# FI.ICT-2011-285135 FINSENY

# D1.2

## *Assessment Summary of Ongoing European Projects and Community Activities (Issue 1)*

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**Abstract:**
This deliverable summarizes the first six months of FINSENY dissemination activities and provides an analysis of the smart energy landscape in close relationship to the objectives of the project. FINSENY has created a database to hold all important information of relevant projects that are being carried out mainly in Europe. A summary of the relevant projects' information can be found as well, putting specific emphasis on the insights, business drivers and tendencies.

**Keyword list:**

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

**Disclaimer:**

None

# Executive Summary

This Assessment Summary of Ongoing European Projects and Community Activities (Issue 1) shows that there is quite some activity going on worldwide, particularly also in Europe, in smart grid developments and projects – in research & development, demonstration projects and actual deployment. FINSENY consortium members are very well connected in the industry, are quite active disseminating and networking in different fora, and have good relationships with many important overarching projects related to ICT and intelligent power networks.

Although there are several other smart grid project databases being developed (but most are not available yet or not focusing on topics relevant to FINSENY), FINSENY WP1 has decided to build one of their own. The purpose is to ensure that the most important ICT-relevant projects are taken into consideration for FINSENY's work, including determining a potential trial site for FI-PPP phase 2. A first selection of relevant projects has already been made – these projects have been contacted for the most part and are being described in this deliverable as they relate to the work of FINSENY. Many of these projects also involve partners who are consortium members in FINSENY – a direct knowledge transfer in both directions is therefore ensured.

As FINSENY will be progressing in the next 6 months, the next Assessment Summary of Ongoing European Projects and Community Activities (Issue 2) will elaborate and go deeper on many of the issues raised in this Issue 1. Issue 2 will also take into consideration new developments of the smart grid energy landscape.

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# Table of Contents

# 1. 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 standardization 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 D1.2 (within task 1.1) is to give an overview of the activities of FINSENY in terms of dissemination and collaboration with other European projects and activities, how these projects and activities have influenced our work in FINSENY, and a first assessment of the energy landscape with a main focus on ICT related issues.

The FINSENY consortium members are well connected to other important previous and ongoing European projects, and other relevant activities. This deliverable will discuss the relationships with other overarching European projects and Fora, including particular dissemination actions on conferences and workshops. Also, the most important European smart grid projects of our database will be discussed, as they relate with and give input to different work packages within FINSENY.

# 2. Smart Grid Energy Landscape

## 2.1 General Development

FINSENY combines two major global developments: the continued development of information and communication technology (ICT), in particular with regards to the Internet, as well as the need to get more efficient on how we produce and consume energy, due to climate change and the requirement of (local) energy security. These two developments are interconnected from several perspectives. On the one hand, ICT has the great potential to help saving energy and to balance energy supply and demand. On the other hand, ICT itself needs a continuous energy supply to function properly – thus in a way contributes to the "energy problem." In addition, ICT can be seen as an example on how the power grid can evolve. Many ICT devices already have their own power storage, such as mobile phones and laptops, thus are somewhat flexible in terms of when (and where) to charge. This flexibility is what supporters of electric vehicles (EVs) and smart household appliances have in mind – only the strain on the power grid is potentially much heavier, due to larger power consumption. Again, intelligent communication and rules can help alleviate this strain.

Of all ICT-based communication technologies, the Internet is the most ubiquitous. Ever more devices are being controlled by microchips and start communicating with the user or with each other via the Internet. Thus, the term "Internet of Things" (IoT) had been coined. McKinsey estimated in 2010 [1] that there are more than 35 billion "things" connected to the Internet – and growing. In fact, the IoT is supported more and more strongly, for example by the EU in connection with RFID technologies, or by industrial initiatives (such as IPSO). These initiatives mostly try to promote and agree on communication standards.

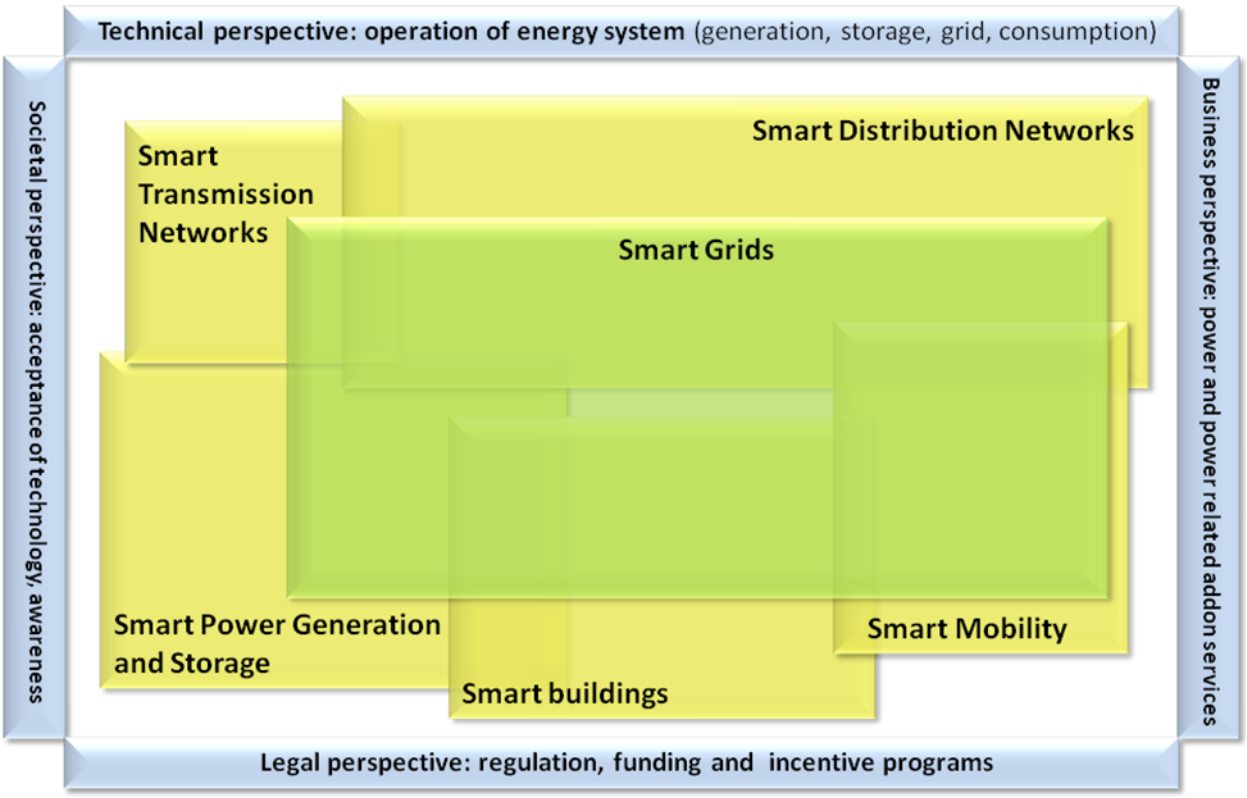
Agreeing on standards is crucial to the smart grid as well. (One of the tasks in FINSENY's WP1 will also deal with that, and a separate deliverable on standards will be issued.) One challenge is to connect the

already existing proprietary and non-proprietary communication standards – for example, standards the distribution and transmission network providers use for their data flows – with the Internet that uses a standard which is evolving, too. Currently, many smart meter companies try to bring their smart meter protocols into standards in order to be selected as one of the smart meter standards in Europe. For example, in September 2011, the establishment of a new ETSI Industry Specification Group (ISG) on Open Smart Grid (OSG) was announced. The OSG ISG will specify the Open Smart Grid Protocol (OSGP) required for communication and interoperability of data concentrators and smart meters/smart grid devices. This specification group has been initiated by Echelon and ESNA in order to standardize their Open Smart Grid Protocol. FINSENY is going to observe this initiative as well as various other projects, alliances and bodies that are dealing with standards on all levels. To some of these initiatives, FINSENY is very well connected to – see also next chapter on relationships.

The "smart grid" is not limited to the aforementioned distribution and transmission networks and smart meters. (Nevertheless, smart meters are an important part of smart grids, not only connecting ICT with power flows, but also connecting "the grid" with consumption in homes or any other kind of buildings.) The distribution and transmission networks have to integrate all power generation facilities, including small (and large) renewable energy sources, many of which produce dependent on the weather. Smart approaches are needed to accomplish this. Also, buildings are becoming smarter to be able to cope with fluctuating energy supply and demand. Last but not least, the emergence of electric vehicles is adding to the smart grid mix. Figure 1 gives an overview of the smart energy landscape, including four different perspectives of the smart grid: technical, business, societal and legal – all different angles from which the smart grid needs to be thought through.

The exact definition of the smart grid varies widely, however. Thus, there are many different market size estimates to be found, all based on different assumptions and bases. All of the estimates, however, have in common that the smart grid market has been and will be growing tremendously. Growth rates of 50% to 100% in five years (from 2010 to 2015) are commonly assumed [2].

**Figure 1: Smart energy landscape**



Besides agreeing on common standards, the resilience of the power grid and grid-related services remains very important. In principle, the Internet is suited well for this, due to its web-like interconnectedness which spreads the risk of total failure. But as we have seen in the financial crisis, global interconnectedness can amplify shocks enormously, and the Internet can get manipulated fairly easily. Thus, one has to be careful relying with the core business of power generation and distribution on the Internet as it is. Since Gartner Group has picked up on smart grid security [3], the topic has arrived and been acknowledged at the decision making level of large corporations. Security is also a topic of WP1 and will be reported in different deliverables – clearly something to do really right when implementing smart grid technology on a larger scale.

Unfortunately, the JRC very recently released that the global CO2 emission reduction agreed upon in the Kyoto Protocol has not yet succeeded [4] – in contrast, global CO2 emissions were on an all-time high in 2010. Thus, clearly more effort is needed everywhere to reduce energy consumption. Smart grid has the potential to support this effort – according to the ETP BLUE Map Scenario, smart grids offer the potential to achieve net annual emissions reductions of 0.7 Gt to 2.1 Gt of CO2 by 2050 [5]. At least as important for CO2 reduction related to smart grids is, however, the aforementioned storage technology, changed regulation of the power/utility industry such that the right incentives are set (towards energy savings), and further effort has to be put into compelling value propositions for businesses and consumers to reduce power consumption directly or to buy technologies such as smart appliances or electric vehicles.

