.M. Consult). The topic of the FISNENY workshop “Smart Home: A Key element of the smart grid?” connected the conference topic nicely with what FINSENY is about.

The workshop consisted of eight presentations, equally divided by FINSENY consortium member presenters and other European projects. This resulted in a fruitful exchange between different aspects of FINSENY and the other projects. Moreover, speakers, attendees and exhibitors of the conference included R&D projects funded under the European Commission's FP7 programme (or other related programmes), namely REViSITE, ENERsip, BeyWatch, E3SoHo, e-E Houses, EnergyWarden, EnRiMa, eSESH and TIBUCON. More information on the contents and outcome of the workshop can be found in a four-page brochure [8].

2.3.3 Workshop on Energy Efficient Buildings (eeBuildings) Data Models

During the 2nd Workshop on eeBuildings Data Models, that took place on 26-28 October 2011 in Sophia Antipolis, France, Synelixis organized and was chairing the Session 6 "Middleware for EupP (Energy using or producing Products), White goods, HVAC, Storage and Micro Renewables".

The session was chaired by Theodore Zahariadis (Synelixis) and Rogelio Segovia (EC Scientific Officer). The sessions had four accepted papers, and among them two papers were that directly associated with FINSENY: the "Middleware for Energy Aware Appliances" co-authored by Synelixis and Telefonica I+D and presented by Mr. Zahariadis (Synelixis) and the paper "Iterative Model-Based Identification of Building Components and Appliances by Means of Sensor-Actuator Networks," co-authored by Orange and INRIA and presented by Gilles Privat (Orange).

More than 40 experts from utilities, industry and academy participated and exchanged views on the importance of open Data Models in energy efficient buildings.

2.3.4 Technical FI PPP session at ServiceWave 2011, Oct. 2011

The ServiceWave conference series has been initiated by the European Technology Platform NESSI (Networked and European Software and Services Initiative). In October 2011 the fourth conference in this series has been taken place in Poznan (Poland) as part of the Future Internet Week. Recent innovations, trends and experiences are intensively discussed in the ServiceWave conferences in the Internet of Services (IoS) arena. But also related topics in the field of Internet of Things (IoT), Internet of Content (IoC) and in underlying network technologies are addressed. Thus obviously the ServiceWave is a very important conference from a general Future Internet viewpoint to discuss related topics and especially intermediate results of the FI PPP projects with a large community.

FINSENY was represented by Johannes Riedl (Siemens AG). A presentation was given as part of the FI PPP session which summarized the current status of the FINSENY project. More concretely, a sound overview was given to the audience on the ICT requirements identified so far in the FINSENY scenario work packages. The discussion of the presented ICT requirements showed that the FINSENY results were very well received and of high interest to the community. This feedback together with follow-up discussions confirmed that currently no important ICT requirements remains undetected – at least on the medium level granularity which was presented. Also the grouping of the ICT requirements was very well received and agreed on. Finally, the next steps in the FINSENY project were explained, also describing the goal to work out a functional ICT architecture addressing the requirements described before. In the subsequent discussion it was clarified that FINSENY is heavily taking into account results that had been achieved in related project activities so that duplication of work is avoided. In this context further explanations were given how FINSENY is achieving this. This was highly appreciated by the audience.

2.3.5 Future Internet Assembly, Poznan, Oct. 26, 2011

During the 8th Future Internet Assembly (FIA) workshop that took place in Poznan on 26 Oct. 2011, the plenary closing session was organized by Synelixis and was devoted to the Future Internet Architecture. The panel moderator was Theodore Zahariadis (Synelixis), who opened the session and introduced 4 invited speakers who presented the Future Internet Architecture from four different points of view:

- Dr. Dimitri Papadimitriou (Alcatel-Lucent) presented his point of view on the Future Internet Architecture, as it is constrained by a network-wide/global-level architecture.
- Dr. Pau (UCLA) considered some networking approaches world-wide (including hinds to NSF research) gaving emphasis on the pros and cons of evolutionary and revolutionary architectural approaches, and discussed architectural issues regarding mobile services.

- Prof. Müller (TU Kaiserslautern) presented some consideration on the Future Internet Architecture from a Service-Oriented point of view. He introduced today's cloud computing and Future Internet architecture with an emphasis on the Future Internet Architecture as an ecosystem, which includes networks, services, policies, humans….
- Dr. Mohr (Nokia Siemens Networks) presented the Future Internet Architecture requirements from a smart energy point of view, putting emphasis on the mobility requirements (e.g. Future Internet and electric cars).

The audience was more than 250 experts followed from utilities, industry and academy. A discussion followed on the different architectural issues, not only between the panel participants but also between the participants.

Figure 8: From left to right: Th. Zahariadis (Synelixis), W. Mohr (Nokia Siemens Networks), G. Pau (UCLA), D. Papadimitriou (Alcatel-Lucent), P. Müller (TU Kaiserslautern)

2.3.6 IEEE PES ISGT-EUROPE 2011, Manchester, Dec. 5–7

The second European conference and exhibition on Innovative Smart Grid Technologies (ISGT-EUROPE 2011) was held December 5 – 7, 2011 at Manchester Central Complex in Manchester, United Kingdom. It is a forum for innovations in the area of Smart Grids with target participants including strategic planners, management, decision makers, technical experts, regulators, politicians, researchers and students. The ISGT conference series started in 2010 and is sponsored by the IEEE Power and Energy Society (PES). Over 300 delegates registered for the conference in Manchester.

FINSENY was represented by Kolja Eger (Siemens AG) in the panel session on "Energy Services for local communities" on Wednesday, 7th Dec. Other research projects like NOBEL and BeyWatch also participated in this session giving a good platform to discuss ICT-related challenges and developments in Smart Grid research projects. The focus of the FINSENY presentation was a general overview of the FINSENY project. Furthermore, the FI PPP and the approach to develop the common parts of the platform in the FI-WARE project based on common generic enablers combined with domain-specific enablers was explained and the big business opportunities for industry in Europe to provide affordable solutions for different usage areas and economy of scale for necessary components was outlined. The feedback of the audience was very good and wide agreement was seen for the chosen approach.

2.3.7 ZigFest (ZigBee Home Automation interoperability event), Torino, Nov. 29 – Dec 1, 2011

The ZigBee Home Automation Interoperability event was organized with a contribution of FINSENY. A total of 10 different companies participated with an average of 20 participants per day. The following devices were tested: smart plugs (3 independent implementations), home gateway/EMS (1 independent implementations), meter interfaces (2 independent implementations), Smart Appliances (2 independent

implementations), testing tools. All testing was done within the context of the following reference use cases based upon FINSENY WP4 activity:

- The following high level Home Domain Use Cases of WP4 were used as a reference:
    - Monitor and manually Control Energy Use
    - Optimize Home Energy and Cost Globally
    - Optimize home energy and Cost Locally
- The following specific Use Cases of WP4 were further used:
    - Display the global energy consumption and costs using data from Smart Meter and Metering Operator
    - Display the global and per appliance energy consumption and costs, either realized and/or forecasted
    - Warn the consumer if the available total power (in the home) is not sufficient to run a Smart Appliance
    - Direct load control
    - Optimize energy in a home equipped with smart appliances

The following features of the ZigBee Home Automation standard were tested:

- Discovery of devices and services from gateways;
- Easy commissioning of complex devices (smart plugs/HomeGateway);
- Energy@Home proposed clusters (specifically the PowerProfile cluster scheduling);
- Attribute reporting;

The event was appreciated by all participants and acknowledged by the ZigBee Alliance itself as it produced the following very positive outcomes:

- Easy commissioning:
    - found a case where the process of using identify query could run into a stalled-mode if multiple networks were found open; solutions were proposed
    - need to update the sequence diagrams for complex devices;
- Power profile cluster changes:
    - change to get power Profile price command were suggested;
    - change power profile states according to smart appliance requirements;
    - define sequence diagrams for scheduling of smart appliances using the power profile cluster;
- Appliance control cluster changes:
    - change to appliance control cluster were suggested;
- Discovery strategy for gateways:
    - solutions for efficient discovery in case of restart of the home gateway were proposed;
- Device Management:
    - It was identified the need for better specification of the ZDO management leave in case of Ha application profile.

2.3.8 Use Case Workshop (VDE|DKE), Frankfurt, Jan. 26, 2012

In this workshop, Johannes Stein (VDE) presented the first draft report "Use Case Collection, Management, Repository, Analysis and Harmonisation" of the Working Group Sustainable Processes (WG SP) of the Smart Grid Coordination Group (SG-CG). The purpose of the workshop was to make sure that the first report to the EU contains all relevant European activities. All participants were encouraged to provide comments and take part in these discussions, including some FINSENY members. Several FINSENY partners strongly support the work of the SG-CG and the WG SP.

Altogether, FINSENY had a major influence on this draft report. FINSENY provided approximately one quarter of all European smart grid use cases that were collected during the call. In addition, during the presentation, FINSENY's contribution was highlighted as best practice example for the collection of use cases, and the general use case approach for standardisation was a central aspect of the discussion.

2.3.9 E-Energy Congress, Berlin, Feb. 2–3, 2012

The conference "E-Energy accelerates the transformation of energy" took place in Berlin from 2nd to 3rd of February. The German National Academy of Science and Engineering "acatech" – together with the Federal Ministry of Economics and Technology – invited representatives from industry, science and politics to discuss an acatech study with scenarios and a long term roadmap for smart grid development in Germany. In his speech on findings from the E-Energy model projects (see chap. 2.1.8) Ludwig Karg (BAUM) highlighted the need to consider Internet technologies – as they are described by FINSENY – to be first choice to implement the smart grid scenarios.

2.3.10 E-World, Essen, Feb. 7–9, 2012

E-World, Europe's leading energy and water management industry fair, serves as a platform for business, networking and matchmaking activities between electricity suppliers, municipal utilities, industrial users, municipalities and service suppliers. The latest technology trends – including innovations with regards to energy efficiency, smart homes and especially smart grids – were addressed by exhibitors and organizers alike. The year's focus topics were the distribution, trade and marketing of energy.

Having gained ever increasing attention from international companies, this year many delegates from Far East, especially Japan, tried to learn about latest technologies in the field of renewable energies and related grid issues. Excellent contacts for E-Energy as well as FINSENY could be built in the framework of the one day conference "E-Energy – ICT-based energy system of the future", which was organized by Germany Trade & Invest (gtai) in cooperation with BAUM, who contributed content from FINSENY and E-Energy.

2.3.11 BMVIT Strategy Workshop in Vienna, Feb. 27, 2012

Two departments – Energy and ICT – of Austria's Federal Ministry for Transport, Innovation and Technology organized a workshop "ICT relevant research topics for the development of future energy grids". 40 Representatives from industry and academia exchanged their views and depicted cornerstones of future research needs.

Ludwig Karg, BAUM, was invited to explain findings from FINSENY and E-Energy. Participants from the IT industry were especially interested to cooperate when defining design principles for the future "internet of energies". Various parties promised to become members of FINSENY Smart Grid Stakeholder Group.

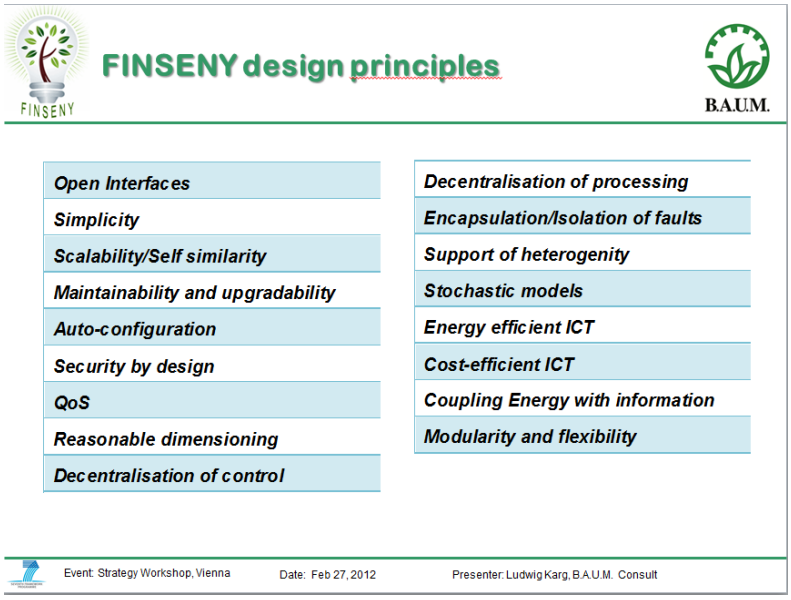


Figure 9: Excerpt from presentation at BMVIT Strategy Workshop in Vienna

2.3.12 ICT for Smart Grid in Africa, Johannesburg, Feb. 27–28, 2012

EUTC was running the first conference outside Europe on 27th – 28th February co-hosted with Eskom, the national South African electricity company. On this occasion, due to a crowded programme, EUTC was not able to make a presentation promoting FINSENY, but FINSENY was mentioned in discussions regarding the wider role of EUTC in Europe. A further conference is being planned for 2013 and this could create an opportunity for a formal FINSENY presentation.

