

CURSO DE GESTIÓN DE REDES ELÉCTRICAS INTELIGENTES

4 - EXPERIENCIAS E INICIATIVAS EN EL DESARROLLO DE LAS REDES INTELIGENTES

4.3 - Proyectos de demostración e iniciativas de innovación en el desarrollo de las redes inteligentes

Junio 2014



Iberdrola Distribución: Smart Grid Projects

Madrid, June 5th 2014



Index

Background

R&D European Programmes

IBERDROLA's SG Portfolio

Projects Ongoing

Projects Completed

Background

General Overview

- Stimulating private investment in SG R&D and D&D Projects
- In Eastern Europe the highest percentage of funding comes from the EC
- More than 50 % of the total smart grid budget originates from four countries: FR, UK, DE and ES
- 49 % of the total budget for the smart grid projects surveyed comes from private capital and the remaining 49 % from various sources of funding

Funding sources



- Universities, TSOs, DSOs, manufacturers, ICT companies, etc.
- 1670 organizations are involved; 22 % of them are participating in more than one project; 216 projects have only one participant
- More than half of the budget is managed by universities and DSOs

Organization Types



- 172 multinational projects (37% of the total) which together manage €1350 million
- Organizations from Spain, France, Italy and Germany are the most active in setting up cooperation links in multinational projects
- France is the top contributor while Switzerland is the top recipient in the multinational collaboration budget share ratio

Multinational Collaboration



Smart Grid Projects Outlook 2014



Smart Grid projects

Big Picture



- 459 Smart Grid R&D and Demo & Deployment Projects
- 28 EU Countries Involved
- Total investment of €3.15 billion

Main Smart Grid Applications

Smart Network Management

Integration of Large Scale RES

Integration of DERs

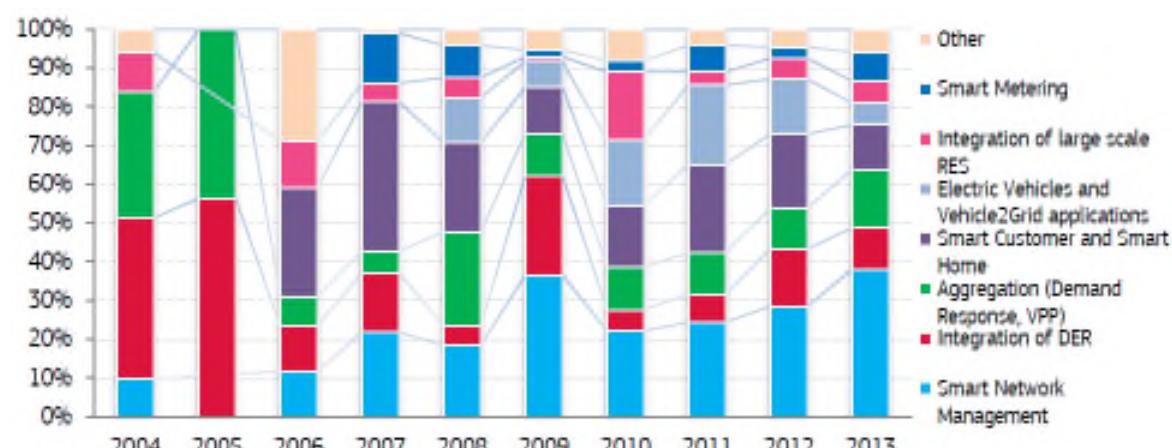
Aggregation (virtual power plant, demand response)

Smart customers and smart home

Electric vehicles and Vehicle2Grid applications

Smart metering

Other



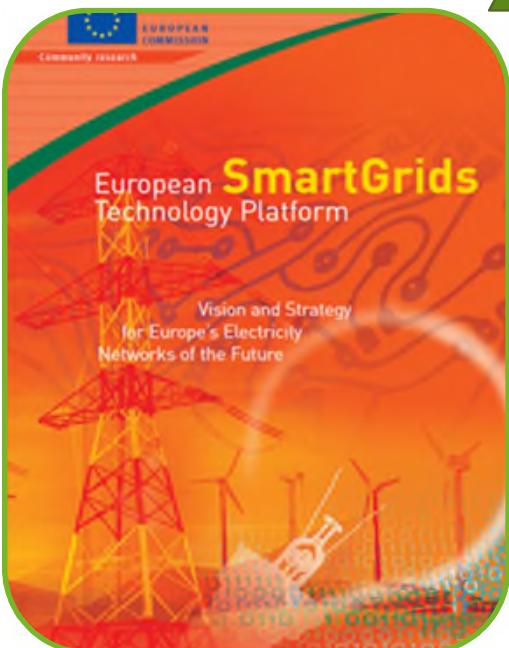
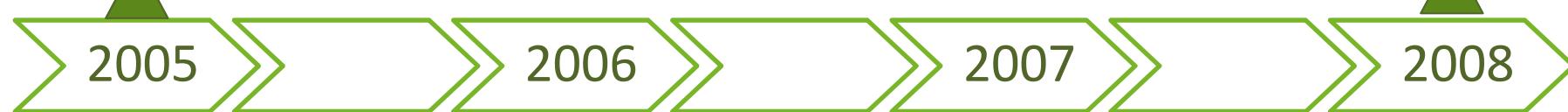
R&D European Programmes

Background

European Technology Platform for SG



- Created in 2005
- Suggested to be created During the first International Conference on the Integration of Renewable Energy Sources and Distributed Energy Resources held in December 2004



Vision and Strategy
for Europe's
Electricity Networks
of the Future

Lower Carbon Energy
Sources

Europe's Electricity
grids require to be
restructured

The European Strategic Energy Technology Plan **SET-Plan** Towards a low-carbon future

Strategic Research Agenda
for Europe's Electricity
Networks of the Future
(SRA)

Ensuring that Europe's
electricity networks develop
in a way that enhances
Europe's competitive
position without
compromising environmental
objectives or the
commitment to sustainability

Providing a clear
framework, goals and
objectives for the research
community and all
stakeholders to focus on



SET-Plan Initiatives

SET- Plan

- Strategic Energy Technologies Plan
- Adopted by the European Union in 2008
- First step to establish an energy technology policy for Europe
- Principal decision-making support tool for European energy policy
- **Make Low-carbon technologies affordable and competitive.**

• 9-year European R&D and demonstration programme

European Industrial Initiatives (EII)

- The European Industrial Bioenergy Initiative
- The European CO2 Capture, Transport and Storage Initiative
- **The European Electricity Grid Initiative**
- The Fuel Cells and Hydrogen (FCH) Joint Technology Initiative
- The Sustainable Nuclear Initiative
- Energy Efficiency – The Smart Cities Initiative
- The Solar Europe Initiative
- The European Wind Initiative



- Projects with this label are in line with the spirit of the EEGI and an EEGI Functional Objective
- It provides a methodology for identifying the list of projects that form part of the EEGI Roadmap
- The EEGI Label provides additional visibility to Smart Grid projects or proposals

EEGI Mechanisms

Joint Research Centre (JRC)

- Experts
- Evaluation of the Smart Grid Projects in Europe
- Generating a support document for the SET-Plan



- European Project
- Operational tool for EEGI

ENTSO-E entsoe

- European Network of Transmission System Operators for Electricity
- 42 Transmission System Operators (TSOs) from 34 countries
- Founded in December 2008

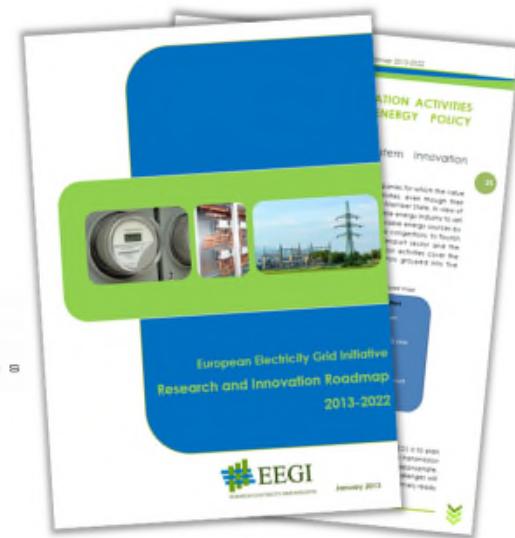
EDSO4SG

- European Distribution System Operators for Smart Grid
- Key-interface between the Distribution System Operators and the European Institutions

Integrated Road Map

- To address energy system and innovation chain integration
- To consolidate the (up-dated) technology roadmaps of the SET Plan
- To cover the entire research and innovation chain from basic research to demonstration and support for market roll-out

EEGI Research and Innovation Roadmap 2013-2022



Spain in Europe



Spanish Electric Grid Platform

- Supporting and fostering European R&D Smart Grid Projects
- Being aligned with the other European platforms for SG

Support Institutions



RETOS DE COLABORACIÓN (antiguo INNPACTO)



R&D Projects



PROYECTOS
MEDIOAMBIENTE



ACCIÓN ESTRATÉGICA DE ECONOMÍA Y
SOCIEDAD DIGITAL 2013 (before AVANZA)