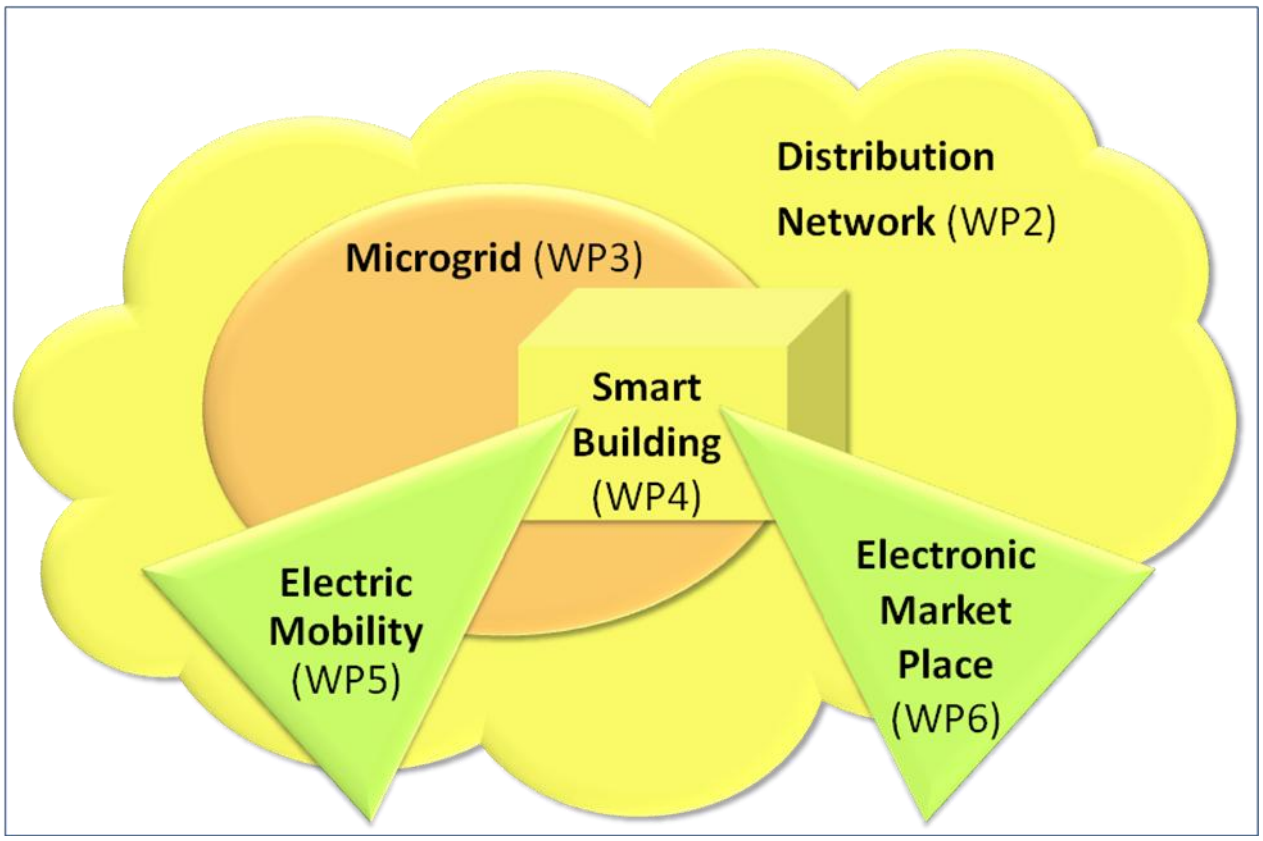
## 2.2 FINSENY Coverage

With various definitions of the smart grid in mind, and as it relates to the future Internet, the FINSENY consortium has decided to focus on the following five smart grid scenarios:

- Distribution network (WP2)
- Microgrid / regional grid (WP3)
- Smart residential & public building (WP4)
- Electric mobility (WP5)
- Electronic market place (WP6)

Accordingly, figure 2 depicts the coverage of the FINSENY project – which, as the main focus is the future Internet, takes a technical perspective for the most part.

**Figure 2: Smart Grid coverage of FINSENY**




## 2.3 EU Developments

In a recent report [6], the JRC has given a good overview on the current smart grid projects landscape in Europe. Most of the smart grid project activity is still located in the EU15 Member States, namely in Denmark, Germany, Spain and the UK. In terms of investments, Italy is leading by far, due to the national roll-out of smart meters (Telegestore project). In fact, in terms of project categories, smart meters are dominating (by number of projects and even more, by monetary investment) all other project categories, such as integrated systems, distribution automation, transmission automation, home application and storage. This is not surprising, as smart meters are, as mentioned before, a basis without a smart grid could not be developed the way it is envisioned by most industry players.

Due to the sheer number of smart meters already installed and needed in the future, it is in fact quite important to get the standards and technologies agreed upon rather sooner than later. There are already different technical developments in European countries, e.g., whether the smart interface for a consumer should be part of the (smart) meter or of a different piece of hardware. Developments in France, Germany, and the UK mostly prefer a separate smart data interface. Thus, the announcement of Open Smart Grid Protocol specification through the OSG ISG (see above) was a path in the right direction.

Although smart grid projects and developments in Europe have been driven by utilities to a large degree, more and more ICT companies are entering the market. Since May 2011, for example, Deutsche Telekom stores offer an E.ON smart meter with smart phone connectivity with an E.ON green energy supply contract.

From the government and regulation side, most European countries have determined their innovation paths and national strategies regarding a smart grid [7]. As the development within and the cooperation between the European countries towards modern technology standards has been fairly weak until recently, the EC has asked in April 2011 to intensify efforts towards smart grid standards and come to an agreement by the end of 2012. FINSENY is part of this effort.

## 2.4 USA

The US smart grid federal stimulus of US$ 4.5 billion announced 2009 has increased activity in this area. Besides US utilities, traditional ICT companies are quite active in the smart grid realm. For example, Oracle offers a smart grid software for utilities, Apple, Intel and Google have been offering or experimenting with home energy management since 2010. While Microsoft and Google cancelled their home energy management efforts (Microsoft Hohm and Google Powermeter) this year, Google announced right away it will use Android@Home for smart grid applications in the home.

As in other technology areas, US companies are less likely to wait for smart grid-related technology standards to establish. They are more likely to put money into a product or service and deploy it fast – failures included. Thus, FINSENY consortium members are watching developments in North America closely.

# 3. FINSENY Dissemination Actions and Relationships with other European Projects and Fora

## 3.1 Relationships with European Projects

FINSENY consortium members are very well connected within European projects 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 so far.

### 3.1.1 CONCORD

The CONCORD project in the FI-PPP family aims towards creating awareness for the FI-PPP programme in the European scientific, economic and end user communities. The overall CONCORD objectives are described in a document “FI-PPP Dissemination Strategy”. There will be a good balance between programme-level dissemination (to be implemented by CONCORD with support from every FI-PPP project) and the project-level dissemination (to be implemented by every FI-PPP project with support from CONCORD).

CONCORD has nominated liaisons for every FI-PPP project. The liaison and deputy liaison for FINSENY are Jukka Mattila (jukka.mattila@aalto.fi) and Petra Turkama (petra.turkama@aalto.fi). FINSENY nominated Ludwig Karg (BAUM) as its representative.

CONCORD has setup a **Dissemination Work Group** (DWG) 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. FINSENY contributed a first version of a joint PowerPoint presentation to DWG who had received a respective request from the EC. FINSENY liaison will create an improved version of FINSENY presentation (in fact a set of such). One of the first achievements of the DWG is the extensive improvement of the FI PPP web portal with the help of all FI PPP project liaisons. At this point of time DWG is collecting the names and contact info of FI PPP stakeholders at various levels into a central database for managing the messages and interactions in the long run.

CONCORD plans to set up a **Stakeholder Engagement Work Group** (SEWG) to reach out to various external stakeholders (i.e. users, SMEs, and public administrations at the local and regional level) through existing networks and communities. The CONCORD SEWG representatives will manage all communication with other WGs, FI-PPP boards, the FIA, etc. in full transparency to all WG participants.
The SEWG should manage stakeholder engagement efforts at two levels: the FI-PPP 1) programme and 2) project level. At the FI-PPP programme level it intends to target and engage high level stakeholder networks. In doing so the SEWG should act as a facilitator between these networks and the different FI-PPP projects. At the FI-PPP project level, the SEWG takes on a double role. On the one hand it will

maintain, supported by the FI-PPP projects' input, an inventory of the projects' own stakeholder engagement efforts and involved stakeholders. On the other hand, it intends to identify where the different FI-PPP projects' stakeholder efforts intersect and/or complement each other. These efforts should help the WG to create a bridge between the projects' various individual stakeholder engagement efforts themselves and the WG's programme level efforts, which will allow maximal cross-fertilization.

With contribution from FINSENY and all other FI-PPP projects the SEWG is in the process of establishing its work and task structures. An alternative plan goes for a Stakeholder Engagement Circle instead of a Work Group.

The monthly CONCORD newsletter is a key instrument to achieve CONCORD's goals. Through its COCORD liaison FINSENY use that potential to increase its visibility.

The calendar on the CONCORD website is supposed to hold all FI-PPP relevant dates and events. In the past FINSENY liaison of CONCORD added FINSENY internal entities on an irregular basis to this calendar. We are in the process to add other events in the framework of smart energy. CONCORD provided an EXCEL-based template for that purpose. Still a selection process has to be defined since there are hundreds of such events every month. One idea is to formalize a transfer from project or program specific calendars (such as www.e-energy.de) to the CONCORD calendar.

### 3.1.2 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 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 FI-PPP Architecture Board meets monthly, alternating between face-to-face and virtual meetings. The kick-off meeting was organized in Budapest during the Future Internet Week in May, 2011, where all FI-PPP projects presented their scope.

First actions in the Architecture Board were the definition of the FI-PPP backlog template to be used to describe the ICT requirements in the different use case projects and the decision about tools for handling requirements and enablers. Furthermore, FI-WARE presented their high-level description of already identified generic enablers. The first intensive interaction with respect to the ICT requirements and generic/specific enablers will start in October, 2011.

### 3.1.3 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. Supported by more than 15 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.

As part of its CONCORD liaison task, Ludwig Karg (BAUM) stays in close contact with ISGAN president Michele de Nigris. An intensive meeting was scheduled around the WEC / ISGAN meeting in Rome (see **Error! Reference source not found.**)

### 3.1.4 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.

FINSENY partner BAUM is 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 is in the process to further describe the "functional projects" which are the core of the EEGI Roadmap and Detailed Implementation Plan. For this purpose a survey was done to identify all smart grid relevant projects in Europe on an international and national base. While partner BAUM together with other FINSENY partners could contribute to this survey, the FINSENY database can benefit from the results.

The latest call of the 7$^{th}$ Framework Programme explicitly refers to the mentioned EEGI initiative when describing the scope of future research projects.

### 3.1.5 GRID+

GRID+ is an FP 7 project in the framework of EEGI initiatives. Being a coordination and support action, it addresses the need to coordinate European research, development and deployment projects in the field of smart grids. The overarching goal of the project is to implement and support the management, planning and networking process of the EEGI in the years 2012 – 2014.

FINSENY partner BAUM has approached the lead partner (RSE, Italy) to establish a relationship and to allow for mutual exchange of knowledge about developments in FINSENY related activities and projects monitored by GRID+.

### 3.1.6 Infinity

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, related to use cases or basic technology (like the ones of the core platform). Therefore, INFINITY is developing a repository, and each Use Case Project, including FINSENY, was requested to provide information on their requirements for validation and testing purposes. This is needed to define the right fields to characterize testing facilities and to help use cases as much as possible in this respect, and filter capacities accordingly. Martin Wagner (ATOS Research & Innovation) is the lead contact within FINSENY to INFINITY.

INFINITY organized a workshop session at the end of June 2011 in Brussels as the kick-off of the interaction with the FI-PPP projects, and is planning a second one in October (Poznan) to ensure that each Use Case Project will address the issue of infrastructure priorities for investment on a European wide basis. The prioritization will cover all aspects of infrastructure not just physical; therefore identity and privacy, legal framework for E-commerce are examples of subjects that could arise.

INFINITY has collected a table of the requirements from PPP projects and is preparing a questionnaire that is being used for infrastructure characteristics.