2.3.13 UTC Latin America conference, Rio, Brazil, Mar. 22–23, 2012

EUTC spoke in the inaugural UTC Latin America conference in Brazil (http://utcal2012.utc.org/) describing the EU projects and working groups that EUTC participates in. An outline of the FINSENY project was presented as part of the EUTC input to the conference. There were approximately 120 delegates. Utility representatives were present from Brazil and Ecuador. Some fourteen international ICT vendor and services companies were also present.

2.4 Planned Workshops & Conferences with FINSENY Participation

In the meantime, FINSENY has first findings and reports to communicate. Thus more workshops and conference participations are planned by consortium members. These activities will disseminate knowledge gained in the FINSENY project and further connect to activities in Europe and around the world. Following is the list of planned activities in chronological order:

- **Hannover Fair, Hannover, April 23–27, 2012**

  FINSENY will present in the E-Energy "speakers corner" and will be presented in the booth of DKE/VDE with people, poster and flyer.

- **FIA (Future Internet Assembly), Aalborg, DK, May 10–11, 2012**

Theme: "Smart Cities and Internet of Things". Currently FIA brings together research projects that are part of the ICT programme of FP7. They are advancing the state of the art in their respective areas and FIA enables open interactions and cross-fertilisation across the technical domains, reaching out to talent in Europe's Future Internet research community.

- **3rd European Summit on Future Internet, Espoo, Finland, May 31 – June 1, 2012**

  Towards Future Internet International Collaboration (http://www.futureinternet.fi/)

- **IARIA conference "INTERNET 2012", Venice, June 24–29, 2012**

  The conference addresses potential topics around the changing Internet. One of the topics is security. Siemens will present the current status of security for the connection of electric vehicles to the charging infrastructure, as defined by FINSENY.

- **Future Network & Mobile Summit, Berlin, July 4–6, 2012**

  There will be at least three poster sessions of the FINSENY working groups WP2, WP3 and WP5. There also might be a dedicated FINSENY session on this event.

- **Fully Charged 2012: International Vehicle Summit, Dublin, July 11, 2012**

  FINSENY will participate in this summit presenting the work done in the WP5: "electric mobility" (http://www.fullycharged2012.com).

- **ITC24: M2M workshop, Krakow, September 2012**

  FINSENY will present a talk at the M2M workshop in conjunction with the ITC24 (http://www.itc24.net/).

- **EUTC 2012, Warsaw, October 24–26, 2012**

  An abstract has been submitted. FINSENY will likely present in the context of international smart grid projects.

- **VDE-Congress on Smart Grids, Stuttgart, November 5–6, 2012**

  A paper has been submitted with a FINSENY overview and first results on architecture.

2.5 Other Dissemination Activities

FINSENY consortium members have undertaken quite a few additional dissemination activities in the last six months. It started with a joint press release in October which was subsequently translated and published in different partner countries. Also, various consortium members have published about their FINSENY activities in their internal or external websites or company newsletters. In addition, the vision paper is being finished and will be published. FINSENY has been publishing in the FI PPP snack and the FI PPP website, and of course on the FINSENY website. An updated poster and a flyer are being prepared for use and distribution at conferences and workshops. These activities are detailed in the following chapters.

2.5.1 FINSENY Press Releases

On October 17, 2011, a joint press release about FINSENY was published. It was subsequently translated and issued in other countries.

- **Finland**: Nokia Siemens Networks issued a press release on October 17, 2011.
- **France**: France Télécom-Orange, EDF, Thales Communications & Security and Grenoble INP jointly published a joint press release for France on October 19, 2011.
- **Germany**: A press release by Siemens was published on October 20, 2011 in both English and German: http://www.siemens.com/innovation/en/news/2011/e_inno_1131_2.htm, http://www.siemens.com/innovation/de/news/2011/inno_1131_2.htm. Several companies reacted on it and asked for further information. They were also invited to participate in the Smart Grid Stakeholder Group (SGSG).
- **Greece**: A press release was published on the Synelixis home website on October 20, 2012; entries in various Greek blogs followed.
- **Ireland**: In October 2011, Waterford Institute of Technology (TSSG), InTune Networks and ESB issued a joint press release which has been published in newspapers (The Irish Times) and online publications:
    - The Irish Times (online article here: http://www.irishtimes.com/newspaper/finance/2011/1028/1224306620785.html#.Tqpip5cawaY.twitter)
    - http://www.thecuttingedgenews.com/index.php?article=53019&pageid=21&pagename=Energy
    - http://www.power-eetimes.com/en/smart-grid-research-collaboration-aims-to-develop-a-renewable-ireland.html?cmp_id=7&news_id=222903606
    - http://www.electronics-eetimes.com/en/smart-grid-research-collaboration-aims-to-develop-a-renewable-ireland.html?cmp_id=7&news_id=222909822&vID=209
    - http://smartgrid.testing-blog.com/2011/11/03/smart-grid-research-collaboration-aims-to-develop-a-renewable-ireland/
- **Italy**: A joint press release from Enel.Si, Telecom Italia and Engineering was issued on January 24, 2012 and subsequently released in several media:
    - Corriere delle Comunicazioni - Missione Smart Grid per Telecom Italia, Enel ed Engineering - 24 january 2012 (24_01_2012_corrieredellecomunicazioni.it.pdf)
    - Data Manager Online - Engineering, Enel e Telecom Italia per lo sviluppo di soluzioni smart per l'energia (24_01_2012_Datamanager.it.pdf)
    - Quotidiano Energia - Smart grid, utility e Ict uniscono le forze (26_01_2012_Quotidianoenergia.it.pdf)
- **Spain**: Iberdrola issued a press release on October 24, 2011.

2.5.2 FINSENY vision paper

Upon request by the Commission in the FINSENY Review Meeting on October 21, 2011, a vision paper is under preparation, which describes the scope and technical approach of the project with a focus on the ICT part in the smart energy domain. It is a joint effort between all technical work packages (WP2-6), as well as WP1 and the project management. The individual missions and visions of WP2-6 were consolidated to the overall FINSENY vision: "*A sustainable Smart Energy system in Europe, combining critical infrastructure reliability and security with adaptive intelligence, enabled by ubiquitous and open Future Internet Technologies*." This paper is currently in the final discussion and approval phase.

This vision paper will be submitted to the EU Commission and will be published on the FINSENY web site. In addition, this paper will be the basis for overview presentations of the project, as well as future posters and the FINSENY flyer.

2.5.3 FINSENY Web Site

The public web site of the FINSENY project is available at www.FI PPP-finseny.eu, and is used as a key vehicle of dissemination and interaction with the public who seeks information about the FINSENY project and its areas of work. The web site was opened in September 2011.

The web site is structured into some main pages, showing the key items to be presented, and that are somehow self-explanatory: Home, Consortium, Deliverables, Publications, News, Links, Contacts, Picture gallery and SGSG (Smart Grid Stakeholder Group).

Besides giving information on the project, the web site will also be used as a key vehicle to make available all the public deliverables, as well as other public reports that the project may decide to produce.

The web site was implemented using WordPress, which is the open source personal publishing platform. Updating the Internet pages and creating new content is simple and quick, and a basic skill level in IT is enough to administer and use the site.

2.5.4 Partner dissemination on the FINSENY project

In the meantime, several of the FINSENY consortium members have published their FINSENY activities in their internal or external websites or company newsletters:

- **B.A.U.M. Consult**: published an article on external website http://www.baumgroup.de/default.asp?Menue=176&ShowNews=549
- **Grenoble-INP**: published a press release on their extranet: http://www.g2elab.grenoble-inp.fr/l-internet-du-futur-au-service-de-l-energie-intelligente-422438.kjsp?RH=G2ELAB_FR
- **Intune Networks**: published an article on their external website: http://www.intunenetworks.com/home/rox-on/latest_pr/smart_grid/
- **RWTH (ACS):** FINSENY article in E.ON Energy Research Center annual report, to be published in March 2012
- **RWTH (FIR):** published an article on their external website: http://www.fir.rwth-aachen.de/forschung/forschungsprojekte/finseny-285135
- **Siemens**: internal publication of a detailed FINSENY description in the Siemens Intranet on November 4, 2011.
- **TID**: published an article on their external website: http://www.tid.es/en/Tecnologia/Pages/TIDInternetTecnologiaFichaProject.aspx?IDElemento=51 and news in its Intranet, with the corresponding reports and links, about FINSENY events in ICT4SH 2011 and the 6th SGSG meeting in Berlin.

Figure 10: FINSENY news in Telefonica I+D Intranet

- **WIT-TSSG**: published articles on external website:
  http://www.wit.ie/News/News/MainBody,47680,en.html
  http://www.tssg.org/2011/10/smart-grid-research-for-a-renewable-ireland/

2.5.5 FINSENY poster and flyer

For the Hannover Fair in April 2012, a **poster** from May 2011 is being updated, and a **flyer** will be created. The contents will largely come from the vision paper (currently under development), and other already published material. Both will be published on the website as soon as it is available.

2.5.6 FINSENY in FI PPP dissemination

While FINSENY members recognize that dissemination via FI PPP, namely the CONCORD Dissemination Working Group (DWG), is an important and very convenient vehicle to get information and results disseminated to the public, only fairly recently the stage of the project started to allow to present preliminary results. Nevertheless, there have been several FINSENY publications to the FI PPP snack and on the FI PPP website in the last six months.

Also, FINSENY strives to participate in FI events, such as the Future Internet week in October 2011 in Poznan, where Fiona Williams (Ericsson) was representing FINSENY in the DWG meeting, and Johannes Riedl (Siemens) presented in the technical FI PPP session at ServiceWave (see chapter 2.3.4). FINSENY participation in the FIA in Aalborg, Denmark (May 10-11, 2012) is planned but not detailed yet; the same is true for the FI PPP "large event" in the fourth quarter of 2012.

2.5.7 Individual dissemination related to FINSENY

FINSENY consortium members are also actively contributing to books and other publications, albeit so far not on FINSENY results. Nevertheless the following contributions contain references and ideas related to FINSENY or FI PPP.

- Gilles Privat (Orange) contributed a chapter to a book on SmartGrids: The title of the chapter is "How ICT will shape Smart Grids" and contains a reference to the FI PPP. Publisher: Hermes Science Publishing/ISTE, will be published in 2012.
- Two authors from SAP Research Karlsruhe working on the FINSENY project have written a book chapter entitled "Data Analysis Challenges in the Future Energy Domain" [9] together with two partners from the Karlsruhe Institute of Technology (KIT). The chapter has been accepted to be published in the book "Computational Intelligent Data Analysis for Sustainable

Development" which will appear this year in the Data Mining and Knowledge Discovery Series by Chapman and Hall/CRC. The chapter presents and analyses selected future energy scenarios which are partly also considered in the FINSENY project. In particular, it discusses the data-analysis requirements, presents existing solutions and highlights the remaining data-analysis challenges where further research is needed.

3. FINSENY smart grid projects database

3.1 Status

The FINSENY database of (mostly European) smart grid projects has the purpose to

- keep track of ICT-relevant smart energy projects,
- collect existing and planned use cases and requirements from other projects,
- identify potential partners for demonstration projects.

At least 40 of the several hundred projects have had and continue to have an influence on the work of FINSENY. Many of the projects' use case descriptions have been re-used in FINSENY use cases or otherwise influenced the technical work packages (WP2 – WP6), including findings about ICT requirements and standards. At the current stage, several of these so-called "Top Runners"-projects are considered for testing purposes, or pilot applications in the next stage.

In the last six months, the database has been continued to be built and cleaned up. Due to the large number of overlapping sources that went into the database, some more clean-up needs to be done before the database can be publisheed. In addition, as the project progresses, still more input of consortium members is expected. The database is currently being used internally by consortium members for quick look-ups, particularly as the selection of testing facilities is one of the major tasks now. The structure of the database is unchanged – see Figure 11.

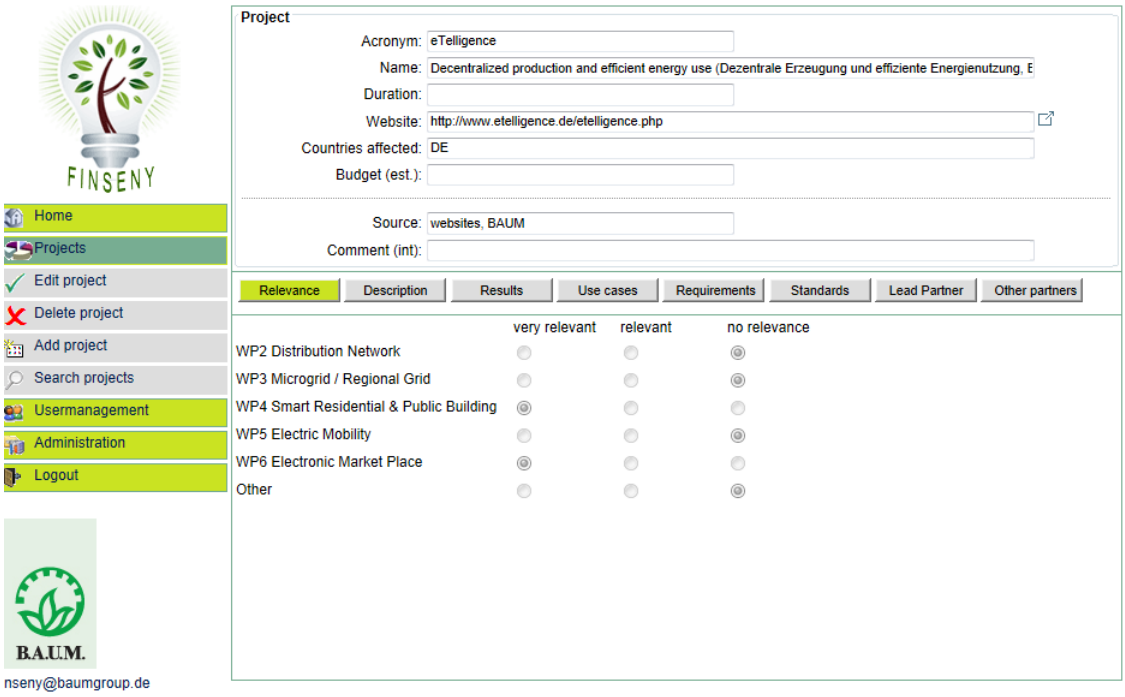


Figure11: Structure of a project entry in FINSENY database

3.2 Evaluation and plans

The smart grid projects database will be continued to be cleaned up, updated and possibly enhanced throughout the course of the project. More and more individual consortium members contribute to the database, and use it to retrieve information on relevant projects. This is particularly important now that the FINSENY project work starts evaluating possible test sites. To make this easier, we have set-up the table in chapter 4.3 that relates the most important projects to FINSENY use cases so that potential test sites can be found according to the use cases that should be tested.