ETORGAI
GAITEK

Topics to be addressed

DSO Objectives and DS0&TSO common objectives

| 2013 - F. Objectives | | Cost (M€) | |
|----------------------|---|-----------|-----|
| D1 | Active Demand Response | 140 | TD1 |
| D2 | Energy Efficiency from integration with Smart Homes | 100 | TD2 |
| D3 | DSO integration of small DER | 80 | TD3 |
| D4 | System integration of medium DER | 90 | TD4 |
| D5 | Integration of storage in network mgt | 100 | TD5 |
| D6 | Infrastructure to host EV/PHEV | 60 | |
| D7 | Monitoring and control of LV network | 150 | |
| D8 | Automation and control of MV network | 100 | |
| D9 | Network management tools | 50 | |
| D10 | Smart metering data processing | 100 | |
| D11 | New planning approaches | 50 | |
| D12 | Asset management | 50 | |
| D13 | New approaches for market design | 20 | |

- Increased observability of the distribution system for transmission network management and control

- The integration of demand side management at DSO level into TSO operations

- Ancillary services provided through DSOs

- Improved defense and restoration plan

- Methodologies for scaling-up and replicating

Research & Innovation programmes

Horizon 2020



Previous Programmes

- Previous
Research and
Innovation
Activities
• 2007 - 2013

FP 7



- Competitiveness
and Innovation
Framework
Programme
• 2007 - 2013

CIP



HORIZON 2020 – CALL 14

CALL LCE: Competitive Low-Carbon Energy (LCE)

- New knowledge and technologies
- Renewable electricity and heating/cooling
- Modernizing the single European electricity grid
- Providing the energy system with flexibility through enhanced energy storage technologies
- Sustainable biofuels and alternative fuels for the European transport fuel mix
- Enabling the decarbonization of the use of fossil fuels during the transition to a low-carbon economy
- Supporting the development of a European Research Area in the field of Energy
- Social, environmental and economic aspects of the energy system
- Cross-cutting issues

LCE - Call



Distribution Grid

LCE 7

- Development of ICT tools and services for smart grids
- Demonstrate innovative demand response in the real grid
- Cheap smart meters
- Study best future ICT infrastructure

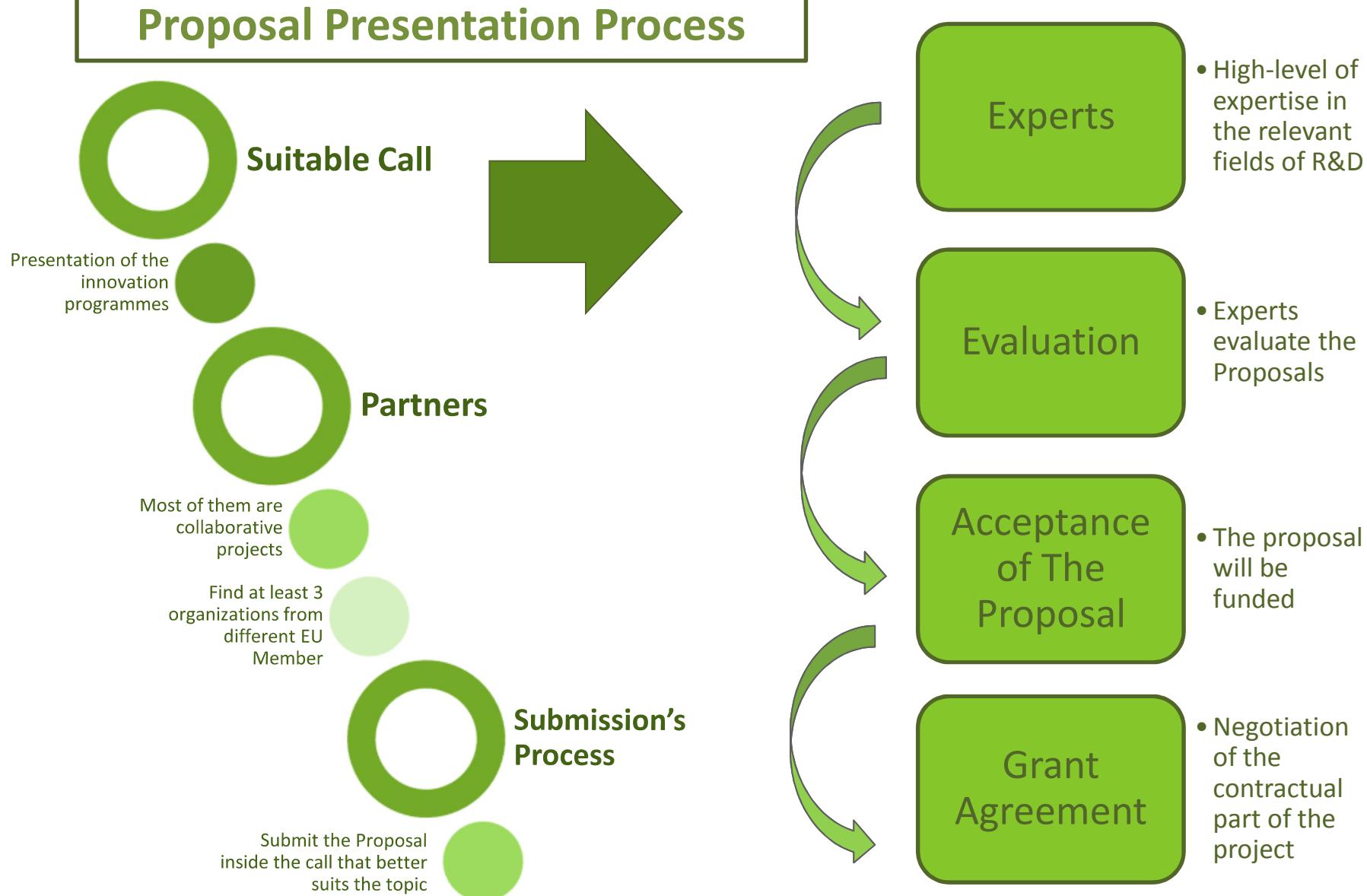


Local/Small Scale Energy Storage

LCE 8

- Innovative Technology development
- Innovative Business models
- Develop plans for market uptake

R&D Evaluation Procedure

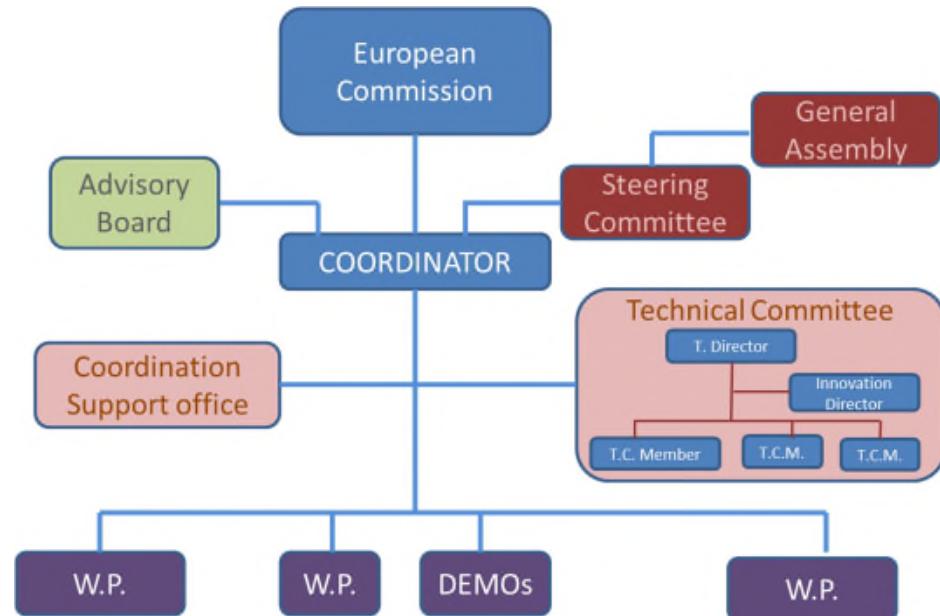


Project Structure

Management Structure



- General Assembly
- Steering Committee
- The Technical Committee
- Coordinator
- Technical/Innovation Director
- Advisory Board



Work Packages

- R&D
- Dissemination
- Management
- Others

Tasks

Milestones

Deliverables



IBERDROLA's SG Portfolio

Projects Timeline

fenix ...a step towards the future of electricity network

OPERA2: Open PLC European research alliance for new generation PLC integrated network phase 2

2005

2006

2007

2008

2009

2010

2011



address®
interactive energy

 **OPENmeter**
Open Public Extended Network Metering




GRID4EU
INNOVATION FOR ENERGY NETWORKS

ADVANCED

Active Demand Value AND
Consumers Experience Discovery

2012

2013

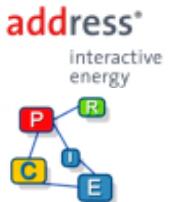
METER ON



iGREENGrid


DISCERN

General information

| Project | Web | logo |
|------------|---|---|
| FENIX | http://www.fenix-project.org/ |  |
| GAD | http://www.gadproject.com/ |  |
| Open Meter | http://www.openmeter.com/ |  |
| ADDRESS | http://www.addressfp7.org/ |  |
| PRICE | http://www.priceproject.es/ |  |
| GRID4EU | http://www.grid4eu.eu/ |  |
| ADVANCED | http://www.advancedfp7.eu/ |  |
| IGREENGrid | http://www.igreengrid-fp7.eu/ | |
| DISCERN | http://www.discern.eu/ | |