### 3.1.7 SGSG (Smart Grid Stakeholder Group)

In addition to the FINSENY project the Smart Grid Stakeholder Group (SGSG) has been established to better understand the views of the communications and energy industry. It is an open group of industrial players interested in the Smart Energy arena. Five meetings of the group were organised since it has been founded in June 2010, and the number of participating organisations has grown to over 50. Further developing the SGSG and organising the information exchange between the SGSG and the project is a major activity in FINSENY.

The main objectives of the last SGSG meeting organized on 13th July 2011 in Munich were

- to share the intermediate FINSENY results with the SGSG and receive their feedback for further consideration, and
- to discuss about further relevant topics for the community: the introduction of the project INFINITY describing how the SGSG members can contribute, the proposal to setup a SGSG Interoperability Working Group, and the introduction of new SGSG members.

The next SGSG meeting will take place in the January/February 2012 time frame. This group is open for all industrial organizations which are interested in Smart Grid / Smart Energy topics.

### 3.1.8 Smart Grid Coordination Group

SG-CG is the successor of the Joint Working Group on standards for Smart Grids which was established in May 2010 and is reporting to the CEN, CENELEC and ETSI Joint Presidents Group. SG-CG is based on the M/490 mandate. Approximately 40-50 organizations (including FINSENY) participate, representing European association of all involved stakeholders.

The report on European Status of Standardisation of Smart Grid contains recommendations for standardisation in the areas of Glossary; Reference architecture, System Aspects, Communication, Information Security, EMC, Generation, Transmission, Distribution, Smart Metering (complementing, not duplicating M/441), Industry, Home and Building Automation and Demand Response.

SG-CG's role is to ensure that:

- the M/490 process is transparent,
- the widest group of stakeholders is represented,
- all deliverables meet the requirements of the mandate & stakeholders.

The SG-CG will:

- Further maintain the report on smart grid standardization in Europe,
- manage the whole work process concerning the smart grid mandate and clarify non-technical questions to avoid unnecessary discussions in technical groups, and
- provide a suitable platform for discussion of smart grid standardization-related issues with the ESOs and European Commission.

But, the SG-CG shall not itself produce standardisation deliverables.

FINSEY partners are contributing in the following subgroups:

- **Technical Reference Architecture** (Telecom Italia, SIEMENS) to represent the functional information data flows between the main domains and integrate many systems and subsystems architectures,
- **Set of Consistent Standards** to support the information exchange (communication protocols and data models) and the integration of all users into the electric system operation, a first set of standards to be available by 2012/Q4,

- **Sustainable standardization processes** (VDE/DKE, BAUM, SIEMENS) and collaborative tools to enable stakeholder interactions, a first set of Use Case management to be operational by 2012/Q1.

### 3.1.9 Energy Hills: Intelligent Energy

RWTH ACS (Prof. Monti) and FIR (Peter Laing) participated in two meetings (15th of July 2011 and 7th of September 2011) of the Energy Hills network within the working group „Intelligent Energy“. 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.

In September 2011, Energy Hills approved the creation of the European Agency for Sustainable Energy (EASE). This is intended to be a European network to promote innovation in energy systems mostly through the collaboration between industry and academia across countries. Partners from Germany, Austria and Finland already joined. Other entities are ready to join from UK, Spain and Italy. The headquarters would be in the RWTH Campus, Sustainable Energy Cluster, Aachen, Germany.

### 3.1.10 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 organization of IntelliCIS with Prof. Antonello Monti acting as Management Committee Member for Germany.

### 3.1.11 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. FINSENY partner BAUM is involved in all 3 taskforces and the steering group of the DACH cooperation and can refer all DACH-partners to the results of FINSENY.

### 3.1.12 Alp Energy

AlpEnergy is a European Territorial Cooperation 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 – to address the central issue of renewable energy supply. AlpEnergy focuses on both technical as well as economical aspects to introduce an efficient operational model that aims at a standardization of both technologies and procedures. It intends to provide new knowledge-based incomes and business opportunities to farmers, traditional and innovative

enterprises, thus supporting the competitiveness of the Alpine ventures and making the Alpine space a showcase for other mountain areas in the world.

FINSENY partners BAUM and INPG are involved in AlpEnergy and strive for specific cooperation in ICT topics with research partners Fondazione Politecnico di Milano (Italy) and Alari Institute at University of Lugano (Switzerland). For further reading see www.alpenergy.net.

### 3.1.13 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 optimization of the energy supply system, encompassing everything from generation and distribution right up to consumption. The project will ensure more effective utilization 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 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 were selected that by end of 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.

ICT-EM projects (GridSurfer, Harz.EE-mobility, e-mobility, Smart Wheels, Future Fleet, MeRegioMobile, E-Tour Allgäu) projects focus on systems integration (smart charging and vehicle-to-grid systems), vehicle navigation and driving assistance, fees and bill payment systems, vehicle fleets, and mobility services. With total investment amounting to roughly 100 million Euros these projects 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.

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:

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

For further reading see www.e-energy.de/en, www.ikt-em.de/en.

## 3.2 Dissemination and Relationship Building on Conferences and Workshops

While it is early in the project, FINSENY partners have already presented and represented 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 so far.

### 3.2.1 ISGAN Inventory Meeting, Vienna, May 23, 2011

The goal of the meeting of the International Smart Grid Action Network (ISGAN) was to find a common base to share information between the different mapping activities. As there will not be one mapping solution which fits all, the participants focused on questions on how and where data can be shared in order to increase the efficiency of the mapping process, whether a common data collection framework (organised and logical) can be set up and whether the projects can be aligned to certain criteria. The inventory in ISGAN thrives to highlight smart grid benefits, inform high level stakeholders to gain support for promising activities, make the opportunities for cooperative action clear, and set a baseline to track national progress.

Julia Benkert (BAUM) represented FINSENY and presented the status of the FINSENY database at that time. Other members present were from ISGAN (from Italy, Sweden, the US, and Korea), as well as from EEGI (Austria), JRC, and ENARD. The status of other mapping activities were presented as well, and the potential for collaboration with ISGAN, EEGI, JRC for mapping of international smart grid projects was discussed.

It was agreed that it is a big challenge for all mapping activities to somehow merge the different goals of all data collection activities to avoid double work. Also, the issue was raised how the databases will be maintained, monitored and funded in the future after most funding programmes will be finished. In addition, it was recommended to look at EPRI definition features for project categories, and at the paper: “Measuring the Smartness of the Electricity Grid” (IEEE). FINSENY will seek to continue communication with ISGAN and its members.

### 3.2.2 WEC Forum, Rome, July 7, 2011

The World Energy Council in cooperation with ISGAN had invited Ludwig Karg (BAUM) to speak in a session “EXISTING PROGRAMMES AND PROJECTS FROM THE ISGAN MEMBERS AND OTHER COUNTRIES” at the Smart Grid International Forum in Rome on 7 July 2011. He used the opportunity to introduce the audience to the overalls goals of FINSENY and to receive valuable input from various speakers, e. g. from IEA (International Energy Agency) and the World Bank. The relationship with those institutions will be maintained.

### 3.2.3 FP7 Contractors Meeting

In his role as leader of the E-Energy ancillary research, member of the above mentioned EEGI initiative and FI-PPP CONCORD liaison, Ludwig Karg presented E-Energy and FINSENY principles and goals at a “contractors” meeting in Brussels. The JRC (Patrick van Hove) had invited potential applicants for FP7 projects for a knowledge exchange and partnering event. While the event was mainly meant to attract actors in the energy field, many participants were keen to learn more about the progress in the ICT projects dealing with smart energy.

### 3.2.4 Future Internet Cluster Workshop, Budapest during FIA, May 16, 2011, presentation

As part of the concertation activities of the EU Commission in Framework Program 6 project cluster are organised. One of these clusters is the Future Internet Cluster, which is gathering the projects in the Future Internet domain. This cluster organised a workshop on May 16, 2011 in Budapest, Hungary, as part of the Future Internet Week (http://ec.europa.eu/information_society/events/cf/fnc7/item-display.cfm?id=5773). Participants were mainly coming from respective EU projects in FP7.

This workshop had two sessions:

- **Session 1 (morning): The impact of sustainability on ICT**
  addressing green computing and networking; qualitative and quantitative impacts; energy savings; reduction of emissions; quality and cost aspects; etc.
- **Session 2 (afternoon): The impact of ICT on sustainability**
  addressing the potential of the use of ICT upon societal, environmental and economical sustainability; smart grids; intelligent transport systems; etc.

Session 1 mainly dealt with ICT related topics in the Future Internet, whereas the second session focused on the use of ICT in vertical sectors. Therefore, FINSENY was invited to the second session in order to present the major challenges in the smart energy domain and the potential of the integration of ICT with energy systems. The FINSENY coordinator, Werner Mohr (Nokia Siemens Networks GmbH & Co. KG), gave an overview presentation of the project by addressing the key drivers for the smart energy domain, an overall project description including the project motivation, the problem statement, the consortium, the objectives, the investigated scenarios and potential trial sites for future phases of the FI-PPP program.

The main objective of the workshop was to make colleagues from the ICT domain aware of new opportunities to use communication technology in vertical sectors.

### 3.2.5 2nd Future Internet Summit, Luxembourg, June 6, 2011, presentation

The University of Luxembourg organized the second Future Internet Summit on June 6, 2011 (http://www.future-internet.uni.lu/). Keynote presentations were setting the scene presenting the view of the EU Commission on Future Internet and presentations from invited speakers on Internet of Things and the use of Future Internet technologies for future traffic systems.

The FI-PPP project CONCORD organized a session with short overview presentations of all FI-PPP projects. The presentation session was followed by a panel discussion to discuss the expected impact of the PPP, potential necessary changes in regulatory conditions and further steps. This was the first joint dissemination event of the FI-PPP in order to make a wider audience aware of the objectives and the approach of the FI-PPP.

The FINSENY Coordinator Werner Mohr (Nokia Siemens Networks GmbH & Co. KG) mainly presented the challenges from the smart energy domain like the necessary integration of ICT with energy systems in order to manage the volatile energy generation due to the increased use of decentralized energy generation and the different associated scenarios distribution network, regional-/microgrid, smart buildings, electric mobility and electronic market place for energy.

The presentations of the event are available at the web site mentioned above.

### 3.2.6 Future Networks & Mobile Summit, Warsaw, June 17, 2011, panel session

The Future Networks & Mobile Summit is a series of conferences since 1991, which is organized in close cooperation with the EU Commission as the meeting place for EU framework research projects. Details about the event are available at http://www.futurenetworksummit.eu/2011/. The main scope of the summit was mobile and wireless as well as fixed/optical communication systems and technologies.

With the start of the FI-PPP, the application of ICT for vertical sectors is becoming more important for this event. Therefore, a panel session was organized and chaired by the Commission entitled "Future Internet: Stairway To Heaven?" Short statements on different views and perspectives were presented by the FP7 ICT projects ETICS, GEYSERS, SAIL, the FI-PPP projects FI-WARE and FINSENY as an exemplary use case and from the Future Internet Architecture Group and the Poznan Supercomputing and Networking Center. It was a similar objective than the one in the 2nd Future Internet Summit in Luxembourg which discussed different views on Future Internet in a wider community.