With the prospect to become partners in the future trials, more projects will be approached to deliver their use case descriptions, as well as ICT requirement lists and standards used (or developed), as far as it concerns FINSENY.

4. Projects particularly relevant for FINSENY

4.1 Criteria for selection of the most relevant projects

The criteria for the selection of the most relevant projects – the so-called "Top-Runners" – have been:

- ICT main focus (including, but not limited to the Internet): we did not consider projects in other important smart grid areas, such as storage technology or consumer behaviour
- Integrated systems: most of the projects selected cover more than one work package within FINSENY, and if only one WP is covered, it has a broad approach
- Innovative: projects which try to implement new technologies, or technologies that have not been tried on these applications before
- Future scope (2020/2030): projects that look far into the future and do not expect a full roll-out in just a few years

In the six months since the last deliverable D1.2, the Top Runners projects have been further examined. In addition to what has been described in D1.2, chapter 4.2 of this report assesses for each of the Top Runners projects the following:

- Which of the projects helped or inspired the definition of FINSENY use cases
- Which projects helped to define ICT requirements for FINSENY and/or have similar ICT requirements
- Which projects are relevant for the standards FINSENY will be using as well
- Which projects are relevant for potential FINSENY testing

4.2 List & assessment of most relevant projects

Following is the selection of existing projects that are most relevant to our work at FINSENY. It is indicated, what we have learned from each project, which similarities there are, and where we will stay in contact, either because of further standardisation work or regarding potential lab sites. Each project is described with title, country or countries and FINSENY WPs affected, a short summary with relevance to FINSENY, and what we can find in the database about them. The projects are listed in alphabetical order.

4.2.1 ADDRESS

ADDRESS (EU with test sites in IT, ES, FR)	WP2, WP3, WP4, WP6

ADDRESS stands for Active Distribution network with full integration of Demand and distributed energy RESourceS and its target is to enable the Active Demand in the context of the smart grids of the future, or in other words, the active participation of small and commercial consumers in power system markets and provision of services to the different power system participants.

- Develop technical solutions both at the consumers premises and the power system level
- Identify the possible barriers against active demand development and develop recommendations and solutions to remove these barriers considering economic, regulatory, societal and cultural aspects
- Identify the potential benefits for the different power system participants
- Develop appropriate markets and contractual mechanisms to manage the new scenarios
- Study and propose accompanying measures to deal with societal, cultural and behavioural aspects
- Study, develop and validate solution to enable active demand and exploit its benefits.

Validation is planned in three sites with different geographic and load characteristics: Spain, Italy and France. Basic idea is an Energy Box at the end user and a new market player, i.e. aggregator, who sells active demand to the TSO and DSO. Since the project finishes in 2012, no results are available yet.

Several ADDRESS use cases have been an inspiration for FINSENY use cases, including load balancing, SRP-based services, CRP-based services. There are various partners both in the FINSENY and the ADDRESS consortium (Enel, Ericsson, Iberdrola, EDF, ABB, Alcatel, VTT, among others), thus ensuring appropriate knowledge transfer between the projects.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	■	Standards	□
ICT requirements	■	Trial sites	□
ICT standards	□		

4.2.2 AlpEnergy

AlpEnergy (CH, DE, FR, IT, SL)	WP2, WP3

AlpEnergy addresses a central issue of renewable energy supply: load balancing with volatile and distributed energy sources. AlpEnergy defined Virtual Power Systems (VPS) as a means for intelligently combining load management with generators, storage and demand by using ICT technology. The project finished end of 2011. A guideline, detailed case studies and various reports on technology as well as business implications are available from the project website www.alpenergy.net.

The project is relevant to FINSENY because of the following reasons:

- AlpEnergy is a Transnational Project bringing together power suppliers, development agencies, research institutes and public administrations from five different countries of the Alpine Space - France, Germany, Italy, Slovenia and Switzerland.
- AlpEnergy has considered several use cases of AlpEnergy for their work, including: Technical Virtual Power Plant, microgrid islanding mode, data acquisition and monitoring, demand side management, price induced load shift, smart metering and load balancing with stationary storages. Especially WP 3 (microgrids) could draw fromn the results of AlpEnergy
- AlpEnergy has run several trials in different countries. Some Distribution Network Owners were able, thanks to their close relationship with their Distribution System Operator, to demonstrate few use cases.

FINSENY partners BAUM and Grenoble InP have been part of the AlpEnergy consortium, i.e. the knowledge transfer is assured. FINSENY's WP3 (Microgrid) has considered several of above mentioned use cases for their work.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	■
ICT standards	□		

4.2.3 aWattGarde

aWattGarde (CH)			WP6
aWattGarde is an internet platform (Velix) that applies social psychology and marketing concepts to motivate households to conserve energy. Since April 1st 2010, about 10,000 customers have joined Velix, and more than 200,000 meter readings were entered. Velix is an interactive online application that was implemented on the basis of the open source CMS Silverstripe. Data can get entered there, or via mobile phone. SMS and email remind users to enter data. The project has started in April 2010, thus no results are available yet.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.4 BeAware

BeAware (EU: SW, IT, FI)	WP3, WP4, WP6
BeAware (Boosting energy awareness with adaptive real-time environments) studies how ubiquitous information can turn users into active players by developing: • an open and capillary ICT infrastructure sensing wirelessly energy consumption at appliance level, • ambient and mobile interaction to integrate energy use profiles into users' everyday life, • value added service platforms and models where consumers can act on ubiquitous energy information while energy producers and other stakeholders gain new business opportunities. BeAware combines research excellence with relevant industrial involvement. To ensure wide applicability, a Nordic and a Southern evaluation site are planned. A liaison with the CITRIS programme in the USA facilitates dissemination. The expected impact focuses on: • grounding the conservation potential to users' cognitive constraints and practices, • ubiquitous computing applications for sensing wirelessly energy use and enabling users to act, and • value added service models to innovate a new energy and multi-utility market. *Brief technical description:* Each household has installed a set of wireless sensors connected to each appliance. A base station gateway (installed in the household too) gathers all consumption data coming from sensors via wireless. Gathered data are sent to a centralized Sensing Layer that makes a pre-processing analysis, stores them and provides data to the Web Service Platform. Home dwellers use their smart phone to check consumption data by using Web Service Platform. Through a smart phone interface, residential dweller can: • monitor how much their appliances are consuming • check historical consumption of each appliance • check if some appliance is consuming more with respect to the last seven days • play a pervasive game by reading tips and answering quiz tailored to their energy habits in a context-aware way with the objective of improving their awareness about energy consumption in the household context • exchange messages and share good practices within BeAware social network where all BeAware users join • check a pie chart about energy consumption household breakdown Results: BeAware experimentation has been assessed via a two phase six months trial during 2009-2011 by involving several household in Sweden, Italy and Finland making a total of 50 to 60 people. Hereafter the main technical results:	

- Smart Sensor – developed by Aalto University of Helsinki (http://www.aalto.fi/)
- Sensing Layer – platform for consumption data management and elaboration developed by BASEN (https://www.basen.net/)
- Basestation – gateway deployed in each household, running on Ubuntu Linux, developed by BASEN (https://www.basen.net/)
- Energy Management Web Service Platform - lead by Engineering Ingegneria Informatica S.p.A (http://www.eng.it) – JAX-WS service platform with JSON binding for building final user application
- EnergyLife – web interface for iPhone tailored to home dweller – developed by Aalto University of Helsinki (http://www.aalto.fi/)
- Watt-LiteTwist - ambient interface for energy consumption visualisation – developed by Interactive Institute, Energy Design Studio (http://www.tii.se/)

Part of these results is available at http://sourceforge.net/projects/beaware/ in terms of source code and documentation.

Standards:

- JAX-WS has been used for developing Energy Management Web Service Platform

BeAware has been considered for its service layer as potential capabilities for the Experimentation Lab.
Website: http://www.energyawareness.eu/beaware/

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Experimentation Lab	■
ICT standards	■		

4.2.5 BeyWatch

BeyWatch (FR, ES) WP4, WP6

The work done in BeyWatch project has aspects, and use cases with a high relevancy for FINSENY, mainly in the residential domain (WP4) and in the market place area (WP6). Some use cases in WP4 and WP6 have been inspired from the project and will benefit the results and development done in the project. The main functionalities developed and demonstrated in BeyWatch that could be applied for FINSENY are for both residential dweller and utility operator sides.

A residential dweller can:

- **monitor** how much their appliances are consuming: instant power demand and accumulated energy consumption
- check historical consumption of each appliance
- **control** the intelligent home appliances (dishwasher, washing machine, fridge/freezer, and legacy appliances plugged in energy-aware smart plugs), including also the control of a combined photovoltaic & solar thermal system (which produces electricity and hot water for domestic use)
- set preferences for scheduling appliances operation and optimising the total cost of electricity for the user

and an utility operator can:

- Smooth energy control
- Load balancing control at neighbour level
- Incentive/contra-incentive electricity consumption at different times

FINSENY perspectives:

- With FINSENY, BeyWatch can be upgraded to support not only residential buildings but also commercial buildings, offices, data centres, etc.
- Higher integration with the energy market place will pave the way to provide to the “agent” system with more information that can induce better energy efficiency. Also the users will be able to get information services that will for sure raise user awareness.

Through the FIWARE enablers, BeyWatch provisioning could be easier and rapidly instantiated for very distinct markets.

A BeyWatch test bed has been selected as a candidate for the demonstration of WP4 and WP6 functionality feasibility towards large scale experimentation as planned in Phase 2. FINSENY will benefit from the experience gained and the development done in the scope of the project for the purpose of evaluating the feasibility of the scenarios defined in FINSENY.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	■
ICT standards	■		

4.2.6 BonFIRE

BonFIRE (EU) general Internet

The BonFIRE project designs, builds and operates a multi-site cloud facility to support applications, services and systems research targeting the Internet of Services community. The facility will give access to large scale virtualised computing, storage and networking resources with the necessary control and monitoring services for detailed experimentation of systems and applications.

BonFIRE will support experiments exploring the interactions between novel service and network infrastructures. Three initial scenarios have been defined to highlight the general classes of experiment that can be supported by the facility. The scenarios include:

- Extended cloud scenario: the extension of current cloud offerings towards a federated facility with heterogeneous virtualized resources and best-effort Internet interconnectivity.
- Cloud with emulated network implications: a controlled network environment by providing an experimental network emulation platform to service developers, where topology configuration and resource usage is under full control of the experimental researcher.
- Extended cloud with complex physical network implications: investigates federation mechanisms for an experimental cloud system that interconnects individual BonFIRE sites with Federica, Open Cirrus and Panlab.

The project is still ongoing (through year-end 2013), but the first round of experiments should show a few results in six months. FINSENY will stay connected through the partner ATOS.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.7 DISPOWER

DISPOWER (EU) WP2, WP3, WP4, WP6

The consortium of this FP5 project consisted of 38 different partners from utilities, power industry, service companies, research centres and universities from 11 European countries. The project has significantly contributed to the further development of technology as well as to the European exchange of experience in the field of integrating small and distributed generators into the electricity distribution grid. The project could give valuable hints as to technology which has to be developed so that the growing number of decentralized energy resources can be further integrated into the European electricity grids in the future, without losing reliability, safety and quality.

On the German residential trial site, an energy management system (PoMS) was installed, controlled via the Internet. At a commercial/industrial site in Germany, data went through the electrical connection line, with an additional possibility of using the Internet. In Spain, PoMS was installed in a residential & commercial site, and communication went through the Ethernet. PoMS apparently went well in all three configurations.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

5.2.9 e-Cube

e-Cube (IT)	WP4, regulatory aspects

e-Cube is a collaboration project funded by the Italian Ministry of Economical Development where telecom operators, energy retailers, equipment manufacturers and universities are collaborating to contribute to the Italian strategic agenda and regulation. Telecom Italia is leading the project and a FINSENY partner, thus assuring relevant knowledge transfer.