General information

| Project | Coordinator | Budget (M€) | Start date | Duration | Scope |
|------------|---------------|-------------------------------|------------|-----------|---|
| FENIX | Iberdrola | 14,7 / 7,8 | Oct-2005 | 4 years | DER integration |
| GAD | Iberdrola | 23,3 / 11,5 | Jan-2007 | 4 years | active demand |
| Open Meter | Iberdrola | 4,2 / 2,4 | Jan-2009 | 2,5 years | smart metering |
| ADDRESS | ENEL | 16,0 / 9,0 | Jun-2008 | 5 years | active demand |
| PRICE | Iberdrola/GNF | 34,3 / 21,0 loan+3,0 grant | May-2011 | 3,6 years | smart grids |
| GRID4EU | ERDF | 54,0 / 25,5 | Nov-2011 | 4,25 yr. | smart grids |
| ADVANCED | ENEL | 4,1 / 2,8 | Dic-2012 | 2 years | active demand |
| IGREENGrid | Iberdrola | 6,7 / 4,3 | Feb-2013 | 3 years | DER integration |
| DISCERN | RWE | 7,9 / 4,7 | Feb-2013 | 3 years | distributed intelligence in networks |

Projects Ongoing

IGREENGrid Project



EUROPEAN ELECTRICITY GRID INITIATIVE

- SUPPORT -

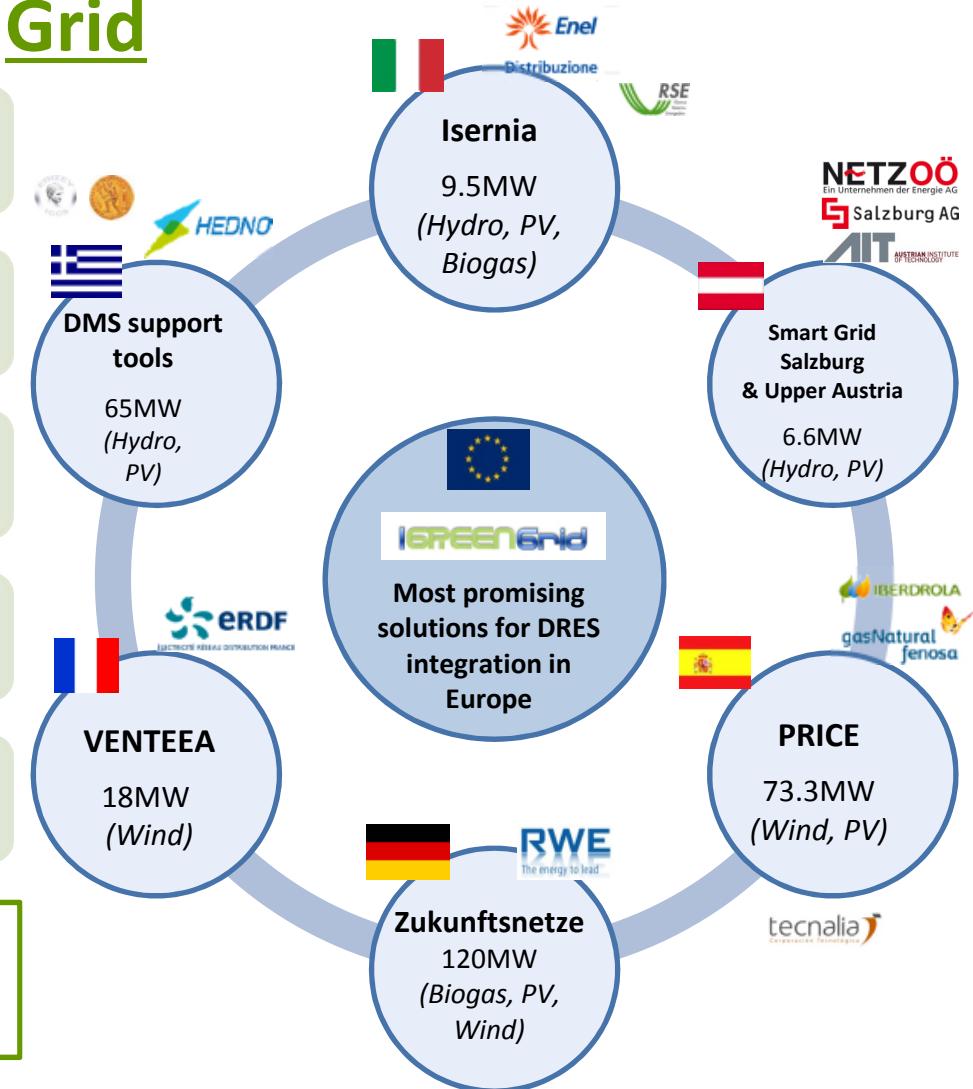


"This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308864".



IntegratinG Renewables in the EuropEaN Electricity Grid

| | |
|---------------------|------------------------------------|
| Duration | • 36 Months |
| Period | • 2013 - 2015 |
| Project Budget | • 6,6M€ • EC: 4,3 M€ |
| Project Coordinator | • IBERDROLA DISTRIBUCIÓN ELÉCTRICA |
| Partners | • 8 DSOs. 4 R&D Institutions |



IGREENGrid project must ensure a strong coordination with GRID+, SiNGLAR and SuSTAINABLE projects throughout the project.



"This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308864".

Project Summary:

Set of guidelines:

Challenge

- **IGREENGrid** project focuses on **identifying the most promising solutions for increasing the hosting capacity** for Distributed Renewable Energy Sources (DRES) in power distribution grids without compromising the reliability or jeopardizing the quality of supply.



Most promising solutions.



Recommendations for the **integration of DRES** in distribution grids, Methodologies and tools.



Criteria to establish **hosting capacity** and to manage **curtailment procedures**.



Technical requirements to DRES, equipment manufacturers & technology providers.



Assessment of the **scalability** and **replicability** at EU level (from technical, regulatory and economic point of view).

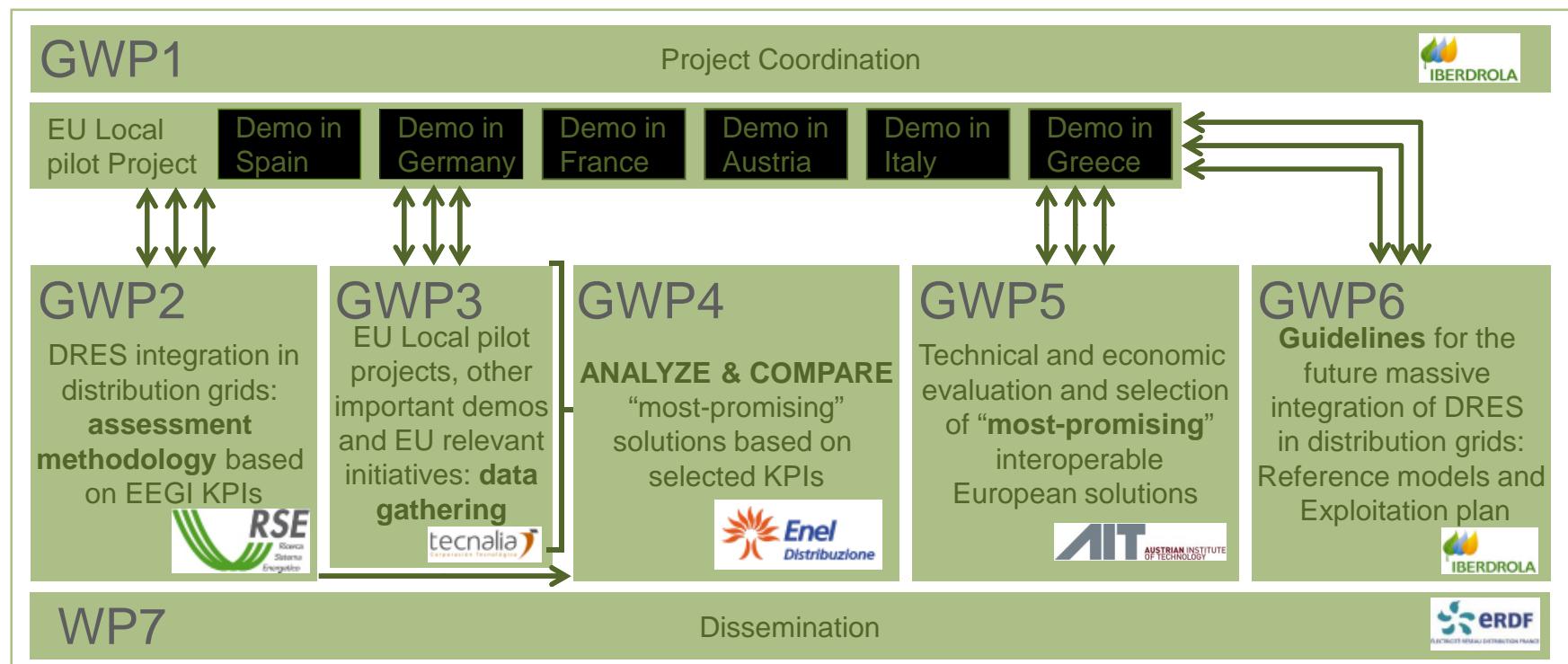


"This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308864".

