



on Integration
of Renewable
and Distributed
Energy Resources

The ADDRESS project: objectives, first draft architecture and expected results

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December 10-12th, 2008
Nice • France



GDF SUEZ



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Active Distribution network with full integration of Demand and distributed energy RESources

- ADDRESS in FP7
- The consortium
- Target and objectives
- First draft architecture and main concepts
- ADDRESS methodology
- Expected results

active demand

address
interactive
energy



Project co-funded by the
European Commission within
the 7th Framework Programme



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FP7 project

⇒ FP7- ENERGY-2007-1-RTD, AREA ENERGY.7.1:

“Development of **interactive** distribution energy networks”

⇒ ADDRESS is a large-scale integrating Project:

- started on **June 1st 2008**
- lasts **4** years (2008 – 2012)
- Consortium of **25 partners** from **11 European countries**
- Enel Distribuzione is the **Coordinator**
- EDF is the Technical Manager
- Total budget **16 M€**, EC financing **9M€**

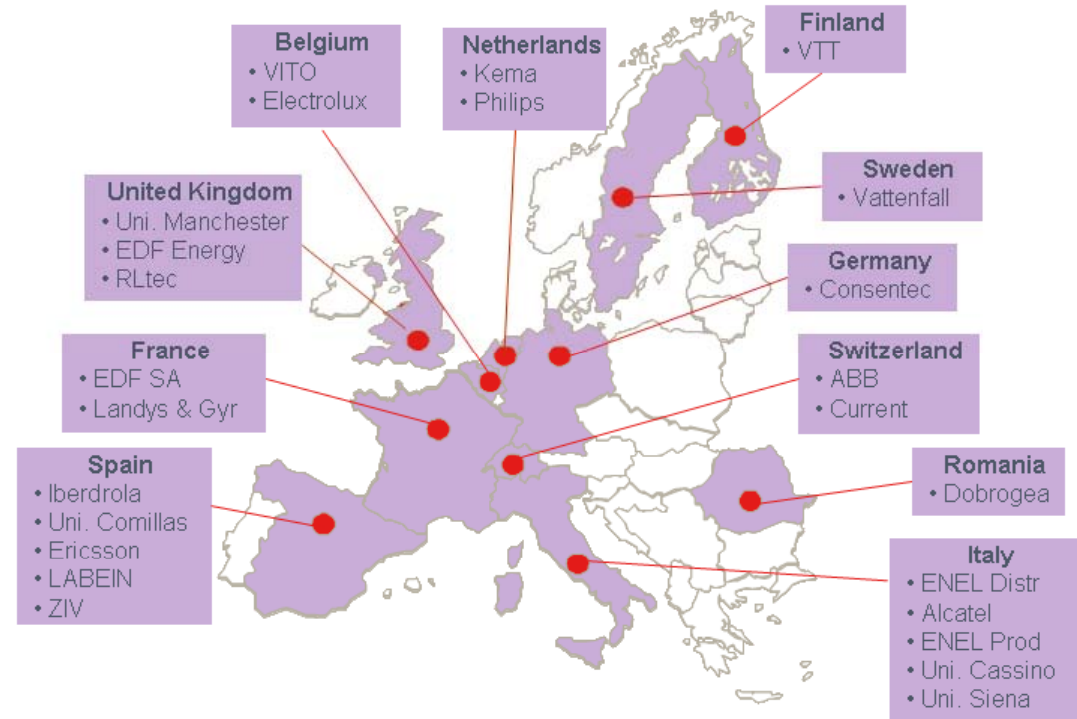


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The Consortium

25 partners
11 countries

knowledge, experience,
competence



- **Research**: University of Manchester, Universidad Pontificia Comillas, Università di Siena, Università di Cassino, ENEL Produzione, VTT, VITO, Fundación Labein, KEMA, Consentec;
- **DSO and TSO**: ENEL Distribuzione, EDF Energy, Iberdrola Distribución Eléctrica, Vattenfall
- **Energy supply and retail**: EDF-SA, ENEL Distributie Dobrogea
- **Electric equipment manufacturers**: ABB, Landis+Gyr, ZIV
- **Home appliances and white goods manufacturers, consultants**: Philips, Electrolux, RLtec
- **Communication and ICT providers**: Ericsson España, Alcatel, Current