The project is assessing the public policies required to:
- raise awareness about power consumption,
- suggest the best way to diffuse these devices (voluntary vs. mandatory requirements),
- address the privacy and customer protection issues raised by the diffusion of these devices,
- guide by means of policies the use of energy,
- evaluate costs and benefits for all stakeholders (utilities, end users, communities).

With FINSENY, e-Cube could be upgraded to harmonise the Italian regulation strategy with the pan-European and ISGAN regulation strategies.

e-Cube is relevant to FINSENY because of the following reasons:
- Policies and Regulations. The project is going to analyze of the socio-economic impact of smart grids and to evaluate the policy options available (e.g. mandatory rollout of smart meters vs. incentive based strategies). It is also going to assess the role that policies can play in shaping rules and incentives, taking into account that in many areas bottom up strategies are extremely important.
- Pilots. In 2012-2013, the project plans to run four pilots in four different domains: Apartment Building, Office, Telco Central Office, Industrial and Public Structure. These are the same domains covered by the use cases of FINSENY WP4. With FINSENY, e-Cube could extend the scope of the pilots outside Italy.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	■
ICT requirements	□	Trial sites	■
ICT standards	■		

4.2.8 EDISON

EDISON (DK)	WP5, WP6

EDISON aims to design a full-scale system for implementation of electric vehicles in Denmark. The main objective is to prepare the electricity distribution network in order to allow the extensive adoption of electric vehicles fuelled by sustainable energy, mainly wind power, in Denmark. The vision is to support 400,000 electric vehicles by 2020. The aim is to design and test the infrastructure, covering both hardware and IT solutions, such as connection points for the vehicles, central charging stations for large car parks, fast charging stations, grid control strategies along with a marketplace for the energy. A prototype of the solution is being built on the Island of Bornholm.

The project finishes in March 2012.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□

ICT standards	□	

4.2.9 eTelligence (E-Energy)

eTelligence (E-Energy) (DE)		WP4, WP6
The idea behind eTelligence is the intelligent system integration of electricity generation from renewable sources and supply-oriented consumption. To this end, the project develops and field-tests: • a regional market place for electricity, • feedback systems, tariffs and incentive programs, • power generation and demand side control systems, • possibilities to utilize B2B-customers' appliances, such as swimming-pools or cold storage houses, to create flexibility, which can be used to compensate for volatile energy production from renewable energies • modern ICT and international standards A field test has been started in Cuxhaven in Spring of 2011. 650 households are testing different feedback systems for analyzing power consumption and cost, as well as CO2 emissions. Furthermore, the feed-in of a wind park, a virtual power plant and a photovoltaic system can be billed and distributed via the eTelligence-Marketplace. The marketplace also makes it possible to control the energy demand of CHPP, cold storages and smart appliances in households. Communication between market participants and the marketplace is enabled by XML-based IEC CIM-standards. Households and B2B-customers are being equipped with ICT-gateways (multibox) and smart meters. Smart Meter and ICT-multibox are linked by means of a PLC -component and connected to DSL or LWL. Thereby, smart metering and distribution of data is successfully enabled. However, the rollout of the metering systems proved to be more difficult than expected, as all 4 manufacturers have difficulties delivering enough meters in time. The project will run through Oct. 2012. Preliminary results suggest that electricity from renewable sources can be sold with more benefits for producer and consumer via the marketplace than they could be sold under the strict feed-in provisions of the German Renewable Energies Law (EEG). In fact, ICT-appliances have already facilitated the energy market and made it more efficient.		
Available in database:		Implications on FINSENY:
Description	■	Use cases ■
Partners	■	ICT requirements □
Use cases	□	Standards □
ICT requirements	□	Trial sites □
ICT standards	□	

4.2.10 E-DeMa (E-Energy)

E-DeMa (E-Energy) (DE)	WP6, WP4, WP3
The goal of E-DeMa is to reach more energy benefits and efficiency for electricity generators, municipal utilities, device manufacturers and above all customers. E-DeMa designs solutions for an intelligent electric distribution and communication network. Therefore, a bidirectional ICT-Infrastructure was developed, which enables the collection of data about energy consumption and feed-in of customers and communicates them to a marketplace. By this method, the intelligent direct control of appliances of B2B- and B2B-customers, as well as the integration of individual local energy systems will be enabled. In fact, the work program comprises of an electronic marketplace, the outline of the communication infrastructure, the requirement specification for two ICT gateways, as well as the system concept for the marketplace software including the meter data management. Results:	

- ICT-Gateways connect different types of consumers to the energy system: ICT-Gateway 1 is a Smart Meter rendering information about consumption and prices. It is based on a Multi-Utility-Communication (MUC)-System and records and communicates measurement- and meter-data. ICT-Gateway 2 is an add-on-component to ICT-Gateway 1, which enables direct control of load and local energy production. Other stakeholders, such as aggregators or energy managers, can access appliances of customers via ICT-Gateway 2. It can be operated via Windows or Linux. Household appliances are connected via ZigBee/KNX.
- A directly controllable Combined Heat and Power-Solution (CHPP) for private customers, which can compensate for fluctuating renewable energy. The CHPP is linked to ICT-Gateway 2 and can therefore be externally and automatically controlled, in order to smooth the load curve.
- 3 distinct, yet connected ICT-"nets" organize the smart home, the communication between all market participants and the market place as such
- A marketplace-platform will be implemented and enabled to communicate with other systems by means of Java Messenger Service. Thereby, it will become an information hub for all participating market actors.

A field test, which is set to commence in Spring 2012, will be able to draw on experiences in about 1500 households in Krefeld and Mühlheim. These will be equipped with ICT-appliances and, thus, connected to the marketplace and the other participating stakeholders. Different dynamic tariff options and possibilities to control B2C- and B2B appliances will be tested, in order to analyse in how far flexibility can be created.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.11 ElectroDrive Salzburg

ElectroDrive Salzburg (AT)	WP5

ElectroDrive Salzburg GmbH offers electric mobility on a subscription basis since the beginning of 2009. Customers pay a monthly fixed rate and receive an electric vehicle and access to public charging stations with free eco-power. Currently, there are e-bikes, e-mountain bikes, segways and e-cars available. By the end of 2012, the company wants to have had added 1500 electric vehicles onto the streets of Salzburg. Long-term, ElectroDrive Salzburg wants to sell mobility, however, not vehicles.

The system has been developed with national funding (25 million €) in the Austrian programme for Electric Mobility Regions. Internet based ICT platforms have been developed to manage the fleet of vehicles.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.12 ELVIRE

ELVIRE (EU, with test sites in IT, ES, FR)	WP5

ELectric Vehicle communication to Infrastructure, Road services and Electricity supply (ELVIRE) focuses on the development of an effective communication and service platform that helps drivers to manage the charge of their Electric Vehicle and enables efficient use of sustainable energy. The project's purpose is to develop an effective system which is able to neutralize the driver's "range anxiety", i.e. the fear to break down due to the vehicle's power range limitation. In order to ease and optimize energy

management of EVs and to cope with the sparse distribution of electrical supply points during the ramp-up phase, innovative ICT and service concepts will be developed.

As the project investigates and develops EV communication, in particular two important ICT aspects, on-board services and external services, the projects results are clearly relevant for FINSENY. However, WP5 concentrates more on the charging infrastructure and organisational aspects like roaming than on the EV communication itself. This is an important prerequisite and therefore ELVIRE is an important project without a direct impact on FINSENY. SAP is partner in both projects, thus making sure important knowledge transfer takes place.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	■	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

5.2.15 Energy@Home

Energy@Home (IT) WP4, WP6

Energy@home is a collaborative project among Telecom Italia, Enel, Indesit Company, and Electrolux where white good manufacturers, energy distributors and telecom operators aim to define effective specifications for Home Area Network communication between energy metering system, broadband residential gateway, and appliances, both smart appliances with communication and logics capabilities as well as legacy appliances through smart plugs.

Energy@home covers several use cases of FINSENY WP4 concerning tools for monitoring and controlling energy loads at the user premises. They cover all functionalities spanning from customer awareness until the achievement of a fully integrated Energy Management system where appliances can coordinate and react to complex tariff schemes as well as to events sent by the grid, both by the energy distributor and the energy retailer. Energy@home – through an official liaison with ZigBee Alliance – defined a set of technical specifications which are very relevant to FINSENY WP4 and which are being integrated into the ZigBee Home Automation Profile version 1.2

Furthermore, a field trial with 100 users has just started to analyse the technical effectiveness and user acceptance of the solution, and, with FINSENY, there is the possibility to extend the scope of this trial to a pan-European approach. On the other hand, FINSENY could benefit from the results of this trial.

Furthermore, Energy@home is going to create a not-for-profit association to create the basis for the commercial exploitation of these kinds of systems.

The project is very relevant to FINSENY because of the following reasons:

- Energy@home aims at defining international standards. The released specifications are based upon ZigBee Alliance and CENELEC CECED (that is the European Committee of Domestic Equipment Manufacturers) specifications. A formal liaison with ZigBee Alliance has been signed and Energy@home is already collaborating with ZigBee Alliance in order to integrate these new use cases into the next ZigBee Home Automation Profile standard. The project is also collaborating with the Home Gateway Initiative (HGI), an international body composed where major broadband service providers and leading vendors of digital home equipments defines the requirements for digital home building blocks. Energy@Home collaborated with the Energy Efficiency Task Force of HGI by providing glossary, use cases and requirements for the Home Energy Gateway functionality necessary for Home Energy Management and Control Services.
- Use Cases. Energy@home provided a well defined and industrial-grounded set of use cases and glossary for Home Energy Management that are relevant to FINSENY WP4. They were also implemented by the project partners.
- Trials. Energy@home partners have just started a trial in private houses of real customers that are using the prototype system. A formal collaboration with FINSENY would be beneficial to both projects in order to exchange information about user feedback but also in order to plan common pan-European trials for the future.
- Energy@home is going to register as a not-for-profit association. A liaison between FINSENY and the Energy@home association would be mutual beneficial, also some partners of FINSENY have

already expressed their intention to be members of the association.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	■	Standards	■
ICT requirements	□	Trial sites	■
ICT standards	■		

4.2.13 FENIX

FENIX (EU)		WP2, WP3	
The project is relevant to FINSENY because of the following reasons: • FENIX have been developing research and demonstration activities on Distribution Network and load management. The project was trying to prove the opportunity to rely on technical and commercial aggregation of Decentralized Energy Resources for power system services. • Use Cases. FENIX provided a well defined and industrial-grounded set of use cases and glossary for Energy Management on both power grid and load management (services for the grid) that are relevant to FINSENY WP2 and WP3. They were also implemented by the project partners. All Business and Control Use cases of WP3 are in relationship with the FENIX project (Technical Virtual Power Plant and Commercial Virtual Power Plant) on the Distribution Network prism and can be extended to Microgrid. • Trials. FENIX has run two major trials. One in the UK about management of small combined heat and power (CHP) units plus a large CHP associated with a swimming pool, power metering of foreign customers was also executed. The second trial was Spain close to GAMARRA with different generation units (CHP and wind farms) with orders that were send to both generation and load customers (FENIX BOX). FINSENY partners IBERDROLA, Grenoble InP (through IDEA joint research unit) and EDF have been part of the FENIX consortium, i.e. the knowledge transfer is assured. The phase II of FENIX is the ADDRESS project (see http://www.addressfp7.org)/.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	■
ICT standards	□		

4.2.14 G4V

G4V (EU)	WP3, WP5
The G4V project was started in 2009 with the goal to analyze the impact and possibilities of a mass introduction of electric and plug-in hybrid vehicles on the electricity networks in Europe. The objective of G4V was to develop an analytical method to evaluate the impact of a large scale introduction of EV and PHEV on the grid infrastructure and a visionary "road map" for the year 2020 and beyond, taking into account all stakeholders and generating fast and openly available results. Driven by major European Distribution System Operators and different research institutions a sufficient amount of grid data could be gathered and analyzed regarding the different effects of electric mobility in different European countries. Besides those influences on distribution grids, other technical, environmental, social, economic and regulatory topics have been addressed. With regard to FINSENY, two main aspects are of highest relevance. WP4 of the G4V project addressed all ICT related issues of electric mobility and was able to derive a set of ICT requirements for different EV scenarios. With respect to the WP2 and WP3 of FINSENY, grid studies of the G4V project are of highest relevance, where a large number of different European distribution grids where analyzed in different scenario worlds characterising future situations with different ICT systems in place and different	

regulatory frameworks. Each of the scenario worlds allowed for different strategies of controlled EV charging.

One of the key findings in this part of the project is that ICT may help to reduce grid reinforcement cost due to extra load caused by EV, but other charging strategies carried out by means of ICT may also be harmful to the grids.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.15 Green eMotion

Green eMotion (EU) WP5; WP3

As an electric mobility project, Green eMotion has influenced mostly WP5 in FINSENY. Within Green eMotion, a framework is developed that consists of interoperable and scalable technical solutions in connection with a sustainable business platform, combining new Smart Grid developments and innovative ICT solutions. Green eMotion also considers the smart grid infrastructure - thus, the project is relevant for WP3 as well.