Project Organization



- Basic EEGI requirements satisfied
- Involve smaller projects with demonstrations of individual technologies
- Not applicable to TSO projects





PRICE, Proyecto Conjunto de Redes Inteligentes en el Corredor del HEnares



Global Information

| | |
|---------------------|---|
| Duration | • 44 months |
| Period | • 05/05/2011 – 31/12/2014 |
| Project Budget | • 34,3 M€ (+ smart metering) (21,0 loan + 3,0 grant) |
| Project Coordinator | • Iberdrola and Gas Natural Fenosa |
| Partners | • 21 partners |

Utilities



Equipment Providers



Universities / Research Centers



ICT Providers

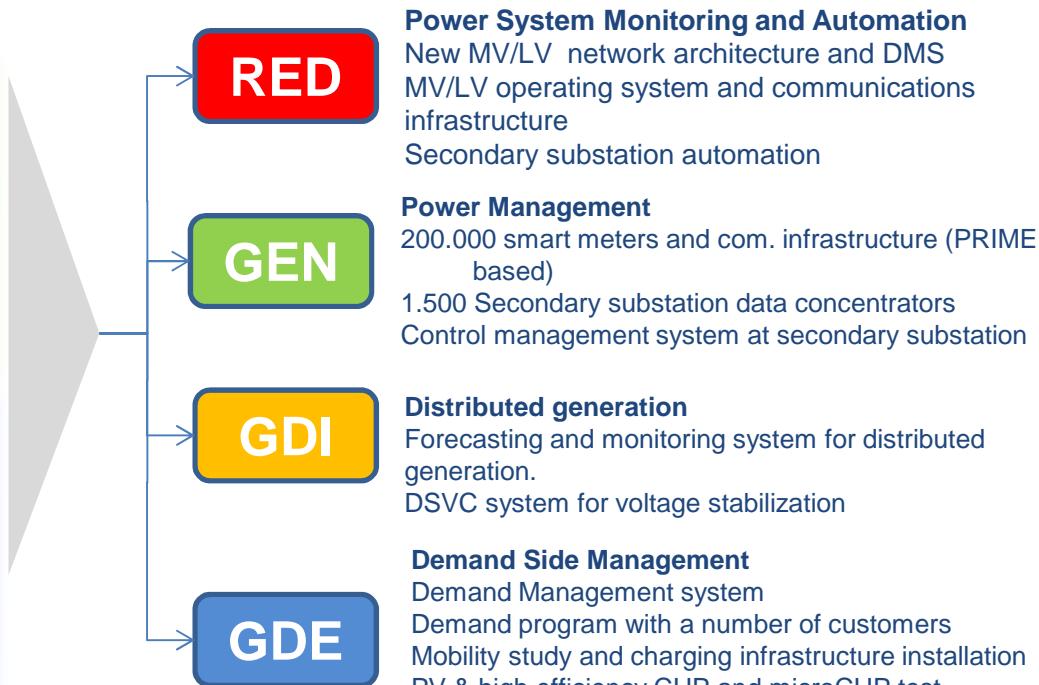
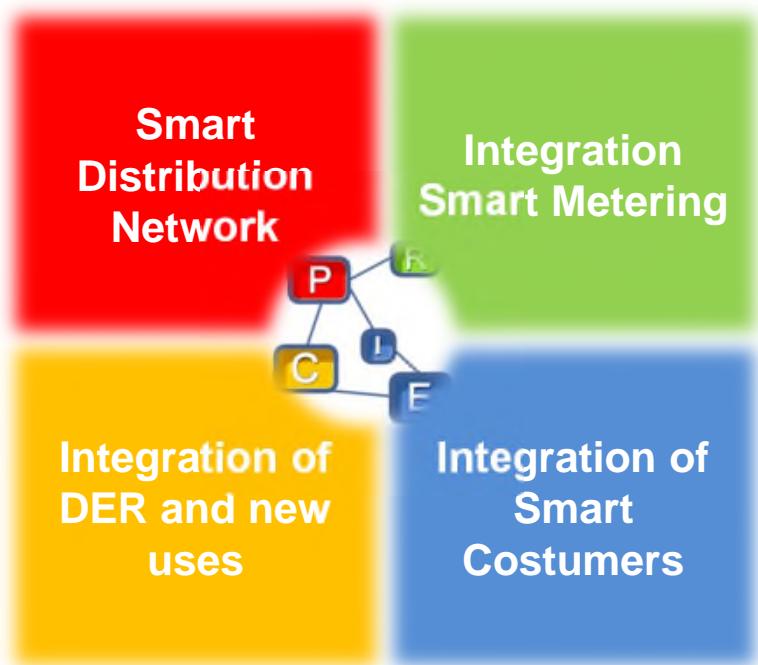


PRICE: Proyecto Conjunto de Redes Inteligentes en el Corredor del Henares

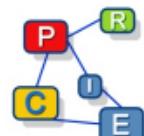


- Fully in line with criteria specified in EEGI Labeling Process.
- Fully in line with the EEGI objectives, form the core of the EEGI Programme.
- System-level innovation
- Large-scale demo projects

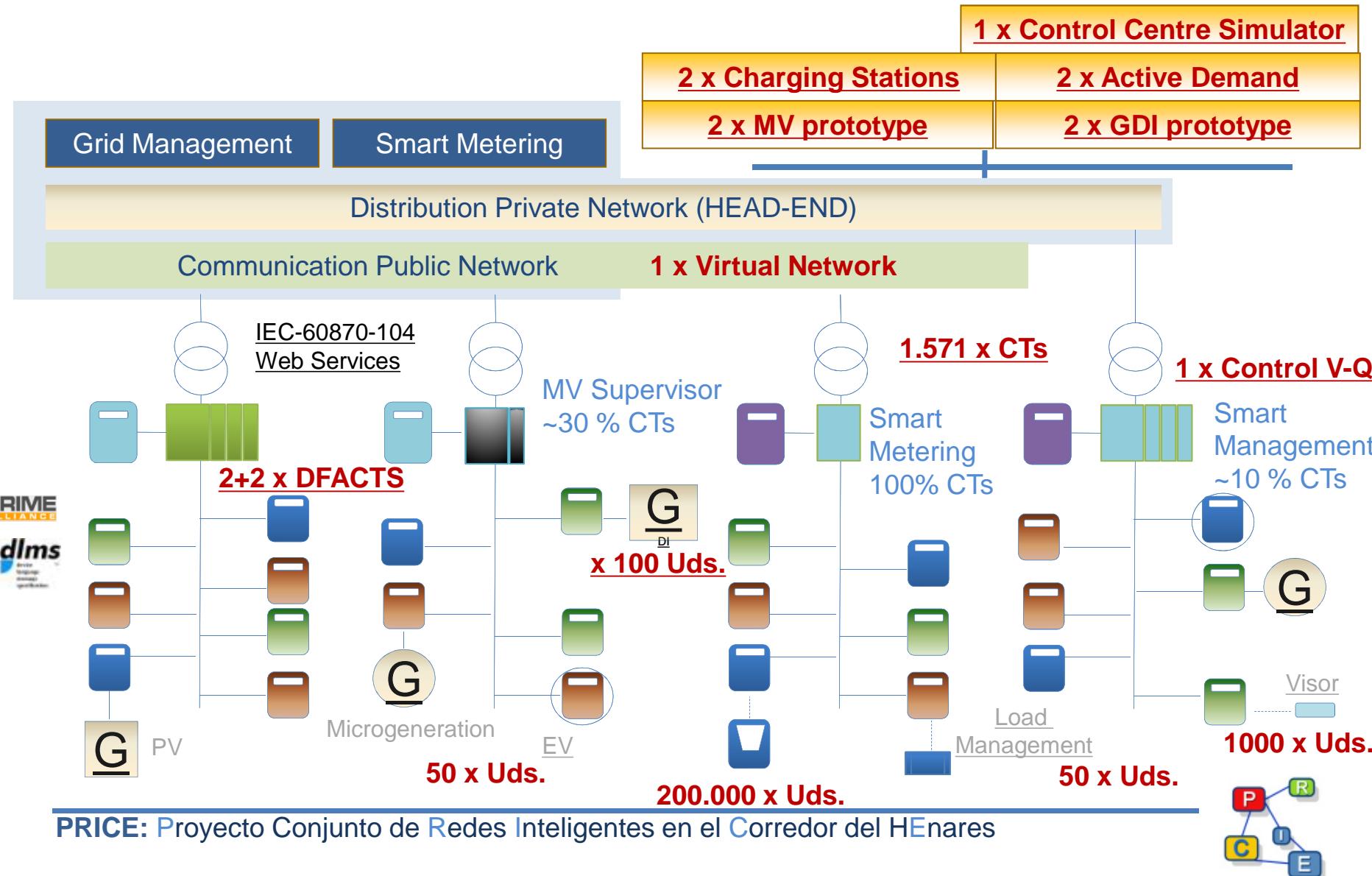
Clusters



PRICE: Proyecto Conjunto de Redes Inteligentes en el Corredor del Henares



General Overview



Project Summary

Challenge

- To deploy a standard solution based on open and interoperable solutions to ensure the integration of distributed generation, the optimal connection with large concentrations of renewable generation and the introduction of electric vehicles before general deployment

Objectives



Monitor and automate the MV/LV power network, improving its operation and maintenance



New power management system.