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Target



Active Demand

- **WHAT:** active participation of **domestic** and **small commercial consumers** in power system markets and provision of services to the different power system participants
- **WHY:** active demand will play a **key role** in the context of the smart grids of the future, along with Distributed Generation and energy storage systems; it can solve constraints and support the development of RES through the flexibility that it can offer; it can provide **savings** for all the participants
- **HOW:** developing a **comprehensive commercial and technical framework** for the development of active demand

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Objectives (1/2)



To enable active demand

- Develop technical solutions:
 - at the **consumers premises**
 - at the **power system level**
- Identify the **possible barriers** against active demand development
- Develop **recommendations** and propose solutions to remove the barriers
- Consider **economic, regulatory, societal** and **cultural** aspects



To exploit the benefits of active demand

- Identify the potential **benefits** for the different power system participants
- Develop appropriate **market and contractual mechanisms**
- Study **accompanying measures** to deal with societal, cultural and behavioural aspects

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Objectives (2/2)



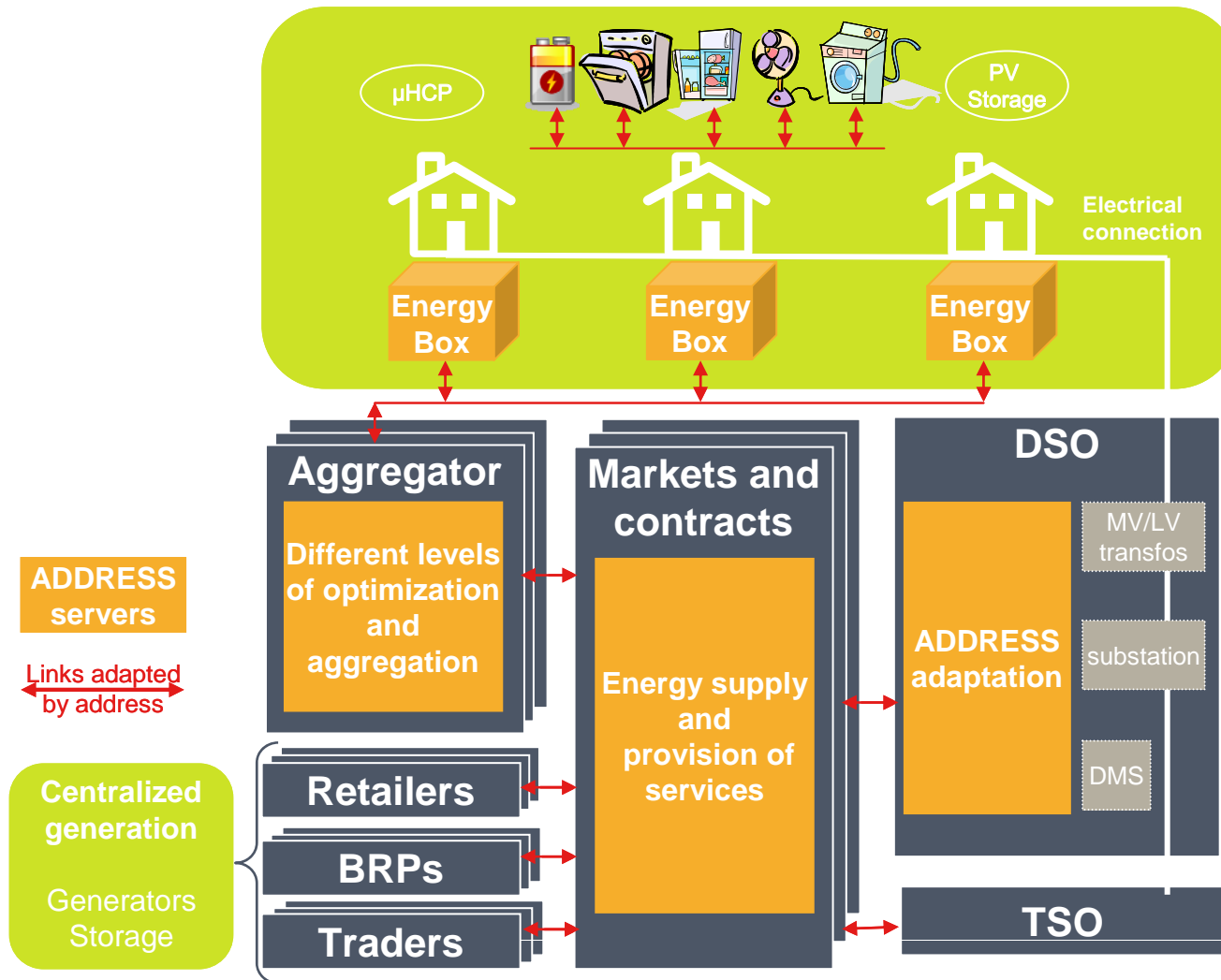
To **validate** the proposed solutions in **three** complementary test sites with different geographical and demographic characteristics and different infrastructure mixes