In WP5, several aspects of roaming and billing such as financial clearinghouse mechanisms are considered and WP5 develops the functional architecture of these scenarios. Two partners of FINSENY's WP5 (ESB and SAP), and beyond that also EDF, Enel and Iberdrola are partners of Green eMotion as well, so knowledge transfer is assured in a general way, although no public deliverables of Green eMotion that directly affect FINSENY are available yet.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.16 GRID4EU

GRID4EU (EU: DE, SE, ES, IT, CZ, FR) WP2, WP3, WP6

Grid4EU is led by a group of European DSOs and aims at testing in real size some innovative system concepts and technologies in order to highlight and help to remove some of the barriers to the smart grids deployment (technical, economic, societal, environmental or regulatory). Grid4EU aims at testing in real size some innovative concepts and technologies able to remove part of the barriers to the smart grids deployment and the achievement of the 2020 European goals. The project focuses on how distribution system operators can dynamically manage electricity supply and demand, which is crucial for integration of large amounts of renewable energy, and empowers consumers to become active participants in their energy choice.

Main Objectives:
- Develop and test innovative technologies and define standards through the set up of demonstrators
- Guarantee the scalability of these new technologies and replicability over Europe
- Analyse SmartGrid Cost-benefits (B-Case)

R&D main challenges:
- Using more Renewable Energy Sources connected to distribution networks,
- Implementing active, more efficient participation of customer to electricity markets (Active Demand)
- Secure energy supply - Network reliability
- MV / LV network Supervision & Automation

- Improving peak load management through increased interactions between network operation and electricity customers
- Demand Side Management (DSM), VE, Storage, Micro Grids

Grid4EU is organized into six physical demonstrators located in six different EU countries (Italy, France, Germany, Spain, Sweden, Czech Republic). The project has just started in summer 2011. ENEL and IBERDROLA are both members of GRID4EU and FINSENY, thus knowledge transfer will be assured.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.17 HOMES

HOMES (FR) WP4, WP6

Optimised Conditions for Homes and Buildings, Controlling Energy and Services (HOMES) is designed to create solutions for achieving optimal energy performance in all buildings. The goal is to optimize energy use, diversify energy sources, sustain energy performance and facilitate the deployment of energy management systems in new and existing commercial and residential buildings in Europe. HOMES will make it possible to achieve energy savings up to 20% and is part of the development strategy of Schneider Electric in the field of energy efficiency.

HOMES is setting new architectures for energy control and distribution in buildings, including innovative sensor, control and power technologies which will result in market products and solutions to improve efficiency, and the development of new services. All electricity consumed in the building will be optimized due to communicating sensors located in each building area, the collaboration between the different systems in the building and an "active control" of Energy – even considering building occupation. The sensors measure parameters of the area (environment, presence, luminosity ...), to allow the control unit ("Active Control Unit") for power, control and communication to manage the equipment and to communicate with users.

There are already five prototypes that have been tested in pilots:

- Roombox solution, a decentralised and cross-application electric command and control architecture, from Schneider Electric,
- HVAC (Heating, Ventilation and Air Condition) emissions controller, for more accurate ventilation management and improved transmission of information, from CIAT the wireless and autonomous sensor, integrating all environmental parameters into a same device, from Schneider Electric and CEA,
- eveBIM collaborative software, designed to integrate ideas on energy efficiency at every stage in the construction and management of a building, from SCTB,
- ZigBee and carrier current equipment, to make available to the living environment an integrated group of products to manage electrical load on one hand and measure consumption on the other, from Schneider Electric and Watteco.

HOMES has also launched five trials:

- An office building (Rhone Alpes)
- A school (Rhone Alpes)
- 2 hotels (Languedoc Roussillon and PACA)
- A new residential building (Ile de France)

Thanks to the variety of types of buildings trialed, both new and existing, HOMES gives FINSENY valuable findings on the constraints and needs related to ICT for energy efficiency and management of energy demand in different types of buildings. The prototypes developed by HOMES should also be considered by FINSENY as existing enablers that could be evaluated in WP8. FINSENY partner EDF is also member of HOMES, thus knowledge transfer is assured.

Available in database:	Implications on FINSENY:

Description	■	Use cases	■
Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.18 ICT for Electric Mobility

ICT for Electric Mobility (DE)			WP5
"ICT for Electric Mobility" is a support program operated by the German Federal Ministry of Economics and Technology (BMWi) in cooperation with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). Within the framework of a nation-wide technology competition, seven projects were selected that by 2011 will develop prototypes and economically viable solutions for the use of ICT in electric mobility systems. A total of 47 companies and scientific research institutes are involved in the winning projects. The projects focus chiefly on (i) ICT-based charging, control, and billing infrastructures for various vehicle types and (ii) effective business models, services and potential standards that can be developed to fit these infrastructures. Within the framework of a nation-wide technology competition, the Economics and Environment Ministries selected seven projects that by 2011 will develop important new ICT-based technologies and services to promote electric mobility. (All of the projects are also linked to at least one E-Energy project and investigate different aspects of the grid integration of electric mobility.) These projects focus on key areas such as systems integration (smart charging and vehicle-to-grid systems), vehicle navigation and driving assistance, fees and bill payment systems, vehicle fleets, and mobility services. Total investment amounting to roughly 100 million Euros will be allocated to these projects, which will develop prototypes and economically viable solutions to be assessed for the very first time in comprehensive field tests. Thus the "ICT for Electric Mobility" programme forms a key pillar of the German government's National Development Plan for Electric Mobility. The seven projects are: GridSurfer, Harz.EE-mobility, e-mobility, Smart Wheels, Future Fleet, MeRegioMobile, E-Tour Allgäu The following ICT for Electric Mobility partners are involved in FINSENY and contribute their expertise from ICT for Electric Mobility, as well as feed back insights and results from FINSENY (all from FINSENY WP 5): In WP5, billing mechanisms for electric mobility are investigated and the corresponding functional architecture is defined. The work done in e-mobility by SAP has influenced this endeavour, in particular the use cases Charge Load Management and Optimized charge scheduling (UC-GO-CLM) of WP5. Several FINSENY partners play important roles in the project thus ensuring relevant knowledge transfer: • SAP: Future Fleet, e-mobility, MeRegioMobil • BAUM: head of ancillary research ICT for Electric Mobility • Siemens: Harz.EE-mobility • RWTH Aachen: Smart Wheels • STAWAG: Smart Wheels			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.19 INTEGRAL/STREP

INTEGRAL/STREP (EU)	WP2, WP3, WP4, WP5
The project is relevant to FINSENY because of the following reasons: • INTEGRAL have been developing research and demonstration activities on Distribution Network and load management. The project was trying to prove the opportunity to rely on distributed control of both power system devices and Decentralized Energy Resources for power system services through 3 trial sites (covering normal critic and emergency operation mode).	

- Use Cases. INTEGRAL provided a well defined and industrial-grounded set of use cases for Energy Management on both power grid and load management (services for the grid) that are relevant to FINSENY WP2, WP3, WP4 and WP5. They were also implemented by the project partners.
- Trials. INTEGRAL has run three major trials. One in the Netherlands about normal operation mode and management of end user devices (through the Power Matcher box which include an agent based technology to interact within each others) such as combined heat and power, small size renewables, electric vehicles. The second trial was Spain in Mas Roig, close to Girona about microgrid experiment with PV panels, small wind generator, batteries, diesel generator with hot water tank (CHP) and home appliances. The different devices were coordinated with JAVA based agent and were communicating within ZigBee protocol. The third demonstrator was in France, close to Grenoble. It consists in a reduced scale distribution network allowing short circuit tests and associated agent based self healing function that permits the sizing of the ICT infrastructure in terms of performances.

A strong liaison between FINSENY and the INTEGRAL consortium exists as few partners from FINSENY such as Grenoble InP, and EDF (through the IDEA joint research centre are members of FINSENY. Thus FINSENY partners Grenoble InP and EDF (through IDEA joint research unit) have been part of the INTEGRAL consortium, i.e. the knowledge transfer is assured and trial opportunities are covered.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	■
Use cases	■	Standards	□
ICT requirements	■	Trial sites	■
ICT standards	□		

4.2.20 IRENE

IRENE (DE) WP2, WP3, WP5

Project IRENE started in April 2011 and deals with future technical and economic solutions for the challenges in the field of distribution grids. It searches for means and methods to cope with distributed generation and expected impacts from electric mobility on the grid. IRENE will test the situation of the year 2020 in a sub-grid in the Allgäu region which already has a penetration of distributed renewable energy resources and (!) electric cars as foreseen for 2020 in all Germany. IRENE uses latest technology sensors and actuators to guarantee safe, economic and environmental friendly operation a combined power and mobility system. Empowering the low voltage grid for seamless integration of electric mobility and DER.

Key elements of IRENE are:

- coping with stress to the grid especially from volatile photovoltaic systems (PV) using a real time compensation system to avoid expensive grid upgrades,
- combining PV with stationary storages and controllable load management of mobile batteries,
- using cost optimized ICT tools to realize a smart grid with Grid to Vehicle (G2V) and Vehicle to Grid (V2G) capabilities.

As IRENE started at the same time as FINSENY did, there are no findings of IRENE yet, that FINSENY could use directly. But FINSENY partners Siemens (though a different department) and RWTH Aachen are partners of this project as well, thus ensuring that information flows both ways.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.21 Kalasatama

Kalasatama (FI)	WP2, WP5, WP6

Kalasatama is a new urban development area in the City of Helsinki. In order to support the environmental targets for a sustainable city, Kalasatama will be a test site for the demonstration of a smart grid system with the main components of the demonstrator are planned to be:

- Smart Power Distribution
- Distributed Energy Storage for Network Support and DER applications
- Smart Homes / Buildings with Demand Response applications
- Distributed Energy Resources – DER – Intermittent Generation
- Energy Storage
- Integration and Use of Electric Vehicles (EVs)
- System Integration for Smart Grid Applications
- End customer services and pricing solutions
- Smart Grid Laboratory

The initial phase with Stakeholder requirement collection, conceptual design and implementation roadmap development was finalized in June 2011. The project implementation planning and detailed roadmap definition are ongoing and the implementation for the first projects is intended to be completed by June 2012.

As can be seen from the planned demonstrator components the Kalasatama scope is closely aligned with the Smart Grid scenarios covered by FINSENY. Smart Distribution Network, Smart Buildings, Electrical Vehicle and Energy Market aspects are covered and even Microgrid solutions could be demonstrated. Kalasatama therefore will be considered as a possible Smart Grid trial site for the second phase of the FI PPP. Furthermore a common trial with the FI PPP SafeCity project will be evaluated, demonstrating the use of the FI PPP core platform for several usage areas in parallel.

The Kalasatama project partners are: NSN, ABB, Helen Sähköverkko, Helsingin Energia and Fingrid, thus FINSENY will be connected through two project partners (ABB and NSN). VTT is a partner in FINSENY and SafeCity.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	■
ICT standards	□		

4.2.22 MeRegio (E-Energy)

MeRegio (E-Energy) (DE)	WP2, WP3, WP6

MeRegio (part of E-Energy) aims toward the development of a certificate for "minimum emission regions". EnBW, in cooperation with their partners ABB and SAP, which are also involved in FINSENY, equipped 1,000 customers with smart meters and applications for an innovative energy management that helps control and regulate consumer loads and decentralized plants. Simulation models allow for examining and analyzing different concepts and strategies. Particular attention is paid to electric mobility. MeRegio means to support building automation systems that control heating, ventilation, air conditioning and lighting systems while ensuring the security of the premises.

ICT-applications connect the physical energy infrastructure with market conditions, and render a more efficient and dynamic energy market that is equipped to deal with the challenge of integrating high shares of renewable, but fluctuating energies. Marketplaces which come with differentiated software to deal with different kinds of energy products are being tested.

Households participating in the final phase of the MeRegio-fieldtest are equipped with smart home appliances, which can be directly controlled via ICT. The created flexibility can be used make the energy system more dynamic and less prone to load peaks the system cannot bear. Furthermore the household are connected to ICT-energy-infrastructure via smart meter and other visualisation appliances that enable

them to keep track of their energy consumption.
- Enabling the network to integrate users with new requirements
- Enhancing efficiency in day-to-day grid operation
- Ensuring network security, system control and quality of supply
- Improving market functioning and customer service
- Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management

The MeRegio project consists of 4 major systems: a network management system, demand side management, marketplace and the consumer world which consists of smart metering and energy management. Transmission of data and communication between the systems is enabled by means of a CORE-platform, which was developed by IBM. The CORE platform keeps track of all data and sends it to different systems in appropriate form. For the development of individual system components, old ICT-appliances were paired with innovative new appliances that were developed during the course of the project.

The households are equipped with either a smart meter by Landis&Gyr, Wiki 1, or a smart meter developed by EnBW, Wiki 2, which makes a bidirectional communication between customers and other energy market participants possible. A control box unit links demand side management and appliances with households and businesses together. In fact, ICT-techniques enable the balancing of supply and demand within the energy market. Communication between individual systems is based on CIM standards and smart appliances are based on the EEBus.