FINSENY was represented by Werner Mohr (Nokia Siemens Networks GmbH & Co. KG). From the FINSENY perspective, it was a good opportunity to present the smart energy domain to the ICT community as an important use case with major implications on future energy systems and the opportunities for the ICT domain to make the energy system more efficient and reliable with the increasing use of decentralized energy generation and to prepare the infrastructure for electric mobility. These topics are high on the political agenda in Europe and also in other regions.

### 3.2.7 Euroview 2011, Würzburg, August 1-2, invited talk

The "11th Würzburg Workshop on IP: Joint ITG and Euro-NF Workshop "Visions of Future Generation Networks" (EuroView2011)" has the intention to foster the communication among researchers from industry and academia. The workshop series was initiated in 2000 and focuses on visions of Future Generation Networks. The number of participants of the EuroView workshop (more than 150 participants in 2010) shows a good standing in the Future Internet community.

FINSENY was represented by Kolja Eger (Siemens). A presentation was given as part of the invited session on Future Internet Activities in FP7. The session was organized by Dr. Rüdiger Martin (EC). From the FI-PPP program the projects FI-WARE, FINSENY and INFINITY were represented. The FINSENY presentation included an overview of the project, the approach in the different scenario work packages and first results about the identified ICT requirements. Additionally, an extended abstract is available from the EuroView webpage:
http://www.euroview2011.com/fileadmin/content/euroview2011/abstracts/abstract_eger.pdf.

### 3.2.8 ISAP 2011, Crete, September 26-28, 2011: Panel Session

The Intelligent System Applications to Power Systems (ISAP) conference is an international conference which has been initiated in 1988. It is an important forum for intelligent system technologies and their applications to power engineering. Thus the topics discussed are of high relevance for FINSENY. More than 130 participants from industry and academia were registered to that conference.

FINSENY was represented by Johannes Riedl (Siemens). A presentation was given as part of a panel session "Active Houses and Smart Grids". An overview has been provided on the FINSENY project together with first results achieved on the evaluation of smart energy use cases and on the identification of ICT requirements. During the discussion a major point was to assure that the use cases which have been identified and described in other projects and activities are taken into account which exactly is done by FINSENY. In addition, contacts have been established with other initiatives that also collect use cases – with which some interaction will take place on benefiting from each other's activities.

### 3.2.9 "XXI Jornadas Telecom I+D Las TIC en las ciudades del Siglo XXI: La Smart City", Santander, September 28, 2011

Telecom I+D days have become an annual reference forum for the ICT sector in Spain, joining together universities, professional associations, private companies and administrations. In their XXI call, sponsored by the Cantabria government and the Santander council and organized by the Cantabria university, under the motto "ICTs in XXI century cities: The Smart City", a programme has been designed to analyze and discuss different technological and sociological aspects impacting the achievement of a sustainable and efficient city.

Ignacio Martín from Iberdrola was invited to participate in a panel discussion about Future Internet in the Smart Grid development. He took this opportunity to present the FINSENY project inside the PPP-FI program. There was a lot of interest in this panel discussion with several questions related to new energy services that could introduce new business for the future.

## 3.3 Planned Workshops & Conferences with FINSENY Participation

For further communication and networking action, several workshops and conference participations are already planned by FINSENY consortium members. Goal of the activities are to disseminate knowledge gained in the FINSENY project and to connect to activities in Europe and around the world from that FINSENY can learn. Following is a list of activities that are currently fixed:

- **ICT for Sustainable Homes conference**, Oct. 24-25, 2011 (Michaela Ballek, BAUM, Pierre Ives Plaza Tron, Telefonica): a three-hour workshop for exchange around smart grid and smart home has been set-up.

- Technical FI-PPP session at **ServiceWave 2011**, Oct. 2011 (Kolja Eger, Siemens)

- Panel session at second European conference and exhibition on Innovative Smart Grid Technologies (**ISGT-EUROPE 2011**), Dec. 2011 (Kolja Eger, Siemens)

# 4. FINSENY smart grid projects database

## 4.1 Overview

One of the tasks of WP1 is to connect and exchange knowledge with other European projects so that the FINSENY developments do not take place in a neutral space. We want to make sure that lessons learned in other projects will be considered and good ideas of FINSENY spread early. To find relevant projects and keep track of them, building a database of European projects has been started fairly early in the FINSENY project.

The FINSENY database 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.

Although other European projects also develop databases of their own, which seemingly cover similar topics – an already published example is the JRC database [6] – it turns out that FINSENY's needs are not completely covered by them. For example, some of the databases do not exist yet, or they are not finished, or the information FINSENY would need is not provided or not publicly available. Thus we decided to take on the task and develop our own database. To make this work available to other projects and to a broader audience, we are considering various options. A final decision will be made once it is cleaned, sufficiently filled and we got permission from the project leaders, depending on the circumstances of publication. We consider posting the FINSENY database directly on the FINSENY website, or helping other European projects building their own databases, such as JRC, SG-CG or GRID+. We have started communication with JRC on this topic.

## 4.2 Structure of the FINSENY database

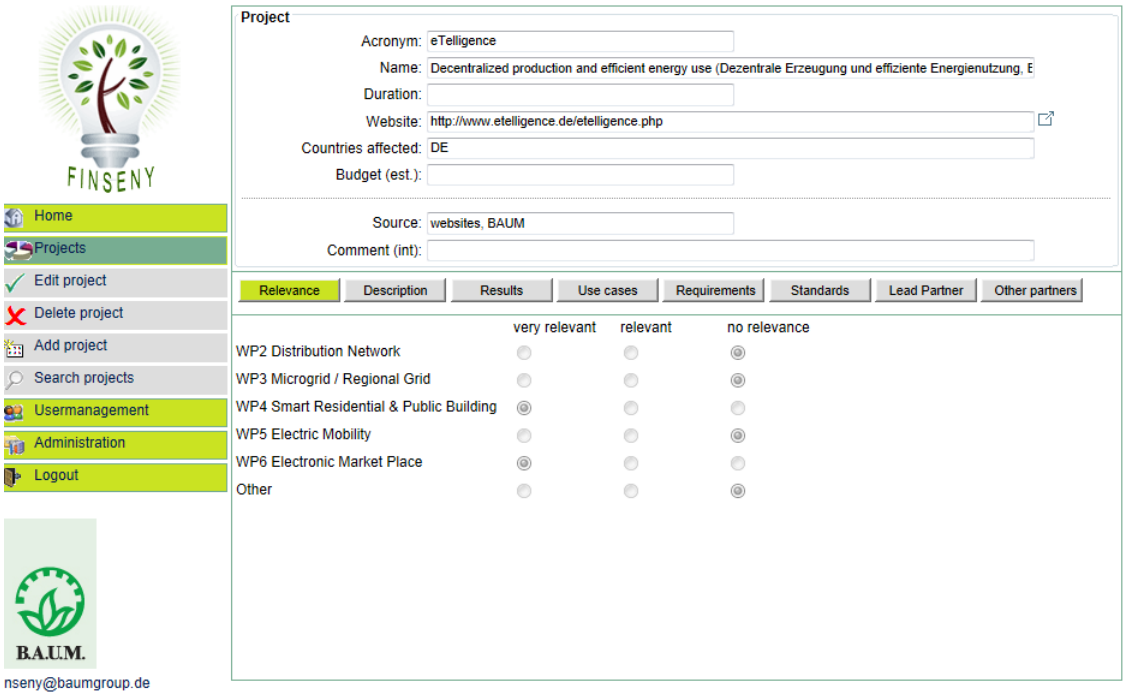
To keep the time-consuming data collection work to a minimum level, we only added database fields that are relevant to the FINSENY project – listed and explained in the figure 3.

**Figure 3: Fields in FINSENY database**

| Field Name | Description |
|---|---|
| Acronym | Abbreviation of the project, if any |
| Name | Complete name of the project (English and native language, if relevant) include master project Acronym, if applicable |
| Duration | Start and end date of project (month/year) |
| Website | Link to website of project (if available) |
| Countries affected | List of countries affected by the project (please use 2-letter ISO country codes: http://www.iso.org/iso/english_country_names_and_code_elements) |
| Budget | Total budget in EUR, funded part (funded by whom) |
| Source | Enter source that has been used to fill-in the data (could be several) |
| Comment (int) | Free text for any comments concerning the completion of the database related to this project |
| Relevance | Radio buttons to indicate the degree of relevance for each FINSENY WP |
| Description | Main objectives and key topics of the project (15–40 lines) |
| Results | Results of the project relevant to FINSENY, incl. documents (titles & links) |
| Use cases | Enter name, description, relevance (by WP) and add documents to describe a use case relevant to FINSENY |
| Requirements | Enter name, description, relevance (by WP) and add documents to describe the ICT requirements the project |
| Standards | Enter name, description, relevance (by WP) and add documents to describe the ICT standards the projects describes |
| Lead partner | Enter contact information according to the field labels |
| Other partners | Partner names with ISO country codes in parenthesis (unless it is a one-country project) |

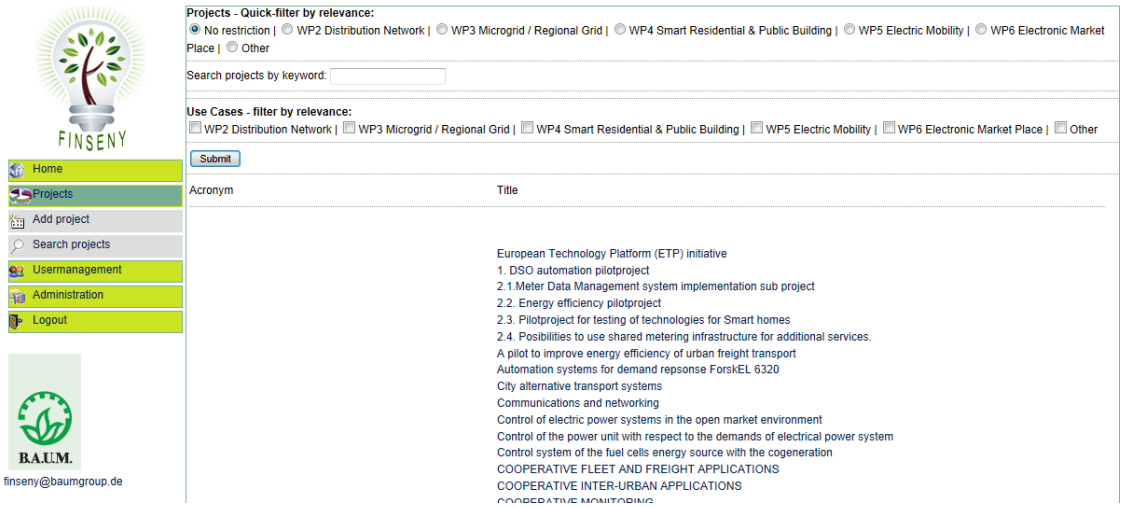
The relevance to the FINSENY WPs shows up for the project in general, but also for each use case, the ICT requirements and ICT standards. This helps to find projects with relevance to the five FINSENY scenarios quickly. Figure 4 shows the structure of the "Relevance" field and gives an overview of the other fields as well.

**Figure 4: Structure of a project entry in FINSENY database**



The database is searchable by work package, keyword and use cases, filtered by relevance. Figure 5 shows the Search screen.