Improve the integration of already existing distributed generation (73.300 kW).



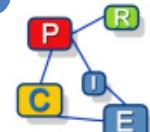
New options and services to integrate demand.



Facilitate the integration of electric vehicles.



Contribution to interoperability and common open standards, (using previous results coming from European projects with the same open philosophy such as Open Meter, Open Node, etc)





DISCERN Project

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007 – 2013) under grant agreement No. 308913.



Distributed Intelligence for Cost-Effective and Reliable Distribution Network Operation



| | |
|---------------------|-----------------------------------|
| Duration | • 36 months |
| Period | • 01/02/2013 – 31/01/2016 |
| Project Budget | • 7,9 M€ (4,7 M€) |
| Project Coordinator | • RWE |
| Partners | • 11 partners from 4 EU countries |



Project Summary

Challenge

- The enhancement of European distribution grids with technical and organizational solutions for the optimal level of smart grid intelligence



Objectives



Establish a family of demonstration projects focused on the MV/LV network and develop an assessment framework based on certain functionalities



Identify, assess and compare the technological options for monitoring and control systems in the distribution network



Test and validate optimal technological solutions by means of real time simulations and small scale field tests



Facilitate the knowledge exchange with innovative European projects



Map relevant standards and contribute to standardization activities



Concepts for the determination of optimal levels of intelligence in the distribution network



Recommendations based on KPIs on cost-effective best-practise solutions to achieve optimal levels of intelligence in the distribution network



Multiple scalable and replicable solutions

ADVANCED

Active Demand Value ANd
Consumers Experience Discovery



ADVANCED Project

ADVANCED

Active Demand Value ANd
Consumers Experience Discovery



The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007–2013) under grant agreement n° 308923.

Active Demand Value ANd Consumers Experiences Discovery

Duration

- 24 Months

Period

- 01/12/2012 – 01/12/2014

Project Budget

- 4,1 M€ (2,8 M€)

Project Coordinator

- ENEL

Partners

- 10 partners from 7 EU countries

European DSOs

VORWEG GEHEN



Universities /Research Centres

vaasa ETT



TNO innovation
for life



ADVANCED

Project Summary

Challenge

- ADVANCED aims at developing actionable frameworks enabling residential, commercial and industrial consumers to participate in AD. It will be achieved through comparing the different AD solutions applied in Europe and enhancing them by the investigation of socio-economic and behavioral factors with direct involvement of real consumers.

Objectives



To increase the understanding on how to deploy efficiently Active Demand



Collecting experience coming from pilots all around Europe where the interaction between consumers and AD programs has been tested



Proposing a series of recommendations to the different stakeholder involved on how to design and implement AD programs.



The project will develop and validate a series of KPIs, evaluating the performance of AD programs taking into account the perspective of different stakeholders



To identify of regulatory, socio-economic and behavioural barriers that hinder the participation of different consumer groups to AD programmes



ADVANCED



GRID4EU Project

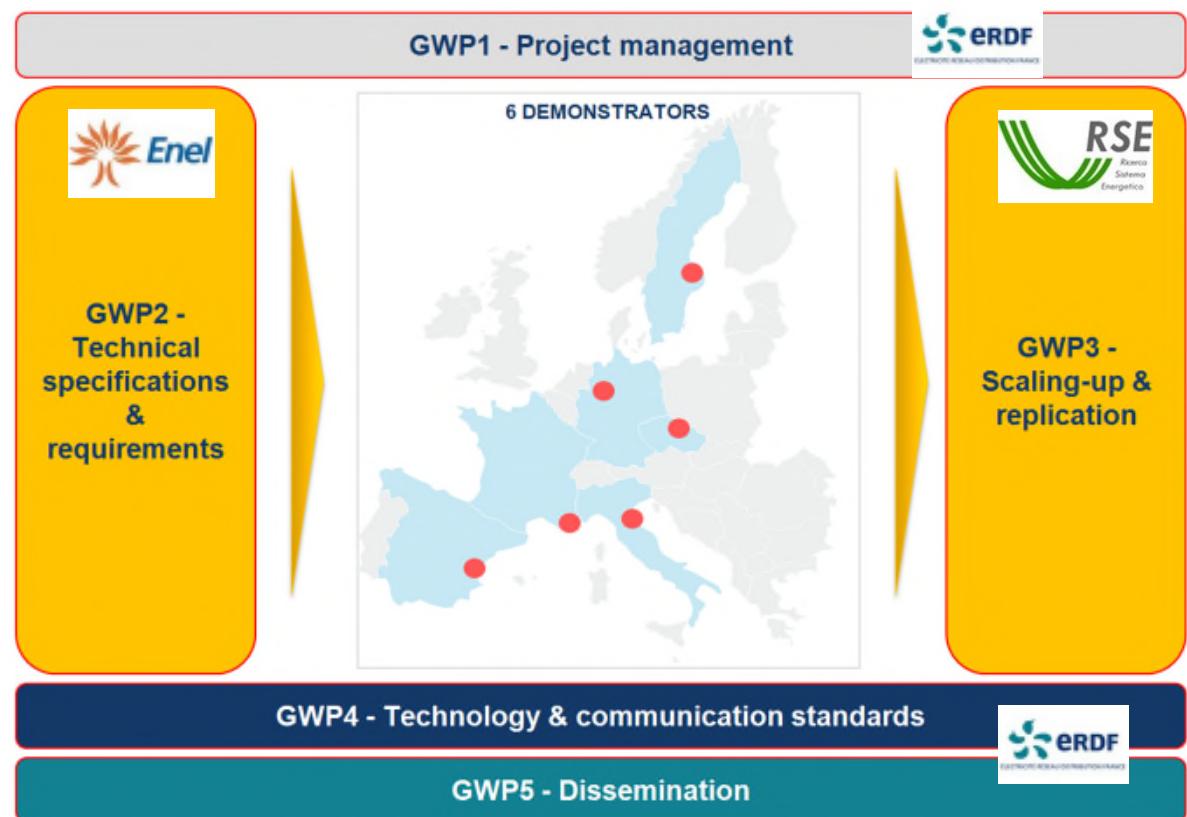


Large-Scale Demonstration of Advanced Smart GRID Solutions with wide Replication and Scalability Potential for EUROPE



General Overview

| | |
|---------------------|---|
| Duration | • 51 Months |
| Period | • 01/11/2011 – 31/01/2016 |
| Project Budget | • 54,0 M€ (25,5 M€) |
| Project Coordinator | • ERDF |
| Partners | • 27 partners from 8 European countries, US and Switzerland |



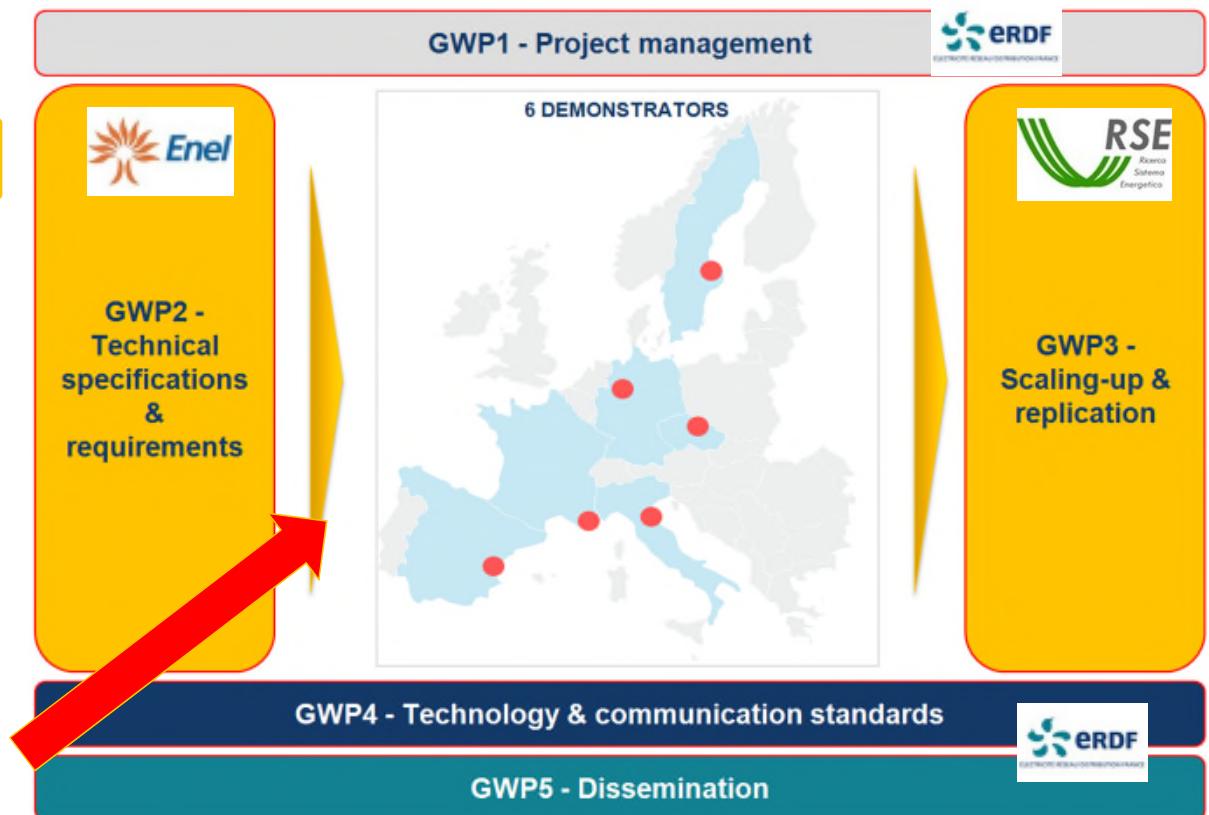
Large-Scale Demonstration of Advanced Smart GRID Solutions with wide Replication and Scalability Potential for EUROPE