With its concentration on standard protocols and its focus on managing homes as smallest possible cells in a smart grid, MeRegio is a very valuable partner of FISNENY. In fact, this is one of the most important projects for WP3 and WP6, in particular for energy contract brokering (WP6_IFUCEU_SC4) and trading flexible capacity (WP6_TS_SC3). Both scenarios have been considered in Tasks 6.1, 6.2 and 6.3. However, trading flexible capacity (WP6_TS_SC3) is by far more interesting and is a valid candidate for a FINSENY trial as the market-based mechanisms in this scenario can bring together electric mobility, grid stability, involvement of final customers & smart homes etc.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	■
ICT standards	□		

4.2.23 MERGE

MERGE (PT/EU)	WP2, WP5

MERGE aims at identifying and preparing solutions for the operational problems that may occur to the electric grids, the generation system and its commercial operation as a result of progressively increasing deployment of EV.

The conceptual approach in this project involves the development of a methodology consisting of:
- Development of a management and control concept that will facilitate the transition from the conventional paradigm to the MERGE concept,
- Development of an evaluation suite that consists of methods and programs of modelling, analysis, and optimisation of electric networks into which electric vehicles and their charging infrastructure is integrated
- Development of dynamic power electronic interface models
- Development of electricity network management and control models
- Modelling EV behaviour in market environment
- Electricity markets and smart meters
- Quantification of the impacts resulting from large EV deployment

IBERDROLA is member of both the MERGE and the FINSENY project, thus information is assured to flow both ways.

Available in database:	Implications on FINSENY:

Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.24 Microgrids/More Microgrids

Microgrids/More Microgrids (EU)			WP3
This project aimed at the increase of penetration of microgeneration in electrical networks through the exploitation and extension of the microgrid concept, involving the investigation of alternative microgenerator control strategies and alternative network designs, development of new tools for multi-microgrids management operation (involving Distribution Management System architectures and new software adaptation) and standardisation of technical and commercial protocols. In all this development the microgrid concept played a key role. The objectives of the project were: • Investigation of new micro source, storage and load controllers to provide efficient operation of microgrids. • Development of alternative control strategies (centralised versus decentralised) • Alternative Network designs • Technical and commercial integration of Multi-Microgrids • Field trials of alternative control and management strategies • Standardisation of technical and commercial protocols and hardware • Impact on power system operation • Impact on the development of electricity network infrastructures Some of the project's use cases were relevant for FINSENY's WP3 work.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.25 MIRABEL

MIRABEL (EU)	WP3, WP6
The main goal of the MIRABEL Project (Micro-Request-Based Aggregation, Forecasting and Scheduling of Energy Demand, Supply and Distribution) is to develop an approach on a conceptual and an infrastructural level that allows energy distribution companies to balance the available supply of renewable energy sources and the current demand in ad-hoc fashion. The technology developed in the MIRABEL Project will improve this situation considerably. In detail, the project works on a concept of micro-requests with time shifts to handle the demand and supply of energy on a household level. Further, they define methods to predict the energy supply and demand in the small (i.e., for households) and in the large and to update predictions over time. Micro-requests are aggregated (and disaggregated) on a regional level, and a scheduling approach is developed for energy production and consumption based on aggregated requests. Finally, the methods and algorithms will be implemented in a distributed, highly decentralised and scalable infrastructure to handle the high amount of data (from the mass of households). As a result of the MIRABEL Project, the overall energy production and consumption cycle will be more efficient, and MIRABEL expects their approach to result in peak-demand reductions of approximately 8-9% for the total grid. The project is of particular relevance for FINSENY's WP3, as it investigates a market-based demand-side-management approach. It relies on data management and analysis mechanisms – in particular forecasting – and leads to a number of ICT-related requirements. As the marketplaces investigated in	

WP6 frequently rely on forecasting mechanisms, MIRABEL has influenced the work in WP6, and its results on forecasting can be an important input when it comes to implementation of such mechanisms.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	■	Standards	□
ICT requirements	■	Trial sites	□
ICT standards	■		

4.2.26 MoMa (E-Energy)

MoMa (E-Energy) (DE) WP4, WP6, WP2, WP3			
The project concentrates on an urban conurbation with a high penetration rate in which renewable and decentralized sources of energy are used to a large extent. Within the framework of the E-Energy project, a representative large-scale trial is being conducted both in Mannheim and in Dresden to demonstrate the project can be applied and translated to other regions. The trial uses new methods to improve energy efficiency, grid quality, and the integration of renewable and decentralized sources of energy into the urban distribution network. The focus is on developing a cross-sectoral approach (involving electricity, heating, gas and water) to interconnect the consumption components with a broadband powerline infrastructure. MoMa develops and deploys a new ICT infrastructure with cellular architecture to maintain grid quality and boost energy efficiency and receptivity for renewable energy as well as to strengthen grid users' personal responsibility consumption. Proactive users in the energy market can gear their power consumption and generation following variable pricing structures. Real-time information and energy management components help the customer contribute to even greater energy efficiency. Main objectives of MoMa are: • Enabling the network to integrate users with new requirements • Enhancing efficiency in day-to-day grid operation • Ensuring network security, system control and quality of supply • Improving market functioning and customer service • Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management. The distributed ICT architecture with energy-management devises (energy butlers), cell controllers etc. poses specific requirements to ICT infrastructure.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.27 NExtGen

NExtGen (DK)	WP2
R&D project about ancillary services from local CHP units on the Danish island of Bornholm: The project was a collaborative project led by CET DTU containing three subprojects, which are organized as a demonstration of Brædstrup CHP plant and two theoretical PhD projects: • Demonstration of information and communication system for decentralized CHP unit. • Information and communication system to market-based system integration of the central production (system services and electricity). • Use of information and communication system for improved system security. The project has direct representation in the standardisation IEC workgroup TC57 WG17 working specifically on the preparation of the upcoming open communications standard IEC61850-7-420 for local production	

• Active voltage and VAR control and monitoring • Development and implementation of IEC 61850-7-420 for CHP • Investigation of VAR-markets EcoGrid EU uses some of the results of the NextGen project.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.28 NOBEL

NOBEL (EU)	WP3, WP6
NOBEL's mission is to develop, integrate and validate ICT enabling a reduction of the currently spent energy, by providing a more efficient distributed monitoring and control system for distribution system operators (DSOs) and prosumers. By having a cross-layer and open information flow among the different actors involved, NOBEL aims at making better and more timely predictions, and at injecting new dynamics into the system that can eventually lead to better energy management and achieve better energy savings. The essence of the NOBEL project was used in a WP6 use case ("Energy markets for neighbourhoods", WP6_TS_SC4). This FINSENY use case has been further developed and is still a candidate to be tested in a trial, but this will likely not be covered by the NOBEL project itself.	

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	■	Standards	□
ICT requirements	■	Trial sites	□
ICT standards	□		

4.2.29 OpenNode

OpenNode (ES, DE, FR, AT, PT)	WP2, WP3, WP4
From a general standpoint, OpenNode can be considered one of the pioneer projects which provides the foundation to define the scope of FINSENY. Also, OpenNode impacts FINSENY execution since the result set of OpenNode allows analysing and managing additional requirements, taking into account the objectives to achieve. The summary of specific impacts of OpenNode for FINSENY is: • OpenNode developed Use Cases with metering proposes independent of the category of device. • OpenNode developed ICT Requirements as a result of the current need of Utilities and Solution Providers but focused on the Customers. • OpenNode is testing the communication channels available, the exchange of data and availability of information related to the components. Moreover, currently OpenNode is testing communications and data models based on the IEC 61850 and IEC 61870-5-101/104 standards by testing the exchange of measurements between the Smart Meters, the Secondary Substation, the Middleware and the SCADA systems of the utilities. Once the results of the testing and compliance activities are available, FINSENY could use them to consolidate and support its own testing processes for the experimentation labs. OpenNode has attended several IEC 61850 (TC 57 Wg10) standardisation meetings in 2010, 2011 and during 2012. These meetings are being organized by the members of Wg10 approximately every 3-4 months focused on several new developments regarding the IEC 61850 standard, which included amongst others: the harmonisation of CIM and 61850. From FINSENY's point of view, the results of OpenNode will impact most of the UC WP's that require manage distribution of energy, energy trading and controlling. In particular, the technological	

components used by OpenNode make it possible to detail the ICT requirements associated with the solution developed for testing this pilot.
Currently most of the aspects, information and conclusions that could be useful for FINSENY are not available, only the public documents are accessible on the OpenNode Web Portal. But most of relevant information for FINSENY that has been generated as a result of OpenNode's development and testing activities is transmitted directly to the WPs Leaders during the meetings of the Project Management Team (PMT), including:

- Agreements concerning standards
- Results of tests on communication channels
- Available and complexity of metrics
- Stakeholders and User expectations

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	■
Use cases	■	Standards	■
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.30 Park & Charge

Park & Charge (EU) WP5

Park & Charge is a concept and project for public charging facilities for electric road vehicles. It originates in Switzerland, but is now accessible in large parts of Europe. Park & Charge tries to make use of an existing network of charging stations with a minimum of cost. Several types of charging stations are in use and their number will be expanded step by step. Park & Charge operates LEMnet (www.lemnet.org), an international directory of for charging stations. This non-profit directory does not only list Park & Charge stations, but also many other stations – private as well as public ones. Park & Charge as well as LEMnet are open to all providers, operators and users.

LEMnet does not only contain overviews maps of all locations, where charging stations are available, but also gives detailed information where the station can be found and what drivers can do close by during the time of recharging their vehicles (shopping, restaurants, cultural facilities etc.). To be registered in this list has, of course, also a promotional aspect for these shops. This multifunctional directory can be seen as "state of the art" on which FINSENY will build up for the Future Internet E-Mobility services. In particular, the real-time and machine-readable offer of this information will improve the possibilities to provide EV users with additional, valuable apps.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.31 Plugged-in Places

Plugged-in Places (UK) WP5

This programme is developing EV infrastructure in 8 areas of the UK to give confidence to potential purchasers of EV's Integration of DER and new users.

Plugged-in Places will provide the charge points to support 'Plug-in Cars' – pure electric vehicle (EVs), plug-in hybrid electric vehicles (PHEVs) and hydrogen cars. They are intended to demonstrate how electric vehicle charging works in practice in a range of different settings – urban, suburban and regional – as well as testing innovative technologies such as rapid charging, inductive charging and battery swap.

The Plugged-In Places programme has made £30m available to match-fund eight pilot projects (in Central Scotland, the East of England, Greater Manchester, London, the Midlands, Milton Keynes, the North East of England and Northern Ireland) installing and trialling recharging infrastructure in the UK

to support the Carbon Plan commitment to install up to 8,500 charge points. These are led by local consortia including private and public sector organisations, local utilities and businesses to secure investment in plug-in vehicle infrastructure for their areas.

The projects are creating a geographical focus for the development of the early market (mitigating the risk of spreading infrastructure provision too thinly), with schemes now starting to become operational. In addition, each project offers unique insights into how the national picture will develop. For example:

- The projects are trialling different recharging technologies – including standard, fast, rapid and inductive recharging – in a range of different locations.
- Through connections to Ofgem's Low Carbon Network Fund projects, the North East and London are investigating how electric vehicles will connect to the smart grid.
- The Northern Ireland project is working closely with a parallel scheme in the Republic of Ireland to test and resolve issues around international and cross-border operation.
- The projects are trialling different delivery models for infrastructure, including approaches that are led by the public sector (e.g. Milton Keynes, Scotland, Northern Ireland) and the private sector (East of England, Greater Manchester), as well as membership models (London, North East), pre-paid models (Northern Ireland) and pay-as-you-go systems (Greater Manchester).

A number of projects are investigating recharging in the home, including East of England and Northern Ireland, with the Midlands project aiming to make 1,000 properties in a new housing development in Corby 'plug-in vehicle ready'.

This project was investigated in-depth in the preparation of WP5 use cases.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.32 PREMIO

PREMIO (FR) WP3, WP2, WP4

The purpose of PREMIO ("Production Répartie, Energies Renouvelables et Maîtrise de la Demande en Electricité, Intégrées et Optimisées") is to study how the various energy resources distributed across the PACA region (South East of France) can be harnessed to achieve a global objective, such as reducing CO2 emissions or load peaks. Ten resource types are being investigated, such as small generating plants using renewable energy (solar or biogas), systems for active control of heating, heat pumps and public lighting, and electricity or heat storage solutions.

The project's control unit is now operational, and the first data are starting to come in from the field. The control unit algorithms were developed by EDF R&D, which is also participating in 4 of the 9 system tests being conducted. These experiments cover individual electricity storage units coupled to photovoltaic panels, residential and commercial load shedding, heat pumps coupled to hot water tanks, and wood-burning stoves designed to replace individual electric heaters.

At this stage, the PREMIO project has already shown that, even with communication technologies deemed as mature, there is still a high unsatisfied need for interoperability and reliability and, even sometimes of coexistence of technologies. A feedback on these needs and requirements has been capitalized by the project and should help FINSENY to focus on the most relevant ICT requirements. Knowledge transfer to and from FINSENY is assured by the common partner EDF.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.33 RegMod Harz (E-Energy)

RegMod Harz (E-Energy) (DE)	WP2, WP3, WP5, WP6

RegModHarz is part of the E-Energy project and partner project of Harz.EE-mobility. It supports the technical and economic development and integration of renewable energy resources by deploying information and communication technology (ICT). The project deals with the creation of an efficient energy infrastructure with a maximum share of regional renewable energies as well as their organisation and operation under market conditions. RES producers, controllable consumers and energy storage devices will be coupled by electronic market places and distributed control mechanisms to a large virtual power plant.