To carry out **dedicated dissemination** activities for the different stakeholders through:

- Publications
- Seminars
- International workshops



ADDRESS Scope (1/3)



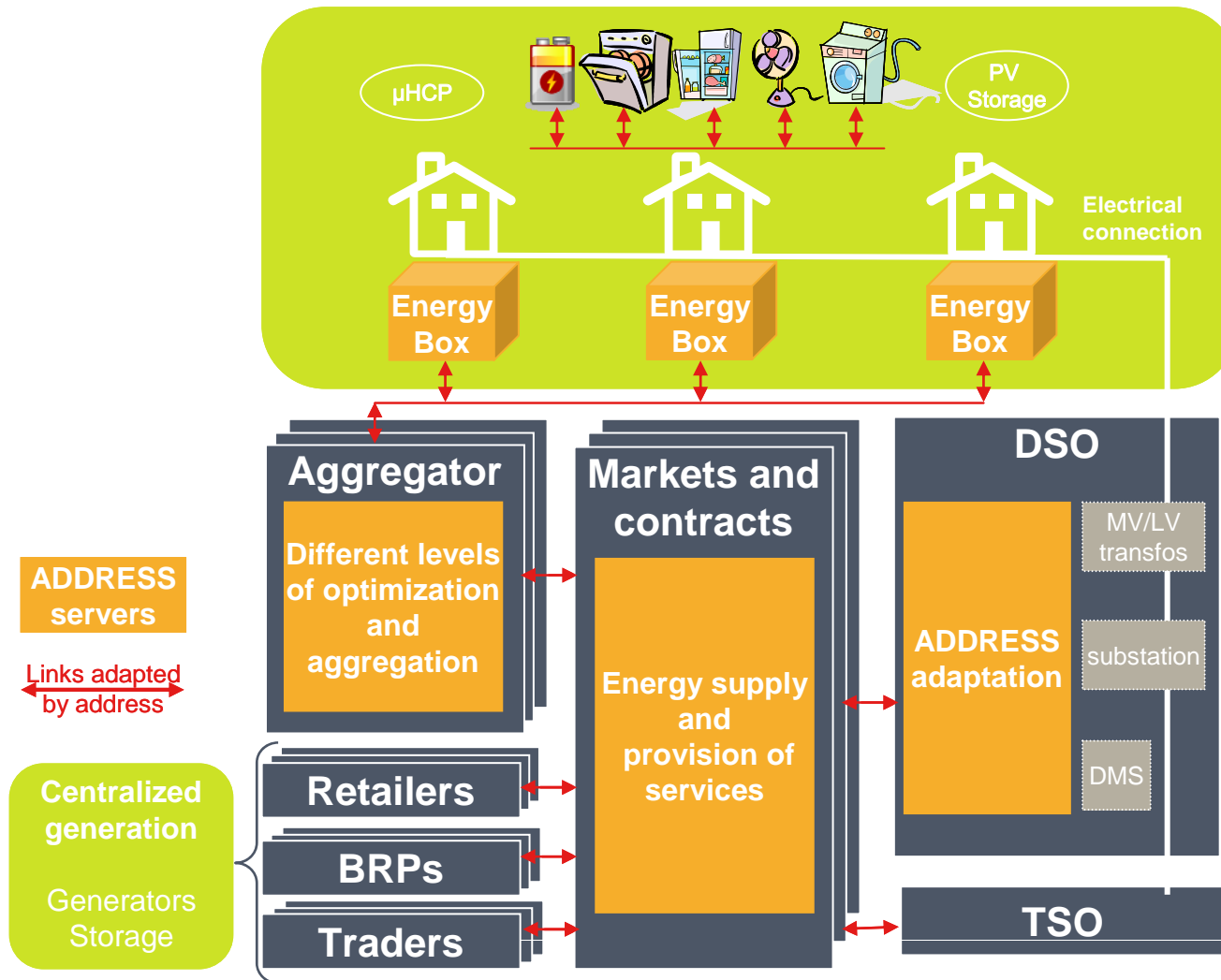
Consumers/Prosumers:

- optimisation and control of appliances and DER at consumers' premises
- Energy Box is the interface with the aggregator

Aggregator:

- mediator between the consumers and the markets
- collects requests and signals from markets and participants
- gathers flexibilities & contributions of consumers
- different levels of optimisation to meet the requirements of topologically dependent services

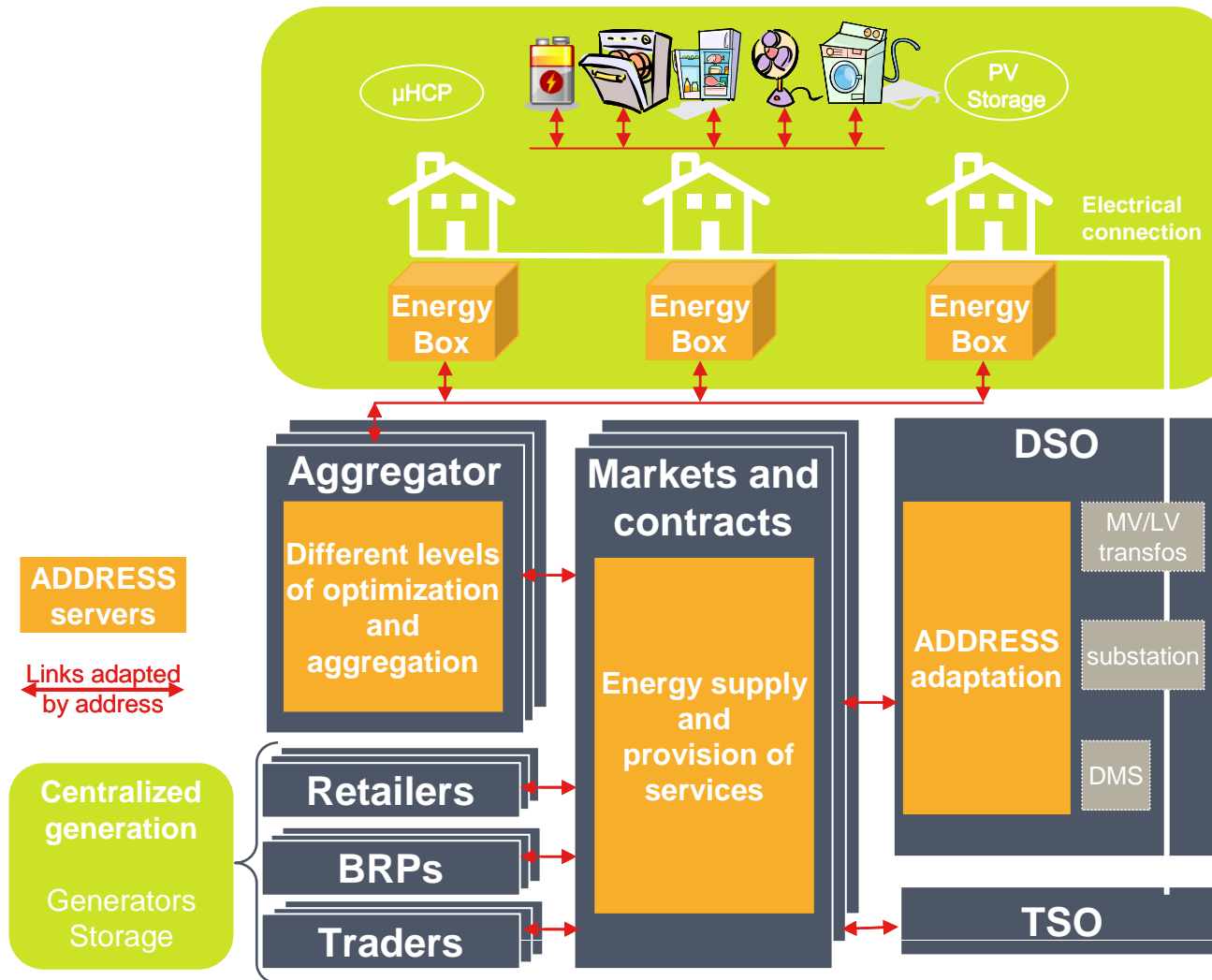
ADDRESS Scope (2/3)