General Overview

6 DEMOS

- Germany **RWE** The energy to lead
- Sweden **VATTENFALL**
- Spain **IBERDROLA**
- Italy **Enel**
- Czech Republic **E**
- France **erDF** ÉLECTRICITÉ RÉSEAU DISTRIBUTION FRANCE



Rest of The Partners

Universities/Research Centres



Equipment Provider



Project Summary

Challenge

- GRID4EU project focuses on how distribution system operators can dynamically manage electricity supply and demand.

Objectives



Develop and test innovative technologies



Define standards through the set up of demonstrators



Guarantee the scalability of these new technologies

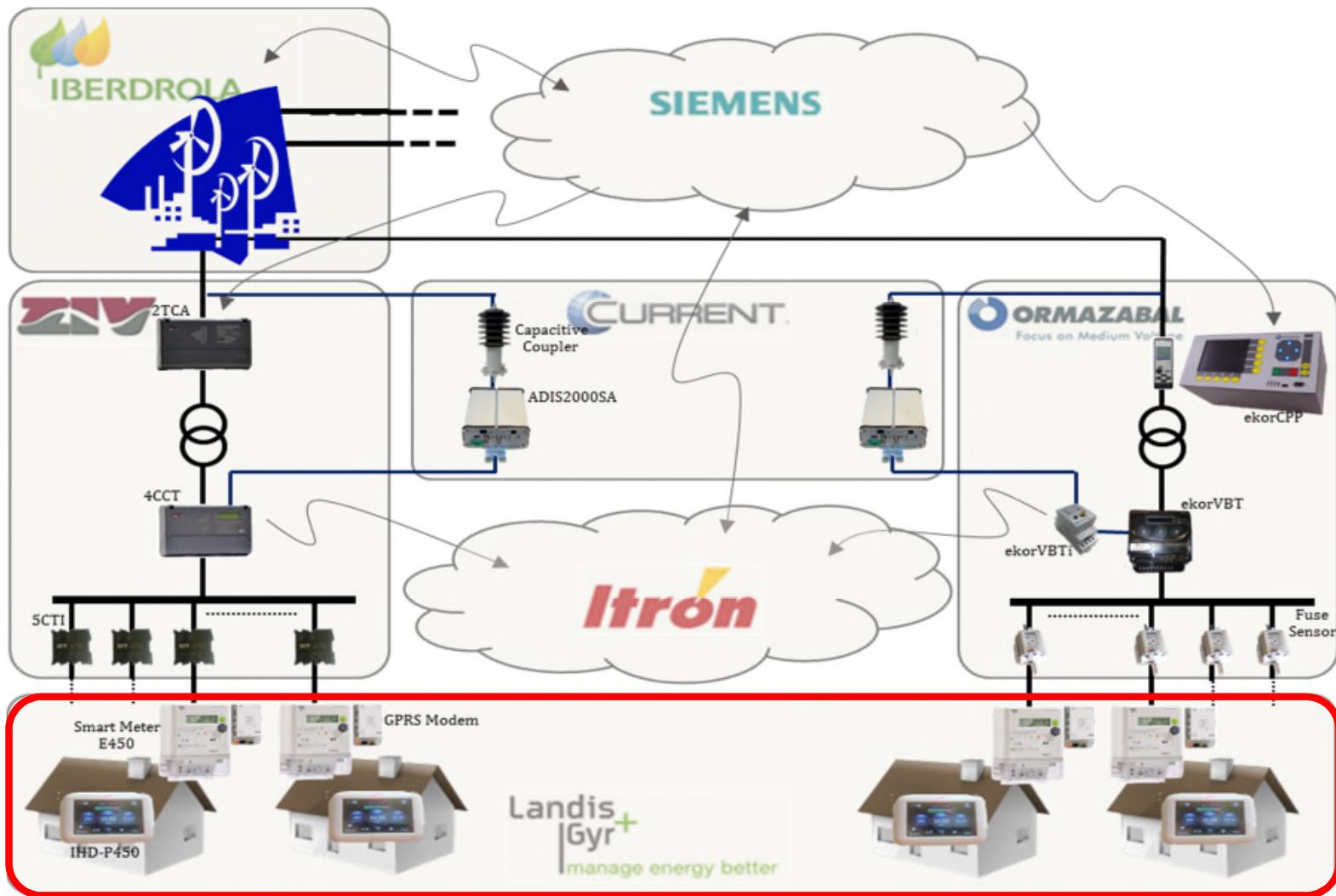


Guarantee the replicability over Europe



Analyse Smart Grid Cost-benefits (Business Case)

Castellon Demo





A tool to make European Smart Grids
collaborative effort a reality



GRID+



General Overview

Duration

- 51 Months

Period

- 2012 - 2014

Project Budget

- 4 M€ (3M€ funded)

Project Coordinator

- RSE

Partners

- 12 partners

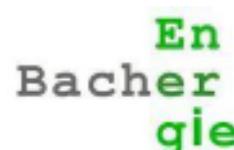
European Utilities



Research Institutions



Consultancy



Project Summary

Challenge

- GRID+ is a Coordination and Support Action which has been created for providing operational support for the development of the European Electricity Grids Initiative (EEGI)

Objectives



To map the research, development and demonstration activities in support of Smart Grid deployment at transmission and distribution level, in Europe and abroad, against the priorities and goals of the EEGI roadmap.



To foster a networking process between EEGI projects and engage with the other Smart Grids initiatives worldwide



To support the definition, validation, updating and use of Key Performance Indicators (KPIs) in order to assess the progress of the initiative and the consistency of project proposals with the EEGI expected benefits and to achieve EEGI-related project goals



To support scaling up and replication activities with the help of methodologies based on project KPIs



To prepare the means and tools in view of the dissemination of the new knowledge from the demonstrators related to the EEGI towards the grids community and its stakeholders



To provide three revisions of the EEGI implementation plan which include a benefit assessment based on the program and project KPI

Projects Completed

ADDRESS Project

address
interactive
energy



The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 207643

General Overview

| | |
|---------------------|--|
| Duration | <ul style="list-style-type: none">• 60 Months |
| Period | <ul style="list-style-type: none">• 01/06/2008 – 31/05/2013 |
| Project Budget | <ul style="list-style-type: none">• 16,0 M€ (9,0 M€) |
| Project Coordinator | <ul style="list-style-type: none">• ENEL |
| Partners | <ul style="list-style-type: none">• 25 partners from 11 EU countries |

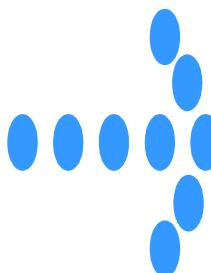
Innovative Project



Deployment a real AD Demo



ADDRESS



Participation of real users



Spanish Field Test - Definition



Located in the city of Castellón de la Plana.



263 Energy Boxes installed in the households.



263 Sets of 5 smart plugs installed in the houses.



263 Additional measuring devices installed



25 Smart washing machines installed in different houses.



14 air conditioning management systems installed.