Major objectives are:
- Enabling the grid to integrate users with new requirements
- Enhancing efficiency in day-to-day grid operation
- Ensuring network security, system control and quality of supply
- Improving market functioning and customer service
- Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management

Since RegModHarz concentrates on the assessment of the need for ICT driven grid operation and demand side management devices, FINSENY can draw from those results when it comes to assess the scaling factors for FI Smart Grid solutions.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.34 SAVE ENERGY

SAVE ENERGY (EU: NL, FI, SE, UK, PT)	WP4

Information and communication technologies (ICT) are recognized as enablers for economic growth and higher energy efficiency. The main objective of the SAVE ENERGY project is to make use of ICT to transform the behaviour of users of public buildings regarding energy efficiency through serious games and real time information from sensors and actuators. SAVE ENERGY will build upon the Living Labs methodology to provide an engaging virtual environment for users, citizens and policy makers to gain awareness, understanding and experience associated with energy saving attitudes.

The SAVE ENERGY Project aims to transform the energy consumption behaviour of public building users – focusing on public servants and citizens – by applying existing ICT-based solutions, specifically real-time information from building management systems and serious games, in an innovative user-driven perspective. The project brought together 16 partners – including public authorities, public agencies, universities, research institutes, SMEs and corporations – to implement five large-scale pilots in five different countries (in Lisbon/Municipality Technical Services, Manchester/Art Gallery, Leiden/Town Hall Services, Lulea/House of Culture, Helsinki/Schools) to test, benchmark, validate and stimulate new strategies and actions to the wider uptake of energy-efficient behaviours.

The pilots are committed to implement energy efficiency policies and to cooperate for the evaluation of innovative ICT-based solutions covering a varied range of building envelopes, usage patterns, functional programmes and available technologies. From office spaces to public schools, the building management systems of the chosen spaces make available information about heating, air conditioning, ventilation, lighting, and other equipment or devices to be either distributed in real time or fed into serious game. The real time information technologies used in the pilots also allow some level of controlling based on preferences, past knowledge or energy saving targets. While important savings are expected from enhanced building management systems and improved awareness of consumptions patterns and simulations, it is the direct transformation of behaviours related to energy efficiency that is likely to bring the most results.

The main objective of the SAVE ENERGY Project is to address the challenges to close the attitude-behaviour gap between the awareness that energy waste is a problem and behavioural transformation to reduce energy consumption and greenhouse emissions, globally considered as one of the greatest challenges facing the public climate change agenda.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.35 SEC (Smart Energy Collective)

SEC (Smart Energy Collective) (NL)	WP2, WP5, WP6
The Smart Energy Collective is an industry-wide collective that is setting up 5 to 10 large-scale smart grids demonstration projects across the Netherlands with a total of around 5,000 private and small business end-users. This industry initiative is dedicated to the practical development of smart energy services and networks, integrating interoperable services, technologies, and infrastructures, i.e. electricity, gas, heat, and ICT. The participating bodies range from grid operators, energy companies, service and technology providers, companies in the building industry, telecom operators, consultancies, and financial institutions. These companies aim to anticipate future energy supply through open innovation, while consulting with end-users and other involved parties as we believe that smart energy concepts and intelligent networks enable consumers to have more control of their own energy management. The large-scale demonstration projects need to ensure the sustainability of our energy supply and advance the speed of commercial product innovation. The project is divided in three phases: 1) concept development and site selection, 2) design of 5 to 10 sets of smart grids, one set per demonstration site, 3) realisation of these large-scale demonstration sites. The development and testing of several 'sets' of integrated, interoperable smart energy services with corresponding technologies and infrastructures that will have positive business cases when introduced on a large scale. These will be demonstrated at 5 to 10 locations with different end-users, e.g. households, offices, and industries, 5,000 in total. Final outcome will be the realisation of various large-scale smart grid demonstration locations spread over The Netherlands, execution by the Smart Energy Collective partners in close cooperation with local stakeholders and the regulator. The demonstrations concern 5 to 10 sets of (new) integrated, interoperable services with corresponding available technologies and infrastructures. It should proof that these sets have a validated market potential, based on currently available information, such that a positive business case exists at large scale introduction. For that reason business cases should be clear and, thus, an estimation of the costs and benefits of the demonstrated integrated services and technologies will be available. Another end result will be a tangible vision on the practical implementation, i.e. joint demonstration and testing of these services at sufficiently large scale (approx. 5,000 connection points) spread over a number of locations in The Netherlands. Last but not least the project will provide transparency with respect to the roles and contribution of all partners in the Smart Energy Collective.	

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.36 Smart Watts (E-Energy)

Smart Watts (E-Energy) (DE)	WP2, WP3, WP5, WP6
The E-Energy project Smart Watts implements the concept of the intelligent kilowatt hour: an open system, which enables new services, value added and increased efficiency for utility companies, device	

manufacturers, service providers and consumers.

Work packages comprise development and deployment of digital electricity meters and gateways, demand-side management for intelligent household appliances (using the EE-Bus Standard), a data centre for metering and pricing data, a prognosis and portfolio management system.

Major objectives are:
- Adoption of intelligent home / facilities automation and smart device using standardized interfaces (EE-Bus)
- Providing consumption/injection data and price signals by different means
- Facilitating consumer participation in the electricity market
- Improving information on energy usage and energy sources
- Collecting meter readings in sufficient frequency

Smart Watts maintains a large list of use cases. Through its project partner FIR, FINSENY has excellent access to the research activities in the fields of internet addressing, name services, authentication, etc.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	■	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	■		

4.2.37 SmartHouse/SmartGrid

SmartHouse/SmartGrid (EU: DE, GR, NL) WP3, WP6

The SmartHouse/SmartGrid project sets out to validate and test how ICT-enabled collaborative technical-commercial aggregations of Smart Houses provide an essential step to achieve the needed radically higher levels of sustainability and energy efficiency in Europe.

Current smart house/energy technologies treat home and working environments as effectively consisting of isolated and passive individual units. This severely limits achieved energy efficiency, as it ignores the potential delivered by homes, offices, and commercial buildings seen as intelligent networked collaborations. The SmartHouse/SmartGrid project introduces a holistic concept for smart houses situated and intelligently managed within their broader environment. It develops intelligent networked ICT technology for collaborative technical-commercial aggregations of Smart Houses able to communicate, interact and negotiate with both customers and energy devices in the local energy grid so as to achieve maximum overall energy efficiency as a whole.

The project builds on
- using available open industry standards in both the ICT and energy sectors,
- employing communication and computing capabilities that are already in widespread use in mainstream home and working environments.

The SmartHouse/SmartGrid technology is field tested in three different countries, delivering proof of concept of a specific aspect of the new technology:
- The capability to handle the large-scale communication, negotiation and information exchange between many thousands of smart energy devices at the same time (Netherlands).
- The capability to intelligently interact with the customer (such as home owners) and deliver optimal home energy management as a response (Germany).
- The capability to control smart energy devices in a fully decentralized and bottom-up way such that optimum energy efficiency at the aggregate level is achieved, together with higher security of supply levels for the end-user (Greece).

SmartHouse/SmartGrid is of high relevance for FINSENY, as it develops and evaluates intelligent networked ICT technology for the integration of Smart Houses and Smart Grids. Therefore, SmartHouse/SmartGrid is in particular interesting for FINSENY WP3 and WP6. Electronic-marketplace mechanisms play an important role in SmartHouse/SmartGrid, but FINSENY WP6 has not directly worked with the techniques used in SmartHouse/SmartGrid, but was inspired by the work conducted

there (e.g., agent-based market participation).			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	□
Use cases	■	Standards	□
ICT requirements	■	Trial sites	□
ICT standards	□		

4.2.38 SPES 2020

SPES 2020 (DE)			ICT
Project SPES 2020 studied future networking, hardware and software architectures as well as software and system engineering methods across different applications. This cross application development enables the transfer and application of technologies from one sector to another. Examined industries are: automotive, automation technology, energy, medical technology, and avionics. The following topics have been researched: model based requirements engineering, model based architecture development, security demonstration, certification and quality insurance of non-functional requirements, as well as modelling of parallel real-time processes and proof of real-time performance. SPES 2020 has finished in October 2011. Besides FI-WARE, SPES specifications can also be considered by FINSENY.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.39 Stockholm Royal Seaport

Stockholm Royal Seaport (SE)			WP3, WP5, WP6
The feasibility study examined and proposed a solution concept for a smart grid in the Stockholm Royal Seaport (SRS) as a future test area for the development and field installation. The uniqueness of the pre-study is that it describes an implementation of a smart grid pilot based on a holistic approach where the system solution is built on not only technology but also business models, market concept and consumer participation. The pre-study was finished in April 2011. The pre-study was structured in following work packages: WP1: Active House: Reduced peak load and increased energy efficiency by active "prosumer" participation based on Demand Response application including PHEV`s infrastructure and home/building automation. WP2: Smart Grid Lab: A complete run-time environment for full scale test of smart grid applications based on Network Manager SCADA/DMS. WP3: Grid development: Identification and research of new grid designs with new active and passive components. WP4: Shore to Ship: Smart harbour solutions WP5: SRS Information Management System: Definition of an information system to follow up of the operational goals. WP6: Market Concept: Business Model and Regulatory framework for actor Especially the outcome of WP1/2/3 is interesting for FINSENY. While WP1 is concentrating on the LAN and WAN communication needs resulting from the home applications, WP 2/3 are focusing on WAN communication for SCADA as well as for substation automation. FINSENY consortium members ABB and Ericsson are also members of this project and ensure that the public results are transferred accordingly.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	□

Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.40 VIKING

VIKING (CH)			WP2
This project proposes the analysis of the interaction between the IT (Information Technology) systems and the transmission and distribution systems. Main objectives are to develop, test and evaluate methodologies for the analysis, design and operation of resilient and secure industrial control systems for critical infrastructures, including vulnerabilities of integrated control systems, possible failures or attacks and develop strategies to eliminate or to mitigate these effects. The overall aim is to make SCADA systems robust against attacks and operational errors. VIKING has formulated four strategic objectives described below. • Provide a holistic framework for identification and assessment of vulnerabilities for SCADA systems. The framework should provide computational support for the prediction of system failure impacts and security risks. • Provide a reference model of potential consequences of misbehaving control systems in the power transmission and distribution network that can be used as a base for evaluating control system design solutions. Related work: • Develop and demonstrate new technical security and robustness solutions able to meet the specific operational requirements that are posed on control systems for our target area. • Increase the awareness of the dependencies and vulnerabilities of cyber-physical systems in the power industry. The results regarding secure transmission of data can be of relevance to FINSENY. VIKING has looked on different ways of configuring the communication network using redundant paths that would make a single point attack impossible. It is a matter of configuring communication channels in the network in the right way. This would add some overhead but only to a minimal extend. VIKING has defined ways of such reconfigurations but also suggested other ways of securing the communication, e.g. use encryption to secure data.			
Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	■
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.41 Web2Energy

Web2Energy (EU)	WP2, WP3, WP6
11 European companies cooperate in the EU FP7 funded project Web2Energy. Web2Energy strictly concentrates on advanced, established and prospective international standards. With that, the direction for follow-up projects is set with the goal that all clients of the Smart Grids will speak the same language – regarding the communication on one hand and the data management on the other hand. Web2Energy builds on data models, and services of the advanced standard series IEC 61850 for substation communication are used. In this way it supports the ongoing work in the IEC bodies for extension, adaptation and improvement of the standards series regarding their application for smart grid solutions. The standard series will be extended for the application of various physical channels as well. In the data bases of all smart grid clients, common information models (CIM) in accordance with IEC 61968 will be applied. With that, data files can be exchanged without problems between the different users, between the network operator and the trader for example. Web2 Energy is active in various fields:	

Network automation: Trouble shooting can be automated for a part of the 20 kV network by remote control. Supply recovery can be achieved in seconds. Smart Aggregation: On the generation side various producers will be equipped with RTU and smart meters. Together with 20 distributed storage units these producers will be monitored by the virtual power plant and are also partly controlled. **Smart Metering**: In the network area of the HSE in six cities about 200 power consumers will be equipped for the pilot project with Smart Meters and access to a web portal. A bonus system was developed and participants receive daily information on the Internet, by email or via mobile phone, alerting them in case it would be cheaper to use energy later. **Language, technology and data**: For every participant – whether consumer, producer or local terminal – the most favourable communication channel had to be defined – over radio links like UTMS, GPRS or telecommunication copper cables (DLS), or fiber optic cables, or over the power cables itself (by Distribution Line Carrier). Web2Energy uses the IEC 61850 protocol for all future services in the distribution network. **Control Centre:** A database with an interactive human-machine interface was developed and is being used to manage all consumer and producer data. The data format is CIM (the common information model accordingly IEC). It has been extended for the new services; these innovations are also incorporated in the relevant standard IEC 61968/70. **Market models**: It was decided to develop 2 strategies, because today's regulations still inhibit an economical operation of virtual power plants.