**Figure 5: Search screen of FINSENY database**




All FINSENY members have viewing access to the database. Upon request, Michaela Ballek (BAUM) has given and will give individuals from the FINSENY consortium editing access to edit projects they have specific knowledge on.

## 4.3 Current contents of the FINSENY database

The FINSENY database of existing smart energy projects has been populated by BAUM using several sources (e.g., FINSENY partners, JRC, CORDIS, E-Energy and ICT for Electric Mobility). Due to the different sources, there have been double and triple entries, which we have started to clean-up and will continue to do so over time. In the beginning, the database had close to 1100 listings which have already been reduced to significantly less than 1000 projects. When cleaned-up properly, we expect the database to hold about 500 different projects (with focus on Europe). Thanks to many individuals within the FINSENY consortium, important existing projects have been double-checked and several use cases added. The process of cleaning-up and adding use cases, as well as ICT requirements and standards is going to continue at least for the next six months, more likely throughout the project.

In addition, altogether 43 relevant projects, called “top runners”, were determined by each working package as they had an important influence on their use cases, and an additional expert assessment. This is a preliminary selection and will be further assessed in the next six months. The criteria, the list of projects and an assessment plan will be discussed in the next chapter.

# 5. Projects particularly relevant for FINSENY

## 5.1 Criteria for selection of the most relevant projects

From the FINSENY database, 43 most relevant projects have been determined by the FINSENY consortium so far. This selection will be further assessed in the next 6 months and reported on in D1.3. The preliminary list of projects is listed in chapter 5.2. The criteria for the selection are:

- 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

While the FINSENY database may contain projects where ICT is only a side-aspect, we only looked in-depth into projects that have a heavy ICT focus. Ideally, the project has an integrated systems approach, i.e., covers more than one of the scenarios FINSENY is looking at. We also looked at particular innovative approaches, not necessarily limited to brand-new technologies, but also to innovative contexts in which they are used. Last but not least, at least some scope of the project must be reaching far into the future such that a very new approach is tried for the first time and not expected to be market-ready by the end of the project.

## 5.2 List of most relevant projects

Following is the preliminary selection of existing projects that are most relevant to our work at FINSENY. This list will be further examined and assessed in the next 6 months, by all FINSENY partners. Also, the most relevant projects will be contacted – if a relationship has not been established already – to make sure knowledge flows in both directions. Each project is described with title, country or countries and FINSENY WPs affected, a short summary with relevance to FINSENY, and to which degree the database is already filled. The projects are listed in alphabetical order.

### 5.2.1 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. [8]<br>• Develop technical solutions both at the consumers premises and the power system level<br>• Identify the possible barriers against active demand development and develop recommendations and solutions to remove these barriers considering economic, regulatory, societal and cultural aspects<br>• Identify the potential benefits for the different power system participants<br>• Develop appropriate markets and contractual mechanisms to manage the new scenarios<br>• Study and propose accompanying measures to deal with societal, cultural and behavioural aspects<br>• Study, develop and validate solution to enable active demand and exploit its benefits.<br><br>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, however, have been an inspiration for FINSENY use cases, including load balancing, SRP-based services, CRP-based services. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases ■<br>ICT requirements □<br>ICT standards □ | |

### 5.2.2 AlpEnergy

| **AlpEnergy** (CH, DE, FR, IT, SL) | WP2, WP3 |
|---|---|
| AlpEnergy aims at the analysis and modeling, the design and development, the demonstration and test, and the evaluation and transfer of Virtual Power Systems (VPS) in four distinct areas of the Alpine Space. This includes the prototyping of cutting-edge ICT technology for power production, transmission, distribution, measurement and use. The consortium of 11 partners from all over Europe has installed smart meters, "energy boxes", middleware, management systems, etc. in the field and is testing the systems. Results will be available in the 4th quarter of 2011. [9]<br><br>FINSENY partners BAUM and INPG are involved in AlpEnergy and strive for specific cooperation in ICT topics. In addition, FINSENY's WP3 (Microgrid) 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. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.3 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:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.4 BeAware

| **BeAware** (EU: SW, IT, FI) | WP3, WP4, WP6 |
|---|---|
| Name: Boosting energy awareness with adaptive real-time environments<br>Website: http://www.energyawareness.eu/beaware/<br><br>Reduction of energy consumption is a societal challenge that requires combination of technical, economical, and social means. So far, energy conservation has focused on new technologies and automation, treating users as passive consumers. However, strong evidence suggests that users can adapt actively their behaviour to energy saving with suitable feedback, support, and incentives, reducing significantly and cost-effectively energy use without impacting adversely their comfort.<br><br>At present, energy information flows are slow, aggregated, and hidden, being operated by a market lacking incentives and proper service models. The opaqueness discourages users to learn and apply conservation strategies in their everyday lives. However, novel ICT's offer opportunities for removing this bottleneck. In particular, ubiquitous interfaces combined with low-cost sensors support real-time information from energy networks and consumption, empowering users to learn and share conservation strategies. | |

BeAware studies how ubiquitous information can turn users into active players by developing:
1) an open and capillary infrastructure sensing wirelessly energy consumption at appliance level,
2) ambient and mobile interaction to integrate energy use profiles into users' everyday life,
3) 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:
1) grounding the conservation potential to users' cognitive constraints and practices,
2) ubiquitous computing applications for sensing wirelessly energy use and enabling users to act, and
3) 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 visualization – developed by Interactive Institute, Energy Design Studio (http://www.tii.se/ )

Part of these results are 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

Available in database:

| | |
|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | ■ |

### 5.2.5 BeyWatch

**BeyWatch** (FR, ES) WP4, WP6

BeyWatch is a European initiative aiming at ICT for energy efficiency, targeting the following:

- Ultra-low power white-goods
- Intelligent control of electrical devices in smart homes & neighborhoods
- Hot water & electricity generation from renewable energy sources
- Business plans for all stakeholders
- Enhanced consumers awareness towards less CO2 emissions

Results:

- An architecture that enables energy efficiency at home and neighborhoods.
- A set of software applications running at a residential gateway and server in the Internet to monitor the energy consumption at home and bigger geographical levels.
- A tuned and controllable hybrid photovoltaic solution at home for hot water and electricity generation.
- ICT connected, efficient and programmable white appliances.
- Simulation tools for grid usage forecast.
- A Business Support system for customers and utilities (integrated in a pilot at EDF labs in France).

As standards, ZigBee and HGI were used.

Evaluation:

The project has run an integration and evaluation cycle at the end of the project for 3 months at a trial site of EDF near Paris. The objective was to run the integrated BeyWatch system and measure the different gains in energy efficiency per appliance and for the whole integrated system.

- For the white appliances (dishwasher, fridge/freezer and washing machine), the gains in standalone mode have reached up to 30% less consumption. The use of hot water coming from the CPS (Combined Photovoltaic System) in the appliances has shown to be a measure that can save up to 50% of the normal power consumption.
- The ICT enabled fridge/freezer can be used for “load shaping” by storing cold.
- The ICT enabled CPS is a very good tool that in combination with the agent can help reduce the energy bills of the customers up to a 59%.
- The agent software running at the home level has shown that is able to control a high number of devices/islands at home to reduce the energy consumption, taking as inputs the user preferences and complex tariff schemes. It can be used very effectively for demand side management and peak-shaving or load shifting.

Improvements:

- M2M communications at home are still suffering from the lack of standardization and from the high level of fragmentation in the Home Area Network landscape.
- ZigBee profiles need further development in order to suite Home Automation and energy efficiency needs in parallel.
- Smart metering combined with ZigBee sometimes is difficult to implement because of the distance between the meter and the in-home equipment. So networking reliability should be improved.

FINSENY perspectives:

- With FINSENY, BeyWatch can be upgraded to support not only residential buildings but also commercial buildings, offices, data centers, 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.

Available in database:

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|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | ■ |

### 5.2.6 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. [10]<br><br>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:<br><br>• Extended cloud scenario: the extension of current cloud offerings towards a federated facility with heterogeneous virtualized resources and best-effort Internet interconnectivity.<br>• 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.<br>• 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.<br><br>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:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.7 DISPOWER

| **DISPOWER** (EU) | 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. [11]<br><br>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:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.9 e-Cube

| **e-Cube** (IT) | general (regulatory) |
|---|---|
| e-Cube is a collaboration project funded by the Italian Ministry of Economical Development where telecom operators, energy retailers, equipment manufacturers and university are collaborating to contribute to the Italian strategic agenda and regulation.<br><br>The project will assess the public policies required to:<br>• raise awareness about power consumption,<br>• suggest the best way to diffuse these devices (voluntary vs. mandatory requirements),<br>• address the privacy and customer protection issues raised by the diffusion of these devices,<br>• guide by means of policies the use of energy,<br>• evaluate cost and benefits for all stakeholders (utilities, end users, communities).<br>A collaboration with FINSENY WP1 would allow to harmonize FINSENY regulation strategy with the Italian strategy.<br><br>It is relevant to FINSENY because of the following reasons:<br>• 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<br>• Pilots. The project plans to have in 2012-2013 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. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards ■ | |

### 5.2.8 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. [12]<br><br>The project will run through March 2012. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.9 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 [13]. To this end, the project develops and field-tests:<br>• 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 (mulitbox) 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. Further preliminary results might be available for the next Deliverable in 6 months.

Available in database:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.10 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. [14]

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:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.11 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 mio €) in the Austrian programme for Electric Mobility Regions. Internet based ICT platforms have been developed to manage the fleet of vehicles.

Available in database:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.12 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.

The project will start with the definition of the representative mission and the most relevant business models. Based on these specifications, a two-pronged approach will carry on addressing the core research and development activities of ELVIRE: the development of both an on-board Driver Assistance Systems and an external electricity management service.

On-board services will rely on a Driver Assistance System that shall connect to the computers of the grid operators and identify which utility is running the nearest local power plug. An on-board charging and metering device will have to monitor the EV's energy status and compare it against the predicted energy required to reach the destination. These new in-vehicle technologies will grant support to the driver and navigate him safely throughout the E-Infrastructure, toward the most appropriate power plug.

External services will rely on an electricity management system which will process the vehicles' data and

combine them with information from the electricity infrastructure and service offers. Then, reliable and secure information will be returned to the driver "in real-time", allowing him to choose between several offers regarding information, service handling and accounting.

It is a declared objective of ELVIRE to run a representative validation test, putting on trial the internal and external systems and their seamless interaction. Issues concerning privacy and security requirements are also core aspects throughout the project.

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. In particular, considering the ICT requirements in this project could be interesting for FINSENY WP5.

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| Description | ■ |
| Partners | ■ |
| Use cases | ■ |
| ICT requirements | □ |
| 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 and legacy appliances through smart plugs.

All the use cases addressed by the project are covered by FINSENY WP4 and relates with 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.

The main result of Energy@Home is so far the definition of a set of technical specifications but a trial, liaison with international standardization bodies and the registration of a not-for-profit association have been already announced.

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 announced the intention of running a trial where real customers are offered to use the prototype system. A formal collaboration with FINSENY would be beneficial to both projects in order to exchange information but also in order to have common trials.
- 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.