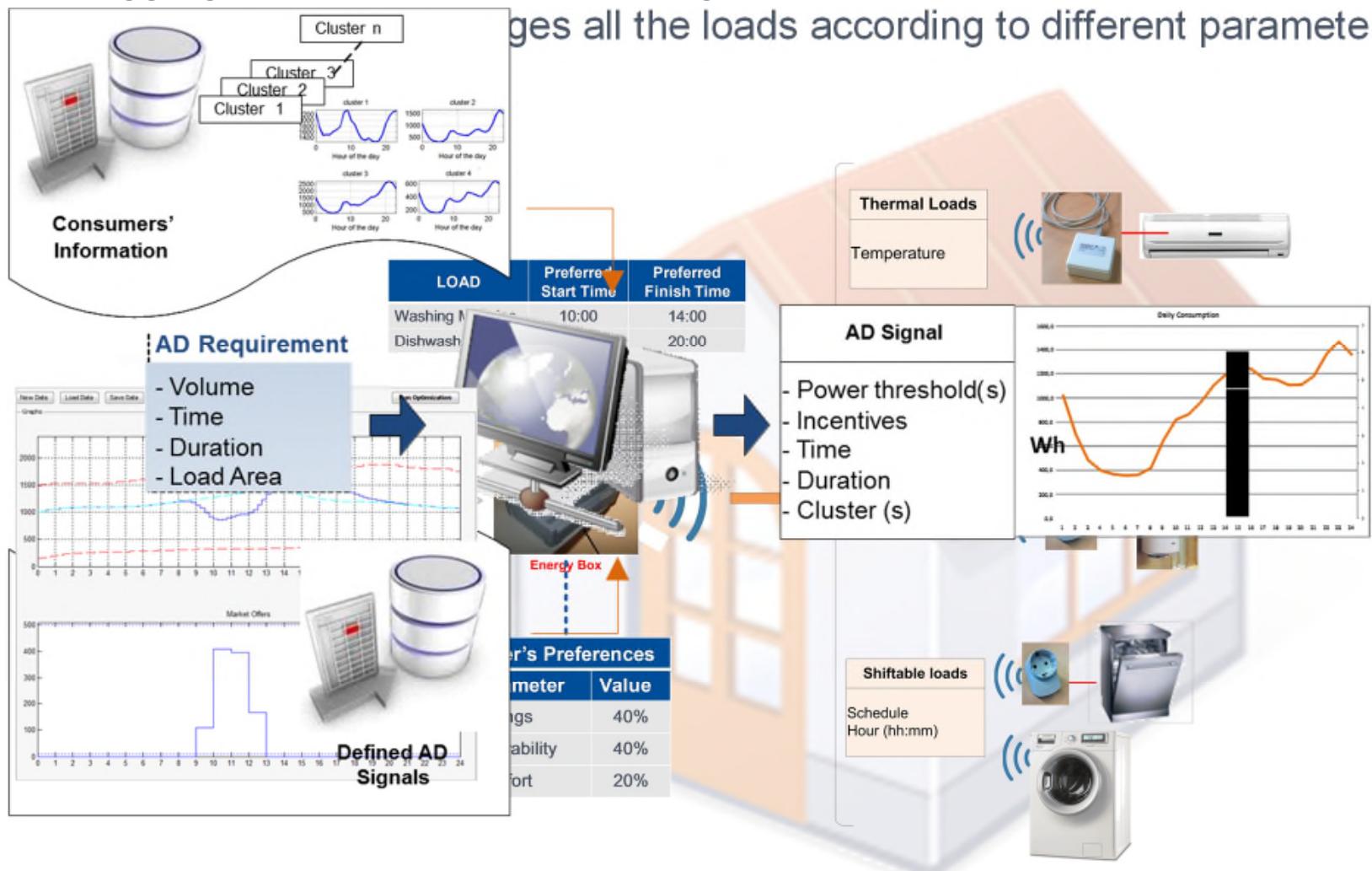
Spanish Field Test – Equipment

The following image depicts a fully



Spanish Field Test – Interactions

The Aggregator Toolbox defines the signals to be sent to consumers....
ges all the loads according to different parameters.

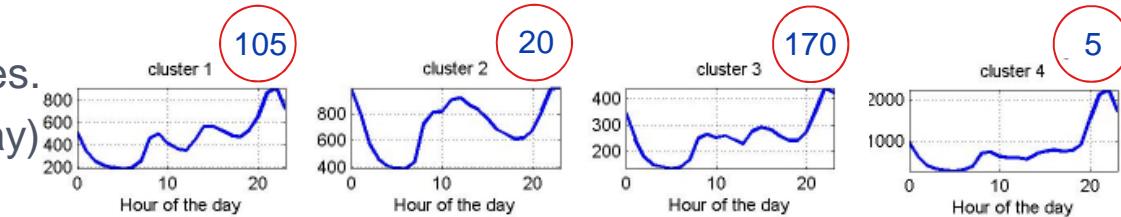


Spanish Field Test – Functionalities (I)

The Aggregator Toolbox (ATB)

- Defines the signals to send to the consumers according to:
 - AD requirements: Volume / Time of the day / Load area.

- Consumers' prototypes.
(Wh /hour of the day)



Use Case:

- Signals sent from the ATB to the selected Eboxes the day-ahead.

Example: Power reduction = 10 kW at 22h during 1h

Cluster 1

Duration signal: 1 h

Start time: 22 h

Incentive condition: If power consumption in time signal is less than 0,5 kW
the user benefit is 0.015 €/kW.

Spanish Field Test – Functionalities (II)

The Energy Box (Ebox)

- A Price/Volume signal is received the day ahead. (slots 15')
- The Ebox schedules the loads for the following 24h:
 - After receiving this signal.
 - After modifications on the status of any managed load.
- Measurements and status information is sent (5' slots) from smart plugs/loads and measuring device to the Ebox.
- At the end of the day, Ebox reports its information to the Aggregator database

Spanish Field Test – Functionalities (II)

The Energy Box (Ebox)

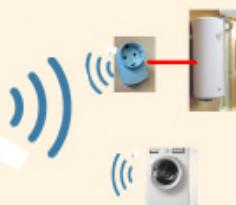
- A Price/Volume signal is received the day ahead. (slots 15')
 - The Ebox schedules the loads for the following 24h:
 - After receiving this signal.
 - After modifications on the status of any managed load.
 - Measurements and status information is sent (5' slots) from smart measuring device to the Ebox.
- At the end of the day, Ebox reports its information to the Aggrega

Use Case

- According to all the parameters, the Ebox schedules the loads:



| | 1 | 2 | 3 | | 8 |
|-------|-------|-------|-------|-------|-------|
| Stops | 12:15 | 15:00 | 16:45 | | 22:30 |

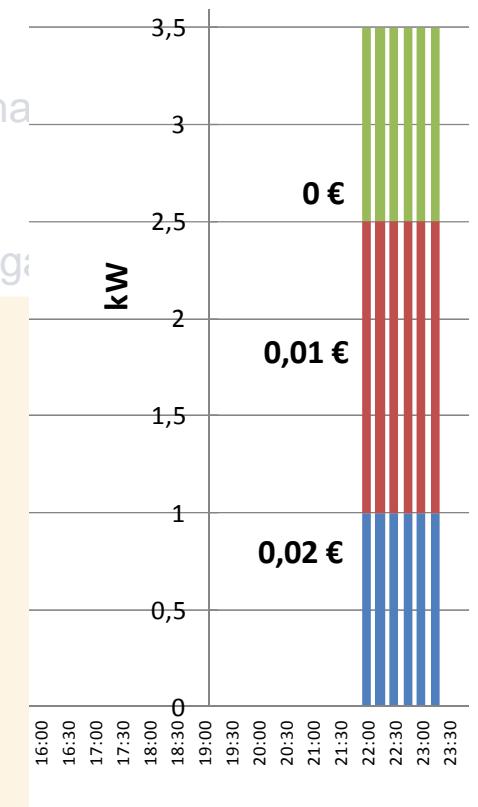


| | 1 | 2 | 3 | | 8 |
|-------|------|-------|-------|-------|-------|
| Stops | 6:45 | 13:30 | 17:30 | | 22:00 |

Next Start → 11:30 h.



Next Start → 17:00 h.



fenix ...a step towards the future of
electricity network

Fenix Project

General Overview

Duration

- 48 Months

Period

- 01/10/2005 – 30/09/2009

Project Budget

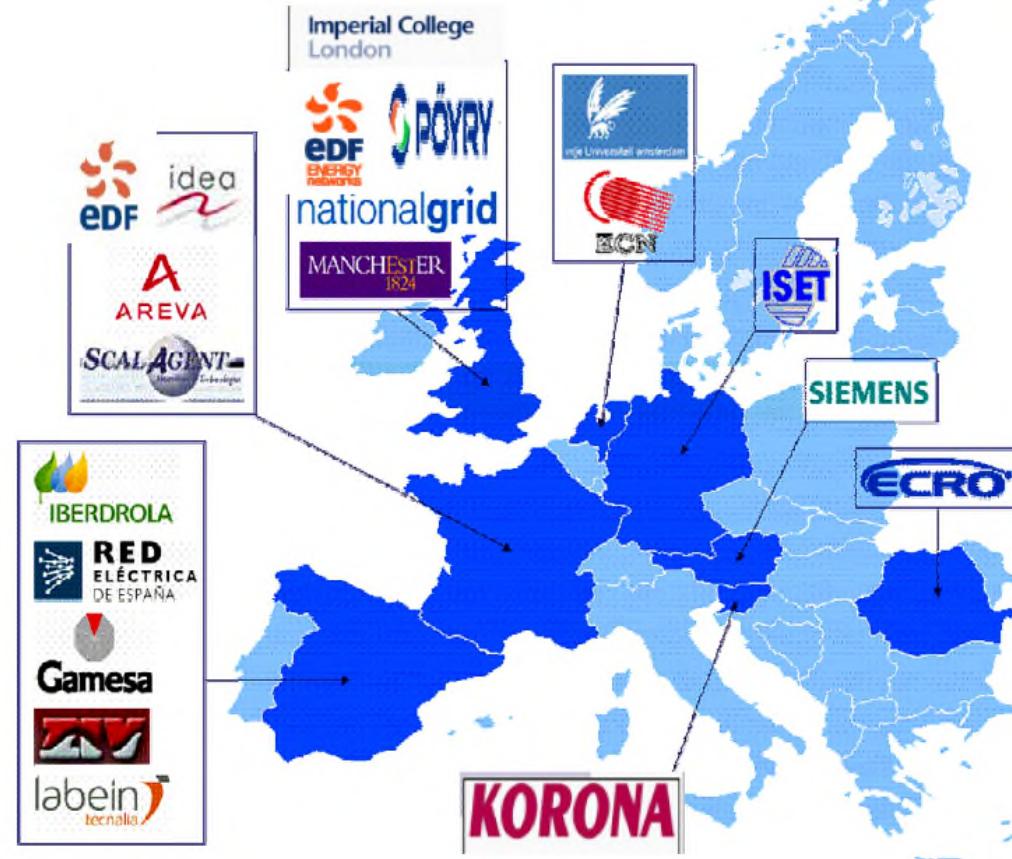
- 14,7 M€ (7,8 M€)