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.42 Western Harbour/Malmö

Western Harbour/Malmö (SE)	WP3, WP4, WP5
By 2020, the City of Malmö will be climate neutral and by 2030 the whole municipality will run on 100% renewable energy. • More efficient energy consumption. Energy consumption in Malmö will decrease by at least 20% per person by 2020, and by a further 20% by 2030. • More renewable energy. Solar, wind, water and biogas will be phased in and fossil fuels phased out. The proportion of renewable energy will be 100% in the City of Malmö by 2020. The ambition is for as large a proportion of this energy as possible to be produced locally. • Reduction of emissions. Greenhouse gas emissions will decrease by at least 40%, calculated from 1990. • Transition in transport and travel. The significant development of rail traffic and other electrically (green electricity) driven public transport, as well as an extended network of cycle lanes, will create new possibilities for local and regional travel. The capacity for transporting goods by ferry and train will be improved. • Adaptation to climate change. Malmö will prepare for temperature changes, rising sea levels, and increased precipitation. Foresight can provide for lower costs and an improved environment.	

Available in database:		Implications on FINSENY:	
Description	■	Use cases	□
Partners	■	ICT requirements	□
Use cases	□	Standards	□
ICT requirements	□	Trial sites	□
ICT standards	□		

4.2.43 ZeM2all

ZeM2all (ES, JP)	WP5, WP2, WP3, WP4, WP6
FINSENY is starting to link with the project (they were present in the 1st FINSENY workshop in Nice on the 25th of October, co-located with the ICT4SH event), in order to share experiences and potentially	

plan to consider the ZEM2ALL trial in Malaga as a possible candidate for the 2nd phase FINSENY trials. By now, this trial has not been selected as a candidate for the 2nd phase FINSENY trials, as the project has not yet tangible results – but we will continue considering it for the near future.

For FINSENY, WP5 specifically, the most relevant aspects that ZeM2all are dealing with is on the use cases they are defining at this stage of the project (March 2012):

- Residential domestic electric vehicle charge: identifying the user by a wireless card
- Fast charge: different charge use cases and business models to get 80% of battery charge in less than an hour

Also the project ICT requirements they are defining are of interest for FINSENY. They are based on the following topics:

- M2M + SIM communication in the vehicle charge process: 3G, wired …
- Open platform for the service providers
- Use of standards protocols for the vehicle charge process

And the standards the project is contributing and using

- ISO/IEC DIS 15118-1 Road vehicles – Vehicle to grid communication interface – Part 1: General information and use-case definition

Available in database:		Implications on FINSENY:	
Description	■	Use cases	■
Partners	■	ICT requirements	■
Use cases	□	Standards	■
ICT requirements	□	Trial sites	■
ICT standards	□		

4.3 Top Runners' relevance and influence in FINSENY use cases

One of the goals of the FINSENY project clearly is to not re-invent the wheel and to re-use as many project results as possible and further build on them. As there are so many projects already in place – the most important ones of which have been described in the previous chapter – and FINSENY consortium members have good relationships with many of them, this goal is clearly achieved, as laid out in Table 1.

Table: FINSENY database "Top Runners" as they relate to FINSENY use cases

Project name	FINSENY WP/Use cases
ADDRESS	**WP2**: Dynamic Control of Active Components (DCAC) **WP3**: Load balancing, SRP-based services, CRP-based services, BUC-1.2.1; CUC-1.1; CUC-1.2; CUC-2.2.3; CUC-5.1 **WP4** **WP6**: Load balancing, SRP-based services, CRP-based services
AlpEnergy	**WP2**: MVDAC and DCAC use cases (virtual power plant, demand side management sub-use cases of DCAC) **WP3**: Technical Virtual Power Plant, microgrid islanding mode, data acquisition and monitoring, demand side management, price induced load shift, smart metering, load balancing etc., BUC-1.2.1; CUC-1.1; CUC-1.2; CUC-2.2.3; CUC-5.1
aWattGarde	WP6:
BeAware	**WP3**: Home energy management system (aggregation of data and status from microgrid system participants), CUC-5.1 **WP4**: Home and per appliance energy monitoring, customer engagement **WP6**: Home energy monitoring, customer engagement, smart metering, persuasive end user interface
BeyWatch	**WP4:** Monitor and manually Control Energy Use, Optimize home energy use globally, Optimize home energy use locally, Generate and Store Energy locally **WP6:** • Detailed Consumption Information o Get detailed information: WP6_IFUCEU_SC1_UC1

	○ Monitor Energy Use: WP6_IFUCEU_SC1_UC3 ○ Optimize Energy Use: WP6_IFUCEU_SC1_UC4 • Transparency in the Green Market ○ Monitors and Controls the Energy Consuming at Home, in a Building, in a Commercial Building and so on: WP6_ TS _SC2_UC3 ○ Information about Energy Generation Sources: Being Green ○ Monitor Energy Use- WP6_IFUCEU_SC5_UC3 ○ Optimize Energy Use- WP6_IFUCEU_SC5_UC4 • Flatten Demand Curve ○ Get Detailed Energy Information Online WP6_DSM_SC1_UC1 ○ Shape Demand- WP6_DSM_SC1_UC2 ○ Monitor Energy Use- WP6_DSM_SC1_UC3 ○ Optimize Energy Use – WP6_DSM_SC1_UC4
BonFIRE	(general project on ICT – cloud computing)
DISPOWER	**WP2**: use case DCAC (integration of distributed generation) **WP3**: Integration of distributed generation, energy trading, ancillary services **WP4** **WP6**
e-Cube	Not applicable to WPs directly; important are the regulatory aspects
EDISON	**WP5** **WP6**
eTelligence	**WP4** **WP6**
e-DeMa	**WP3**: Aggregator, Data acquisition and monitoring, demand side management, supply-side management, price induced load shift, smart metering, energy market place, auto-configuration **WP4** **WP6**
ElectroDrive Salzburg	**WP5**
ELVIRE	**WP5**: important prerequisite, but no direct impact on project work
Energy@Home	**WP4**: Home energy monitoring, optimized energy scheduling, overload management, demand response, smart appliance **WP6**: Optimize energy cost in case of multi-tariff contract
FENIX	**WP2**: SG Energy Control of Power Inverter (SGEC); Dynamic Control of Active Components (DCAC); MV DAC from utility control centre (MVDAC); Fault Location, Isolation and Service Restoration (FLIR) **WP3**: BUC1.3: Business Interaction with DERs, BUC2: Microgrid Operator sells Balancing and Ancillary Services, CUC1: Balancing supply and demand on different time-scales, CUC1.4.1: State Analysis and sub sequent actions for providing ancillary services, CUC1.4.2: State Analysis and sub sequent actions for dispatching a contracted energy profile, CUC2: Demand Side Management, CUC2.2.3: Price-based load Shifting, CUC3: Supply side management, CUC3.2.4: Voltage Var Control, CUC3.2.8: Tertiary Reserve
G4V	**WP3** **WP5**
Green eMotion	no public deliverables of Green eMotion that can be re-used by FINSENY directly are available yet
GRID4EU	**WP2**: MV DAC from utility control centre (MVDAC); Fault Location, Isolation and Service Restoration (FLIR); SG Energy Control of Power Inverter (SGEC); Dynamic Control of Active Components (DCAC) **WP3** **WP6**
HOMES	**WP4** **WP6**
ICT for Electric	**WP5**: MeRegio Mobil: Charge Load Management (UC-GO-CLM),

Mobility	Optimized charge scheduling; Future Fleet: general experiences used, no direct influence
INTEGRAL/STREP	**WP2:** FLIR Use Case, DCAC (integration of distributed generation, distributed control) **WP3:** DER/RES aggregation, balancing power, emergency mode, BUC 3: Microgrid Provide Islanding Mode, CUC1.6: Switching to/from Islanding mode, CUC4: Black Start in Islanding Mode **WP4:** Home High Level Use Case: Monitor and Manually Control Energy Use, Load/Demand Management Use Cases, Optimize Home Energy Globally, Optimize Home Energy Locally, Residential Building High Level Use Cases: Monitor Energy Use, Support Online Community, Generate Energy Locally, Optimize Energy Use **WP5:** Use Case Short Trip: Function Home Charging (UC-ST-H), Use Case Grid Operational: Function Charge Load Management (UC-GO-CLM)
IRENE	**WP2** **WP3**: BUC-1.3; CUC-1.2 CUC-3.1;CUC-3.2 **WP5**
Kalasatama	**WP**2: MV DAC from utility control centre (MVDAC); Fault Location, Isolation and Service Restoration (FLIR); SG Energy Control of Power Inverter (SGEC); Dynamic Control of Active Components (DCAC) **WP5** **WP6**
MeRegio	**WP2**: SG Energy Control of Power Inverter (SGEC) **WP3**: BUC-1.2.1; CUC-1.1; CUC-5.1 **WP6**: energy contract brokering (IFUCEU_SC4), trading flexible capacity (TS_SC3)
MERGE	**WP2:** e-mobility sub-use case in DCAC **WP5**
Microgrids/More Microgrids	**WP3**: islanding mode, flexible AC distribution system, inclusion of renewables into a microgrid, forecasting supply and demand
MIRABEL	**WP3**: Forecasting demand – focus on households, aggregation DERs, micro-request-handling, CUC-1.1; CUC-1.2; CUC-1.3; (CUC-1.4.2?); CUC-3.1; CUC-5.3? **WP6**: some of the forecasting mechanisms are relevant
Moma (E-Energy)	**WP2** **WP3**: BUC-1.2.2; CUC-1.1; CUC-2.2.3; CUC-5.1? **WP4** **WP6**
NextGen	**WP2**: MV DAC from utility control centre (MVDAC); Fault Location, Isolation and Service Restoration (FLIR); SG Energy Control of Power Inverter (SGEC); Dynamic Control of Active Components (DCAC)
NOBEL	**WP3** **WP6**: energy markets for neighbourhoods (TS_SC4)
OpenNode	**WP2**: MV DAC from utility control centre (MVDAC); Fault Location, Isolation and Service Restoration (FLIR); SG Energy Control of Power Inverter (SGEC); Dynamic Control of Active Components (DCAC); Mobile Work Force Management (MWFM) **WP3**: Smart metering, grid automation, load management **WP4**
Park& Charge	**WP5**
Plugged-in Places	**WP5**
PREMIO	**WP2** **WP3**: BUC-1.1; BUC-1.3; CUC-1.1; CUC-3.1; CUC-5.3 **WP4** **WP6**
RegMod Harz (E-Energy)	**WP2**: Fault Location, Isolation and Service Restoration (FLIR); SG Energy Control of Power Inverter (SGEC); Dynamic Control of Active Components (DCAC) **WP3**: Virtual Power Plant, Data acquisition and monitoring, supply-side management, balancing, auto-configuration

	WP5 **WP6**
SAVE ENERGY	**WP4**
SEC	**WP2** **WP5** **WP6**
Smart Watts (E-Energy)	**WP2**: Fault Location, Isolation and Service Restoration (FLIR); SG Energy Control of Power Inverter (SGEC); Dynamic Control of Active Components (DCAC); **WP3**: BUC-1.2.1; CUC-1.1; CUC-2.2.3; CUC-5.1 **WP5** **WP6**
Smart House / Smart Grid	Only indirect use in **WP3** and **WP6**.
SPES 2020	(general topic: ICT architectures and methods)
Stockholm Royal Seaport	**WP3** **WP5** **WP6**
VIKING	**WP2**
Web2Energy	**WP2** **WP3**: BUC-1.2.1; CUC-1.1; CUC-2.2.3; CUC-5.1; BUC-2; BUC-1 **WP6**
Western Harbour/Malmö	**WP3** **WP4** **WP5**
ZeM2All	Project just started; will be relevant for **WP2-6**.

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6. List of abbreviations

BMVIT	Federal Ministry for Transport, Innovation and Technology, Austria
BMWi	Federal Ministry of Economics and Technology, Germany
BUC	Business Use Case (WP3)
CHP	Combined Heat and Power
CIM	Common Information Models
CRP	Conditional Re-Profiling
CUC	Control & Management Use Case (WP3)
DACH	Germany, Austria and Switzerland
DCAC	Dynamic Control of Active Components (WP2 use case)
DER	Distributed Energy Resources
DSM	Demand Side Management
DSO	Distribution System Operator
EEGI	European Electricity Grid Initiative
EV	Electric Vehicle
FI PPP	Future Internet Public Private Partnership
FLIR	Fault Location, Isolation and Service Restoration (WP2 use case)
HEM	Home Energy Management
HGI	Home Gateway Initiative
HV	High Voltage
ICT	Information and Communication Technology
ICT4SH	ICT for Sustainable Homes (conference)
IoT	Internet of Things
IoS	Internet of Services
IoC	Internet of Contents
ISGAN	International Smart Grid Action Network
LAN	Local Area Network
LV	Low Voltage
MWFM	Mobile Work Force Management (WP2 use case)
MV	Medium Voltage
MVDAC	Medium Voltage Data Acquisition and Control from utility control centre (WP2 use case)
PHEV	Plug-in Hybrid Electric Vehicle
QoS	Quality of Service
SG>EC	Smart Grid Energy Control of Power Inverter (WP2 use case)
SG-CG	Smart Grid Coordination Group
SGSG	Smart Grid Stakeholder Group
SGAM	Smart Grid Architecture Model
SRP	Scheduled Re-Profiling
TSO	Transmission Systems Operator
UC	Use Case
WAN	Wide Area Network

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