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| Partners | ■ |
| Use cases | ■ |
| ICT requirements | □ |
| ICT standards | ■ |

### 5.2.13 FENIX

| **FENIX** (EU) | WP2, WP3 |
|---|---|
| The objective of FENIX was to conceptualize, design and demonstrate a technical architecture and commercial and regulatory framework that would enable DER units to become the solution for the future: a cost-efficient, secure and sustainable EU electricity supply system. To facilitate this solution, the VPP concept was further developed and tested in FENIX. The VPP enables large-scale technical and commercial aggregation of DER units and thereby providing services to system operators and energy market actors. [15]<br><br>The main results of the FENIX project are:<br>• Development of a VPP concept that fits the European power system<br>• Development of an information and communication architecture that is scalable and hierarchically flexible<br>• Development of new hardware components and software applications by leading European manufacturers that realize the VPP concept<br>• Development of a commercial and regulatory framework that allows the beneficial integration of the VPP concept in the future European power system<br>• Cost-Benefit-Analyses that quantify the economic benefits of the VPP concept<br>• Demonstration in two field demonstrations in real networks in Spain and the UK, complemented by laboratory demonstrations and simulations that prove the feasibility of the developed VPP concept<br><br>FINSENY partners IBERDROLA and EDF have been part of the FENIX consortium, i.e. the knowledge transfer is assured. | |
| Available in database: | |
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.14 G4V

| **G4V** (EU) | WP2, 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.<br><br>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.<br><br>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.<br><br>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 characterizing 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:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.15 Green eMotion

**Green eMotion** (EU) WP5; WP3, WP6

Green eMotion aims at enabling mass deployment of electric mobility in Europe. To achieve this, major players from industry, the energy sector, municipalities as well as universities and research institutions have joined forces to develop and demonstrate a commonly accepted and user-friendly framework consisting of interoperable and scalable technical solutions in connection with a sustainable business platform. The Smart Grids development, innovative ICT solutions, different types of electric vehicles (EV) as well as urban mobility concepts will be taken into account for the implementation of this framework. Green eMotion will connect ten ongoing regional and national electric mobility initiatives leveraging the results and comparing the different technology approaches to ensure the best solutions prevail for the EU single market. A virtual marketplace will be created to enable the different actors to interact and to allow for new high-value transportation services as well as EV-user convenience in billing (EU Clearing House).

Furthermore, the project will contribute to the improvement and development of new and existing standards for electric mobility interfaces. The elaborated technological solutions will be demonstrated in all participating demonstration regions to prove the interoperability of the framework. Green eMotion will facilitate the understanding of all stakeholders about the parameters which influence the achievement of best possible results for society, environment as well as economy and thus ensure transfer of best practices. As a result, policy makers, urban planners and electric utilities will receive a reference model for a sustainable rollout of electric mobility in Europe. The commitment of industry players ensures the focus of the project on the market after demonstration. By proving efficient and user-friendly solutions which are also profitable for businesses, the Green eMotion framework plans to accomplish EU wide acceptance of all stakeholders.

As an electric mobility project, the connection to the FINSENY project overall might not be obvious, but there are a number of connections besides 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, Smart Grid developments, innovative ICT solutions etc. Therefore, the project is relevant for some other FINSENY WPs as well: Green eMotion considers the smart grid infrastructure (FINSENY WP3) and relies on electronic-marketplace mechanisms (FINSENY WP6). The ICT relevance also becomes obvious when looking at the project partners: Besides utilities, electric-vehicle-related and other partners, ICT companies such as IBM, SAP and Siemens play a major role in the project.

Available in database:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.16 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.<br><br>Main Objectives:<br>• Develop and test innovative technologies and define standards through the set up of demonstrators<br>• Guarantee the scalability of these new technologies and replicability over Europe<br>• Analyse SmartGrid Cost-benefits (B-Case)<br><br>R&D main challenges:<br>• Using more Renewable Energy Sources connected to distribution networks,<br>• Implementing active, more efficient participation of customer to electricity markets (Active Demand)<br>• Secure energy supply - Network reliability<br>• MV / LV network Supervision & Automation<br>• Improving peak load management through increased interactions between network operation and electricity customers<br>• Demand Side Management (DSM), VE, Storage, Micro Grids<br><br>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:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.17 HOMES

| **HOMES** (FR) | WP4, WP8 |
|---|---|
| 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. [16] HOMES will enable to achieve energy savings up to 20% and is part of the development strategy of Schneider Electric in the field of energy efficiency.<br><br>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.<br><br>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 learnings 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:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.18 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. [17]

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):

- SAP: Future Fleet, e-mobility, MeRegioMobil
- BAUM: head of ancillary research ICT for Electric Mobility
- Siemens: Harz.EE-mobility

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|---|
| • RWTH Aachen: Smart Wheels<br>• STAWAG: Smart Wheels |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ |

### 5.2.19 INTEGRAL/STREP

| **INTEGRAL/STREP** (EU) WP2, WP3, WP4, WP5 |
|---|
| The INTEGRAL project aimed at building and demonstrating an industry-quality reference solution for Decentralized Energy Resources (DERs) aggregation-level control and coordination, based on commonly available ICT components, standards, and platforms. Assumptions considered large share of Distributed Energy Resources (DER) and Renewable Energy Sources (RES) in the electricity production. This means that EU policy targets, in EU Electric Power Systems have been met. [18]<br><br>The project have experimented three field tests:<br><br>• Distributed coordination by PowerMatcher agents:<br>This project provided a learning cycle for the application of Smart Grid technology in real field test environments such as the PowerMatching City Hoogkerk pilot, from ECN network in the Netherlands. It has shown that this multi-agent technology can be successfully applied to handle a number of very various Smart Grid use cases serving several different stakeholders. Advanced ICT technologies ranging from the millisecond to the minutes level in the grid are now able to be combined within a one-solution framework. The INTEGRAL project produced the PowerMatcher Agent core 3.0 and gave a broad exposure to ECN regarding deployment and exploitation of Smart Grid technology in 'living laboratory' environments.<br><br>• PowerMatching City<br>Initially PowerMatching City was set up as a virtual power plant with a large number of decentralized power generators, it grew later into the first fully functional smart grid living lab. Indeed, the decentralized generators are composed by the micro combined heat and power generator and PV panels but also by hybrid heat pumps, electric vehicles and smart appliances. PowerMatching City integrates also market model that enables and achieves a simultaneous optimization for the stakeholders of the utility, the network operator and the end-user at the same time.<br>At last, the design, implementation, roll-out and analysis of the results of PowerMatching City learned many valuable lessons. These are the reason why the consortium of PowerMatching City agreed on continuing the project in a second phase, where the infrastructure is used and expanded.<br><br>• Critical grid conditions<br>CRIC has acted as the coordinator of the INTEGRAL Field Demo at Mas Roig, an estate about 10 km far from Girona, Spain. This demonstrator aimed to provide solutions for the Smart Power Grid under critical operation conditions. An integrated ICT platform has been built in order to improve the microgrid design and performance in realistic critical situations. In the demo, Smart Grid critical conditions have been reproduced for random energy production or consumption situation, critical meteorological conditions or potential grid cut-offs. In order to guarantee performance and stability of the microgrid under these conditions a new intelligent Demand Management System has been designed, developed and tested by CRIC, Wattpic and NTUA.<br><br>• Smart Grid MAS<br>The MAS architecture allows the cooperation of the developed MAS with different ICT technologies and power electronics. This architecture creates an integrated platform that enables the operation of Microgrids under normal or critical situations. This design caters to the adaptability and the extensibility of the system. A Graphical Interface has been developed to provide users an overview of the system operation, and to inform them about the consumption of the controllable loads and the production of the distributed generators. The graphical interface, enables the users to manage their consumption by adjusting the operation of the controllable load. |

- The self-healing concept in Smart Grids

France has been the host of the field demonstration focused on emergency operating conditions, showing self-healing capabilities of DER/RES aggregations. The aim of this demo was to provide solutions to reduce outage time and operation costs, due to a fault occurrence within the network, by applying the concept of self-healing approaches (SHA). In general, it is expected to include the three following high-level functions: (i) fault distance computation, (ii) fault location and isolation by combination of fault indicator states with fault distance computation states with fault distance computation, (iii) fault isolation and distance computation. In order to precisely determine the faulty section, a novel approach that combines FI states with fault distance computation has been developed.

- Dealing with real-life networks

In order to represent the behavior of the real network during a fault and to satisfy economical conditions, a test bench network of 30kVA, 0.4kV was constructed. This analogical emulation allows testing real Remote Terminal Units fed by real fault currents and voltages at reduced scale.
The fault passage indicators (FIs), real RTUs from Schneider Electric Telecontrol, are systems that find and correct faults. They are key elements of the architecture. They are micro-processor based measurement devices, including various interface units to communicate with both the SCADA and the local agent. A real Supervisory Control and Data Acquisition (SCADA) have been developed to validate Agent-SCADA interactions.

- Experimental set-up and summary results

To evaluate the ICT performances requested by the self-healing agent, different layers of communication and associated monitoring were developed. The communications are completely controlled by an emulated ICT system based on TCP-IP. This network is able to control bandwidth, latency and even error rates but also supports analyzing all protocols used between RTUs, agents and SCADA during a fault. Level 2 contains the different RTUs, a distributed database, the agent and the SCADA server. Level 3 contains the PACs and other controllers of the test bench. The agent has shown, during the different scenarios, a good robustness and a high adaptability to the network configurations.
Regarding ICT facilities, the monitoring used for the demonstrator was the HMI of the SCADA, which was used to verify the function of the agents, the fault injection in the micro-network, and so on. This monitoring was further complemented by having the routing nodes continuously log all traffic that was passed through each respective subnet and by generating real-time graphs of the number of packages and amount of traffic (custom scripts), and by having the controller repeatedly sending out latency probes to the nodes.

New challenges arise from the various scenarios that were tested during this emergency-condition Demo. A major concern, with respect to low impedance faults, is the reaction of synchronous generators which could modify the short-circuit currents and might impose an evolution in the fault passage indicators (FIs). Master to master protocols should also be preferred to increase the performance of the agents distributed in the Smart Grids.

Available in database:

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| Description | ■ |
| Partners | ■ |
| Use cases | ■ |
| ICT requirements | ■ |
| ICT standards | □ |

### 5.2.20 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.

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:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.21 Kalasatama

**Kalasatama** (FI) WP2 – WP6

The City of Helsinki has defined environmental targets for the city until 2030. These targets set by the City of Helsinki for urban planning are considered to be in "world class" in a global comparison. As a part of this environmental strategy the new Kalasatama area of Helsinki will be a test site for the demonstration of a smart grid system including key elements of smart grid such as integration of local generation, smart homes / buildings, electrical storage, charging of electric vehicles, grid automation etc. These technical enablers in combination with packaged commercial energy services will enable the fulfillment of the environmental targets set for the sustainable city.

The civil works and infrastructure construction of the area has been started and the first construction will start later in 2011. The Smart Grid demonstrator planning will also provide requirements for the zoning regulations (e.g. building of wind turbines and solar panels in buildings) as well as the construction itself (e.g. electrical and data wiring in the buildings). When finished in 2020 the Kalasatama area will have 18,000 residents and 10,000 office workers (commuters).

General objectives of the Kalasatama Smart Grids Cooperation are:
- Test and demonstrate new concepts for and design of smart grids in sustainable cities
- Apply and assess new technology, business and regulation models and energy solutions and services for end customers
- Actively contribute to the achievement of the environmental targets for Helsinki Smart Energy
- Test new energy services and customer feedback to allow the services to be offered throughout Helsinki (as applicable)

The main components of the Smart Grid 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. As of September 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.