Project Coordinator

- Iberdrola Distribución

Partners

- 20 partners from 8 EU countries



Project Summary

Challenge

- To boost DER (Distributed Energy Resources) by maximizing their contribution to the electric power system, through aggregation into Large Scale Virtual Power Plants (LSVPP) and decentralized management.

Functionalities



Integrate DER cost effectively in the operation and development of electricity networks.



Solving system problems with DER.



Virtual power Plant (VPP) as key delivery mechanism for integration of DER and demand response.



Fenix Box optimise position of local DER and demand, transmit data on DER position and operating parameters, cost, etc. to aggregator



GAD Project

General Overview

Duration

- 48 Months

Period

- 01/01/2007 – 31/12/2010

Project Budget

- 23,3 M€ (11,5 M€)

Project Coordinator

- Iberdrola Distribución

Partners

- 14 Spanish partners



MINISTERIO
DE CIENCIA
E INNOVACIÓN



Centro para el Desarrollo
Tecnológico Industrial

Project Summary

Challenge

- Demand Side Management by means of Intelligent Devices allowing the lamination of demand curve, and the reduction in the demand growth.

Impact



Reduction of operation costs of the system



Infrastructures Optimization



Better security of supply



User awareness of generation costs in peak demand periods



Greenhouse gases emissions reduction

Equipment Installed



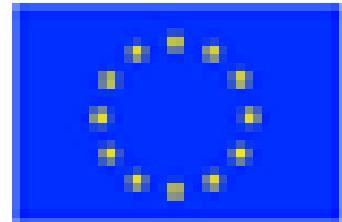
- Smart Meter
- Energy Box
- User Interface
- Smart appliance
- Smart Plugs

Equipment



The diagram illustrates the communication infrastructure for a smart home system, divided into three main sections:

- WAN TRONCAL (Wide Area Trunk):** Supports "Equipo de Comunicaciones de la Subestación" (Substation Communication Equipment) and "Equipo de Comunicaciones del Centro de Transformación" (Transformation Center Communication Equipment).
- WAN ACCESO (Access):** Supports "DCONTA (CONTADOR)" (Smart Meter) and "DCCA (DISPOSITIVO CONTROL DE CARGAS)" (Load Control Device).
- LAN (Local Area Network):** Supports "COMUNICACIONES BPL" (BPL Communications) and includes the following components:
 - DISPOSITIVO INTERFAZ DE USUARIO (User Interface Device)
 - VITROCERÁMICA (Glass Ceramic Hob)
 - DISPOSITIVO CONTROL DE LÍNEAS (Line Control Device)
 - HORNO (Oven)
 - A/A (Air Conditioning)
 - LAVADORA (Washing Machine)
 - EIN (ENCHUFE INTELIGENTE) (Smart Plug)
 - LAVAJILLAS (Dishwasher)



OPENmeter

Open Public Extended Network Metering

Open Meter
Project

General Overview

| | |
|---------------------|---------------------------------|
| Duration | • 30 Months |
| Period | • 01/01/2009 – 30/06/2011 |
| Project Budget | • 4,2 M€ (2,4 M€) |
| Project Coordinator | • Iberdrola Distribución |
| Partners | • 19 partners from EU countries |

Partners

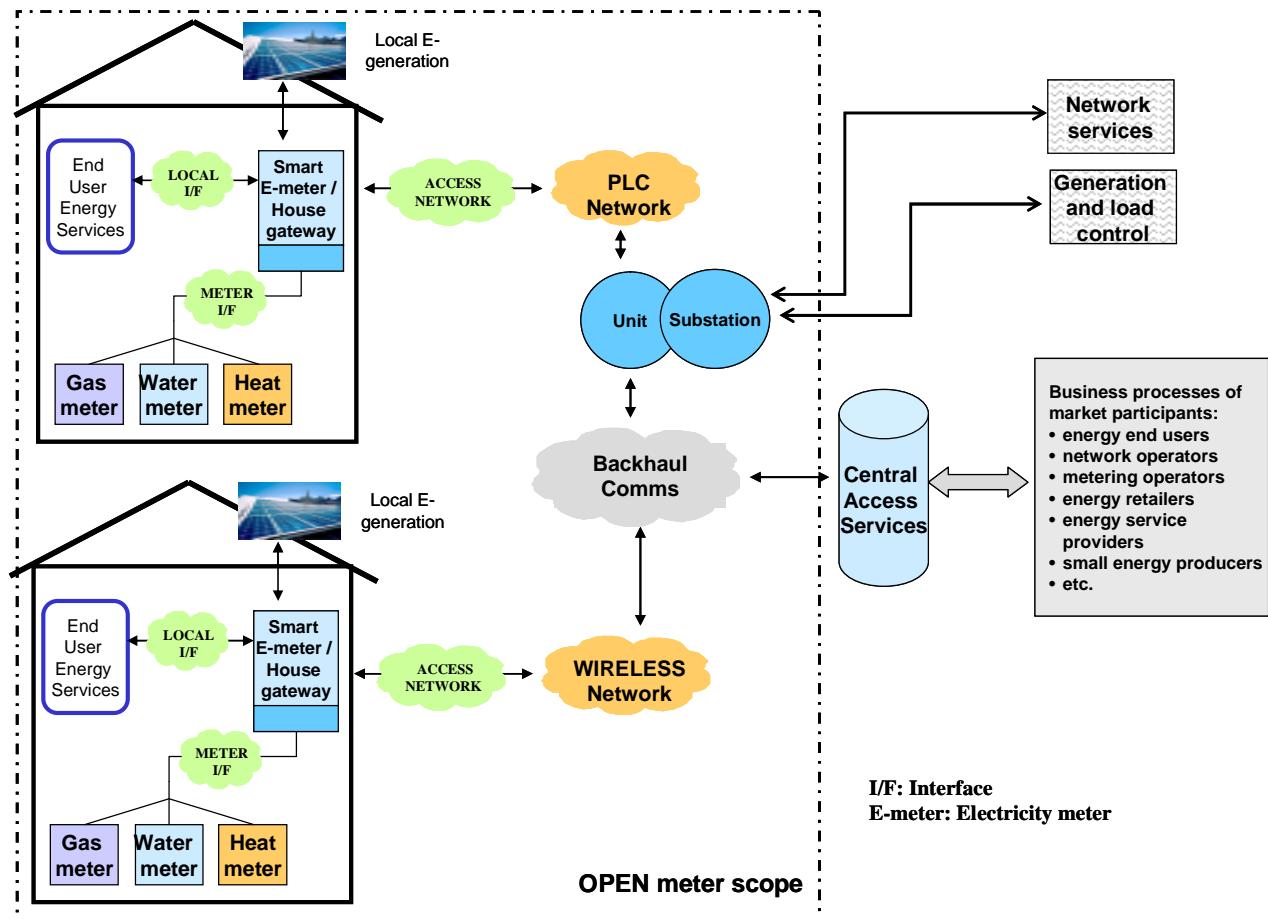
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|---|--|---|---|---|---|---|
|  |  |  |  |  |  |  |
|  |  |  |  | INDUSTRY | USERS |  |
| | | |  | <ul style="list-style-type: none"> Smart Meter Manufacturers Telecommunication industry Silicon design & manufacturing | <ul style="list-style-type: none"> Energy operators (retailers) Network operators Metering operators |  |
| | |  |  | R&D, Technology centers | POLICY MAKERS | |
| | | | Universität Karlsruhe (TH) Forschungsuniversität • gegründet 1825 | <ul style="list-style-type: none"> Comm. protocols, data formats Integrated systems Compliance tests | <ul style="list-style-type: none"> Regulatory bodies Standardization bodies |   |

Project Summary

Challenge

- To specify a comprehensive set of open and public standards for AMI, supporting electricity, gas, water and heat metering, based on the agreement of all the relevant stakeholders in this area, and taking into account the real conditions of the utility networks so as to allow for full implementation

Scope





Thank you for your
attention