Markets and contracts:

- Energy supply
- Ancillary Services: steady state V control, tertiary reserve and tertiary frequency control
- Balancing services (incl. compensation of RES variability)
- Overload and network congestion relief
- Load shaping services (e.g. peak shaving)
- Power exchange markets and ... Bilateral Contracts

ADDRESS Scope (3/3)



Distribution System Operators:

- Consumers considered are directly connected to the distribution network
- Key participant in active grids of the future
- Enable active demand and ensure secure and efficient network operation
- Interacts through markets
- Direct interaction with TSO for system security

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Main Concepts



- ❑ Interaction based on **real-time price** and **volume** (mainly P) **signals**
 - Real-time = 20 to 30 min ahead or longer
 - May be modulated by geographical / topological information
 - Direct load control by DSO will be not considered

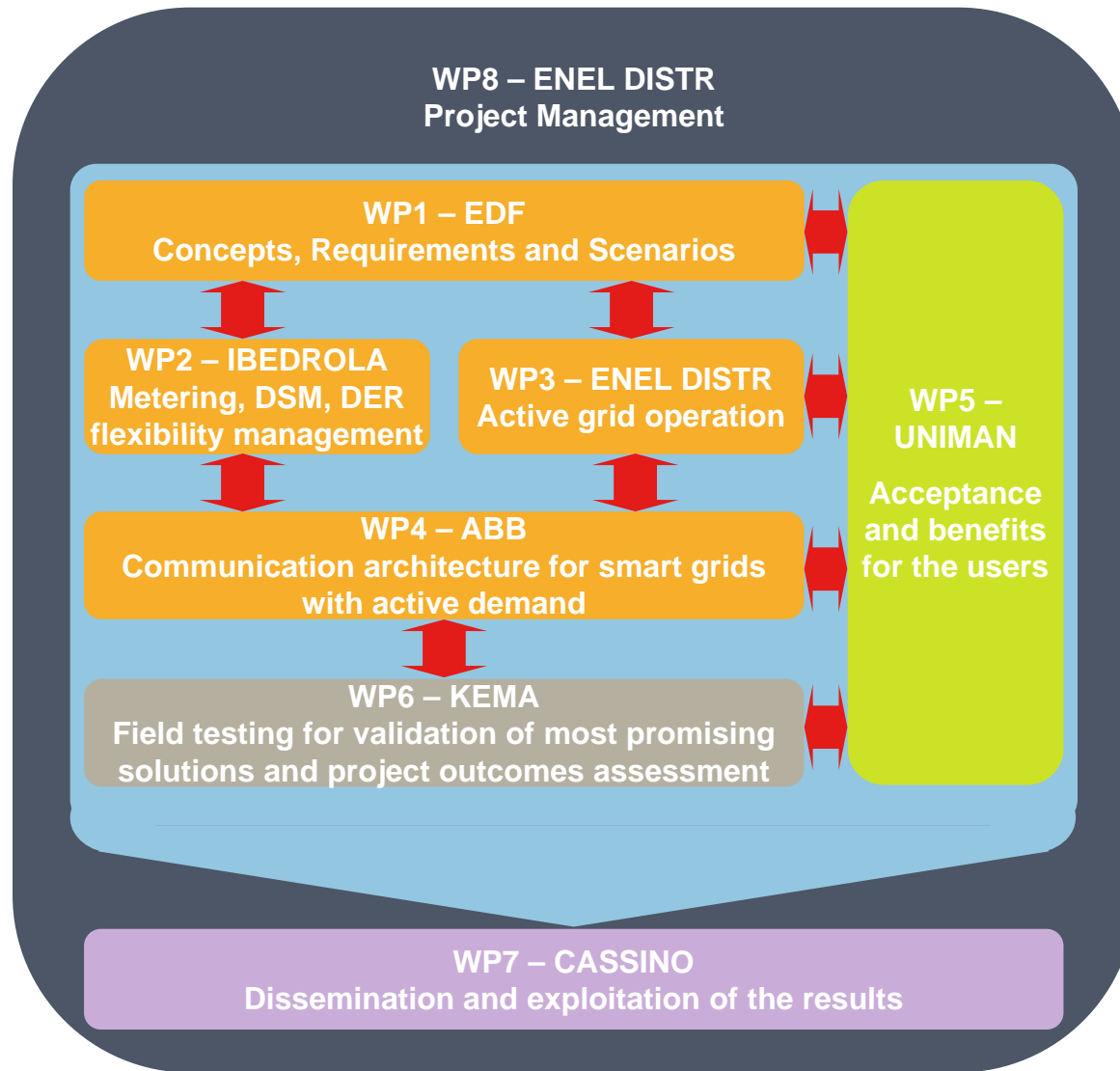
- ❑ **“Demand” approach** (in contrast with “generation” approach)
 - consumers not motivated by purely economic aspects
 - not able or not prone to characterize precisely in advance the services and flexibilities that they can provide
 - Services “requested” through appropriate price and/or volume signal mechanisms and provided on a **voluntary and contractual basis**