The project partners are: NSN, ABB, Helen Sähköverkko, Helsingin Energia and Fingrid, thus

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| FINSENY will be connected through two project partners (ABB and NSN). |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ |

### 5.2.22 MeRegio (E-Energy)

| **MeRegio (E-Energy)** (DE) WP2, WP3, WP6; WP5 |
|---|
| 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. [19]<br><br>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.<br><br>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 visualization appliances that enable them to keep track of their energy consumption.<br>• Enabling the network to integrate users with new requirements<br>• Enhancing efficiency in day-to-day grid operation<br>• Ensuring network security, system control and quality of supply<br>• Improving market functioning and customer service<br>• Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management<br><br>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 SAP. The CORE platform keeps track of all data and sends it to different systems in appropriate form. Furthermore, it provides other services for the energy<br>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.<br><br>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.<br><br>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. |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ |

### 5.2.23 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. [20]<br><br>The conceptual approach in this project involves the development of a methodology consisting of:<br>• Development of a management and control concept that will facilitate the transition from the conventional paradigm to the MERGE concept,<br>• Development of an evaluation suite that consists of methods and programs of modeling, analysis, and optimization of electric networks into which electric vehicles and their charging infrastructure is integrated<br>• Development of dynamic power electronic interface models<br>• Development of electricity network management and control models<br>• Modeling EV behaviour in market environment<br>• Electricity markets and smart meters<br>• Quantification of the impacts resulting from large EV deployment<br><br>IBERDROLA is member of both the MERGE and the FINSENY project, thus information is assured to flow both ways. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.24 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. [21]<br><br>The objectives of the project were:<br>• Investigation of new micro source, storage and load controllers to provide efficient operation of microgrids.<br>• Development of alternative control strategies (centralised versus decentralised)<br>• Alternative Network designs<br>• Technical and commercial integration of Multi-Microgrids<br>• Field trials of alternative control and management strategies<br>• Standardisation of technical and commercial protocols and hardware<br>• Impact on power system operation<br>• Impact on the development of electricity network infrastructures<br><br>Some of the project's use cases were relevant for FINSENY's WP3 work. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.25 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. Many Renewable Energy Sources (RES, e.g., windmills, solar panels) pose the challenge that production is dependent on external factors (wind speed and direction, amount of sunlight, etc.). Hence, available power can only be predicted but not planned, which makes it rather difficult for energy distributors to efficiently include renewable energy sources into their daily schedules.<br><br>The technology developed in the MIRABEL Project will improve this situation considerably. In detail, we work on a concept of micro-requests with time shifts to handle the demand and supply of energy on a household level. Further, we 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. We aggregate (and disaggregate) the micro-requests on a regional level, and we develop a scheduling approach for energy production and consumption based on aggregated requests. Finally, our 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).<br><br>Energy distribution companies may use the aggregated request information to re-schedule energy demands/supplies and thus have additional means to react to shortages or an abundance of energy. They may also trade their demand requests with other energy distribution companies.<br><br>As a result of the MIRABEL Project, the overall energy production and consumption cycle will be more efficient, and based on our experience with peak-demand leveling, we expect our approach to result in peak-demand reductions of approximately 8-9% for the total grid.<br><br>The project is of relevance for FINSENY, as it investigates a market-based demand-side-management approach. It relies on data management and analysis mechanisms and leads to a number of ICT-related requirements. In Particular the FINSENY WP3 (Microgrid) and WP6 (Electronic Market Place for Energy) might benefit from the techniques investigated in MIRABEL. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.26 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. [22]<br><br>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. To draw from the lessons learned in the MoMa trial, FINSENY will seek contact when assessing the use cases and requirements.

Available in database:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.27 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 standardization 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.

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.28 NOBEL

**NOBEL** (EU) WP3, WP6

In general, energy consumption in the EU-27 has stagnated over recent years. In 2006, according to the latest official data, gross inland energy consumption in the EU-27 was 1.825 Mtoe (million tons of oil equivalent), while total final energy consumption was 1.176 Mtoe. It is in this 650 Mtoe of difference between energy spent and energy finally used where NOBEL (Neighbourhood Oriented Brokerage Electricity and monitoring system) will focus its efforts.

Distributed generation of energy coming from various vendors, even private homes, is a big challenge and, additionally, a source for new business opportunities for tomorrow’s power management systems

that, unlike today, will not dispatch energy centrally or under central control. On the contrary, the production, distribution and management of energy will be treated and optimized using local data. Information and Communication Technologies (ICT) are key to enhance the monitoring and control of electrical energy from the source to the load, especially in cases of large scale distributed energy production.

In existing approaches electricity is distributed to the final users according to its expected estimated demand, usually pre-computed yearly. Such non-dynamic approaches are difficult to evolve and cannot accommodate changes in the system, e.g., on the production side, on the consumer side etc. 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.

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. More concretely, NOBEL aims at achieving the following results:

- IPv6 software layer for future smart meters and embedded devices in a smart grid.
- Middleware for data capturing and processing energy data on a smart grid.
- Service Oriented framework to support the monitoring of the grid, and the brokerage of electricity in neighborhoods.
- A Neighborhood Oriented Energy Monitoring and Control platform.
- A Neighborhood Oriented Public Lighting Monitoring and Control platform.
- A citizen platform to obtain real-time information and participate in the brokerage of electricity.

NOBEL is therefore of high relevance for FINSENY, as it investigates ICT mechanisms for smart energy. This involves in particular the smart grid (FINSENY WP3) and makes use of electronic-marketplace mechanisms (FINSENY WP6).

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.29 OpenNode

**OpenNode** (ES, DE, FR, AT, PT) WP2, WP3, WP4

Based on Information and Communication Technology (ICT), OpenNode seeks to address three major challenges by a network of embedded devices – the smart Secondary Substation Nodes (SSNs) – capable of communicating with each other, monitoring and controlling the distribution grid status and thus contributing to the efficient exploitation of the energy resources:

1) the increased integration of fluctuating power resources to achieve the climate goals,
2) increased "smartness" especially in the electrical distribution grid to renew the infrastructure to cope with increasing capacity requirements, and finally
3) the stakeholder diversification separating the grid operation, the power provisioning, the metering services, auxiliary services and others.

The OpenNode project focuses on research and development of (i) an open SSN which is seen as an essential control component of the future smart distribution grid, (ii) a middleware to couple the SSN operation with the Utilities systems for grid and utility operation, and (iii) a modular communication architecture based on standardised communication protocols to grant the flexibility required by the stakeholder diversification and to cope with massively distributed embedded systems in the distribution grid. The open SSN architecture developed within this project will make the distribution part of the grid transparent, controllable and intelligent thus being an essential component of the Smart Grid.

The relevance of OpenNode to FINSENY is closely related to the integration and interaction of the OpenNode's components to ensure a two direction exchange of data between the Smart Meter and SCADA systems of the Energy Providers. Moreover, the development of components in OpenNode not been defined by the type of customer you have access to electricity, therefore the results of tests of the

components can be extrapolated and used as reference for all types of projects requiring manage information related to the consumption of electrical energy, including energy requirements planning, consumer behaviour, etc.

To achieve these results, OpenNode is performing laboratory and field tests with the currently available standards (IEC-61870, CIM, IEC61870 and web services) and new standards (IEC-61850) to be implemented during the next years in the energy industry. Consequently, part of the work being done is related to ensure compliance with international guidelines.

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 to analyse and manage 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.

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| Description | ■ |
| Partners | ■ |
| Use cases | ■ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.30 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.

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| Description | ■ |
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| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.31 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 trialing 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 trialing 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 trialing 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'.

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.32 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:

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| Description | ■ |
| Partners | ■ |
| Use cases | □ |

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| ICT requirements | □ |
| ICT standards | □ |

### 5.2.33 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 organization 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. [23]<br><br>Major objectives are:<br>• Enabling the grid to integrate users with new requirements<br>• Enhancing efficiency in day-to-day grid operation<br>• Ensuring network security, system control and quality of supply<br>• Improving market functioning and customer service<br>• Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management<br><br>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:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.34 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. [24]<br><br>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.<br><br>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:

| | |
|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.35 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. [24]

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 realization 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:

| | |
|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.36 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. [25]<br><br>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.<br><br>Major objectives are:<br>• Adoption of intelligent home / facilities automation and smart device using standardized interfaces (EE-Bus)<br>• Providing consumption/injection data and price signals by different means<br>• Facilitating consumer participation in the electricity market<br>• Improving information on energy usage and energy sources<br>• Collecting meter readings in sufficient frequency<br><br>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, authentification, etc. | |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.37 SmartHouse/SmartGrid

| **SmartHouse/SmartGrid** (EU: DE, GR, NL) | WP3, WP4, WP6 |
|---|---|
| We have entered a new energy era where the world's economic regions are dependent on each other for ensuring energy security and stable economic conditions. Europe and the rest of the world share common aims of providing abundant clean, secure and affordable energy. Therefore, future goals include improving energy efficiency, increasing penetration of renewable energies, diversifying and decentralising Europe's energy mix and enhancing competitiveness of European industry. ICT will play a key role in the transformation of the electricity sector that is triggered by market liberalisation, the extensive use of renewable energies, increasing prices and decentralised energy generation (and co-generation) systems. Distribution of electrical energy follows today the broadcasting model (from few centralised power plants to millions of users), while in the future it will be closer to a community based model (from thousands of decentralized power systems to millions of users). 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.<br><br>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.<br><br>The project builds on<br>• using available open industry standards in both the ICT and energy sectors,<br>• 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 the FINSENY WP3 and WP4, but also for the FINSENY WP6, as electronic-marketplace mechanisms play an important role in SmartHouse/ SmartGrid.

Available in database:

| | |
|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | ■ |
| ICT requirements | ■ |
| ICT standards | □ |

### 5.2.38 SPES 2020

**SPES 2020** (DE) ICT

Project SPES 2020 studies 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, avionics. The following topics are researched: model based requirements engineering, model based architecture development, security demonstration, certification and quality insurance of non-functional requirements, as well as modeling of parallel real-time processes and proof of real-time performance. [26]

SPES 2020 is scheduled to finish in October 2011. FINSENY will take into consideration the results, as the SPES specification will also apply to energy systems, namely smart grids.

Available in database:

| | |
|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.39 Stockholm Royal Seaport

**Stockholm Royal Seaport** (SE) WP3, WP5, WP6

The feasibility study will examine and propose 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 project will increase knowledge of optimization, control, maintenance, market concepts and regulation of future smart grid in urban areas and create the conditions for a demonstration project that will allow the implementation of a smart grid supporting climate mitigation in city areas. The feasibility study aims to describe in detail the implementation and design of a larger demonstration project including market models, technical solutions, deployment, as well as study and evaluation of a smart grid in the Stockholm Royal Seaport.

The project is 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 harbor 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

The results of the feasibility study will also identify general solutions that will be applicable on a similar energy in the urban environment and create commercial products and services in the future.

*Relevance to FINSENY:*
Especially the outcome of WP1/2/3 can be 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 will ensure that the results will be transferred accordingly.

Available in database:

| | |
|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.40 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.

*Relevance to FINSENY:*
The results regarding secure transmission of data can be of relevance to FINSENY.

Available in database:

| | |
|---|---|
| Description | ■ |
| Partners | ■ |
| Use cases | □ |
| ICT requirements | □ |
| ICT standards | □ |

### 5.2.41 Web2Energy

| **Web2Energy** (EU) | WP2, WP3, WP4, 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.<br><br>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.<br><br>Web2 Energy is active in various fields:<br>**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.<br>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.<br>**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.<br>**Language, technology and data**: For every participant – whether consumer, producer or local terminal – the most favorable 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.<br>**Control Center:** 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.<br>**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:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ | |

### 5.2.42 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. [27]<br>• 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.<br>• 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.<br>• Reduction of emissions. Greenhouse gas emissions will decrease by at least 40%, calculated from 1990.<br>• 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.<br>• 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:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ |

### 5.2.43 ZeM2all

| **ZeM2all** (ES, JP) WP5, WP2, WP3, WP4, WP6 |
|---|
| The ZEM2ALL project aims to collect all the aspects related to clean mobility and develop the technologies needed to create a unique ecosystem of communication between the different actors of electric mobility: vehicle users, charging points, electrical distribution, back office, front office, city council and citizens in general.<br><br>The project started in 2011. An important trial in the Spanish city of Malaga will begin in 2012. The trial will involve: 200 EVs, 220 regular charging stations (slow speed), and 16 high speed charging stations. The vehicles will be owned by real final users that will have to lease the EVs. The latter will be a mix of available technologies from Mitsubishi (EVs, charging stations), Hitachi (ICT), Endesa (Energy infrastructure), Telefonica (ICT services) and Sadiel (IT for energy).<br><br>FINSENY is starting to link with the project (they will be 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. No results can be reported yet about ZEM2ALL, but we will continue reporting the status of ZEM2ALL in the following WP1 deliverables within FINSENY. |
| Available in database:<br>Description ■<br>Partners ■<br>Use cases □<br>ICT requirements □<br>ICT standards □ |

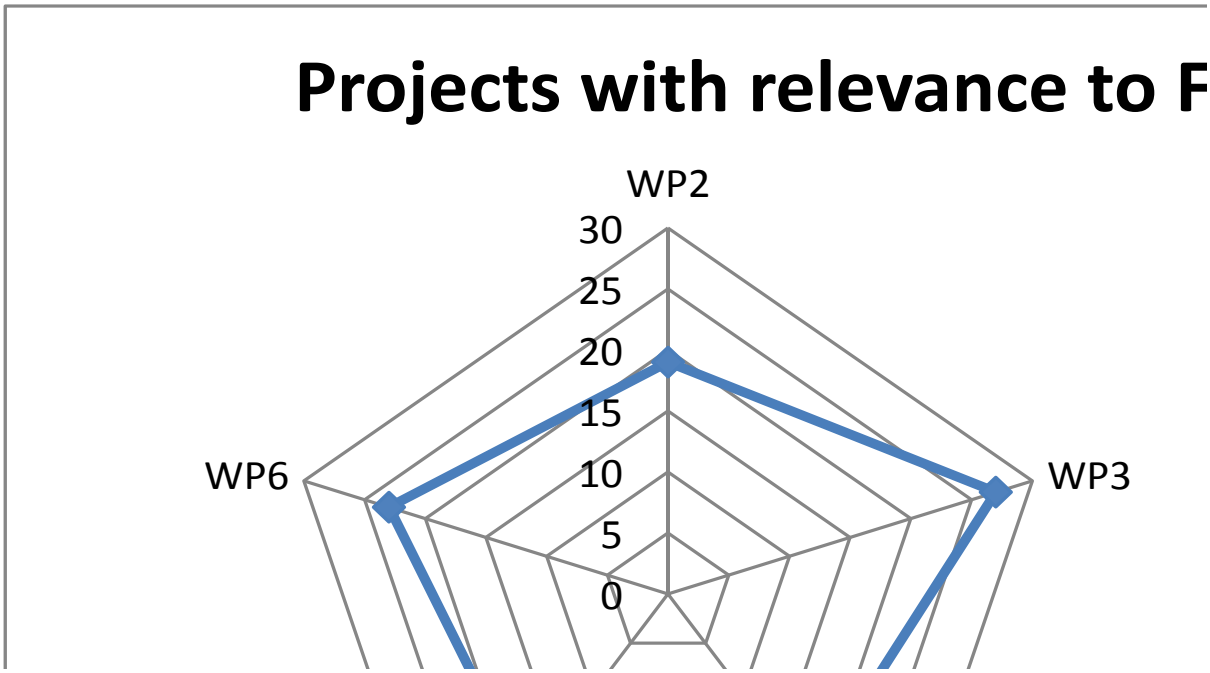
## 5.3 Relevance for FINSENY Work packages

As we have not finished cleaning-up the FINSENY database, we cannot report on the full set of projects yet. Thus, we have limited the following evaluation on just the 43 “top runners” projects to demonstrate how we plan to do the evaluation for the extended assessment in D1.3.

It will be helpful to know how well the topics of our work packages 2 to 6 have been covered by other (finished and ongoing) projects. The first step is to see how often the five scenarios (distribution network, microgrid, smart buildings, electric mobility and electronic market place) have been covered by existing projects. This is depicted in figure 6. We can see that they are fairly distributed for this set of projects, between 19 and 27 occurrences for each of the five scenarios.

This result, of course, could just show that we selected the projects with a bias toward certain scenarios, such as the microgrid and the electronic market place – as these are potentially the most innovative topics. In issue 2 of this deliverable, we will be able to give a more objective picture of the smart grid landscape in Europe.

**Figure 6: Selection of FINSENY database projects with relevance to FINSENY**




## 5.4 List of relevant use cases with reference to FINSENY use cases

Equally interesting is to which degree the projects we selected are indeed reflected in FINSENY use cases. We started data gathering very late in the process, so not all WPs were able to go through the process in detail. Figure 7, however, gives some impression on how the knowledge generated in various European projects is considered, possibly "re-used" within FINSENY. In issue 2 of this deliverable, we will look deeper into the use cases – from FINSENY as well as from the other projects – with the goal to assess the core ICT issues within the smart grid realm.

**Figure 7: FINSENY database projects as they relate to FINSENY use cases**

| Project name | WP/Use cases |
|---|---|
| **ADDRESS** | WP2:<br>WP3: Load balancing, SRP-based services, CRP-based services<br>WP4:<br>WP6: Load balancing, SRP-based services, CRP-based services |
| **AlpEnergy** | WP2:<br>WP3: Technical Virtual Power Plant, microgrid islanding mode, data acquisition and monitoring, demand side management, price induced load shift, smart metering, load balancing etc. |
| **aWattGarde** | WP6: |
| **BeAware** | WP3: Home energy management system (aggregation of data and status from microgrid system participants)<br>WP4: Home and per appliance energy monitoring, customer engagement<br>WP6: Home energy monitoring, customer engagement, smart metering, persuasive end user interface |
| **BeyWatch** | WP4:<br>WP6: |
| **BonFIRE** | (general project on ICT – cloud computing) |
| **DISPOWER** | WP3: Integration of distributed generation, energy trading, ancillary services<br>WP4:<br>WP6: |

| | |
|---|---|
| **e-Cube** | Not applicable to WPs directly; important are the regulatory aspects |
| **EDISON** | WP5:<br>WP6: |
| **eTelligence** | WP4:<br>WP6: |
| **e-DeMa** | WP3:<br>WP4:<br>WP6: |
| **ElectroDrive Salzburg** | WP5: |
| **ELVIRE** | WP5: |
| **Energy@Home** | WP4: Home energy monitoring, optimized energy scheduling, overload management, demand response, smart appliance<br>WP6: Optimize energy cost in case of multi-tariff contract |
| **FENIX** | WP2:<br>WP3: Technical Virtual Power Plant, Commercial Virtual Power Plant |
| **G4V** | WP2:<br>WP3:<br>WP5: |
| **Green eMotion** | WP3:<br>WP5:<br>WP6: |
| **GRID4EU** | WP2:<br>WP3:<br>WP6: |
| **HOMES** | WP4: |
| **ICT for Electric Mobility** | WP5 (MeRegio Mobil): Charge Load Management, Optimized charge scheduling<br>WP5 (Future Fleet):<br>WP5 (Smart Wheels):<br>WP5 (Harz EE-mobility): |
| **INTEGRAL/STREP** | WP2:<br>WP3: DER/RES aggregation, balancing power, emergency mode<br>WP4:<br>WP5: |
| **IRENE** | WP2:<br>WP3:<br>WP5: |
| **Kalasatama** | WP2:<br>WP3:<br>WP4:<br>WP5:<br>WP6: |
| **MeRegio** | WP2:<br>WP3:<br>WP6: energy contract brokering, trading flexible capacity<br>WP5: |
| **MERGE** | WP2:<br>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<br>WP6: |
| **Moma (E-Energy)** | WP2:<br>WP3:<br>WP4:<br>WP6: |
| **NextGen** | WP2: |
| **NOBEL** | WP3:<br>WP6: energy markets for neighborhoods |
| **OpenNode** | WP2: |

| | |
|---|---|
| | WP3: Smart metering, grid automation, load management<br>WP4: |
| **Park& Charge** | WP5: |
| **Plugged-in Places** | WP5: |
| **PREMIO** | WP2:<br>WP3:<br>WP4: |
| **RegMod Harz (E-Energy)** | WP2:<br>WP3:<br>WP5:<br>WP6: |
| **SAVE ENERGY** | WP4: |
| **SEC** | WP2:<br>WP5:<br>WP6: |
| **Smart Watts (E-Energy)** | WP2:<br>WP3:<br>WP5:<br>WP6: |
| **Smart House / Smart Grid** | WP3:<br>WP4:<br>WP6: |
| **SPES 2020** | (general topic: ICT architectures and methods) |
| **Stockholm Royal Seaport** | WP3:<br>WP5:<br>WP6: |
| **VIKING** | WP2: |
| **Web2Energy** | WP2:<br>WP3:<br>WP4:<br>WP6: |
| **Western Harbour/Malmö** | WP3:<br>WP4:<br>WP5: |
| **ZeM2All** | Project just started; will be relevant for WP2-6. |

# 6. Common results and trends

Common results from projects, national standards etc. will be joined in mandate M/490. FINSENY is closely watching – and FINSENY partner members even driving the effort. We will closely follow the process to make sure that FINSENY stays in line with the main results. We will be able to report more details in phase 2 of the assessment.

# 7. List of Figures



# 8. Glossary of Terms

Please refer to the general FINSENY Glossary of Terms you can find at the following link:

https://overseer1.erlm.siemens.de/infobase.do?reqCode=infobase&mainFrame=%2Frepository%2FRepository%2Flist.do%3FreqCode%3Dlist&_noredirect_=true

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[12] EDISON website: www.edison-net.dk

[13] eTelligence website: www.etelligence.de

[14] e-DeMa website: www.e-dema.com

[15] FENIX website: www.fenix-project.org/

[16] HOMES website: www.homesprogramme.com/

[17] ICT for Electric Mobility website: www.ikt-em.de

[18] INTEGRAL website: www.integral-eu.com

[19] MeRegio website: www.meregio.de

[20] MERGE website: www.ev-merge.eu

[21] Microgrids/More Microgrids website: www.microgrids.eu

[22] MoMa website: www.modellstadt-mannheim.de

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[27] Western Harbour / Malmö website: www.malmo.se/English.html