 - Development of appropriate technologies at consumers’ premises
 - Accompanying measures for **societal and behavioural aspects**

- ❑ Distributed intelligence and **local optimisation**
 - Topologically-dependant services
 - Participants optimise real-time response according to the real-time signals

Put the “right amount” of intelligence at the “right place”



ADDRESS methodology (1/3)



8 Work Packages

- ❖ Project management
 - ❖ Dissemination
 - ❖ 6 “technical” WPs
- Organised to support the methodology adopted for
- development,
 - validation and
 - deployment
- of the concepts and solutions.

ADDRESS Methodology (2/3)

1. Develop

- the concepts, in particular the mechanisms for the design of price and volume signals
- ADDRESS technical and commercial architectures along with functional requirements based on the concepts
- 4 or 5 scenarios representative of European power systems

➤ WP1



2. Develop

- enabling technologies, algorithms and prototypes,
- test them individually in laboratories.

- WP2 for consumers, aggregators and other deregulated market participants
- WP3 for DSOs and TSOs and grid operation
- WP4 for communication architecture.

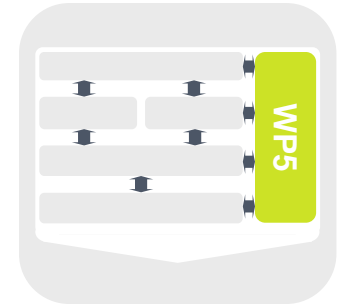


ADDRESS Methodology (3/3)

3. Develop

- contractual, market & regulatory mechanisms for exploitation of the benefits
- recommendations for accompanying measures for social acceptance

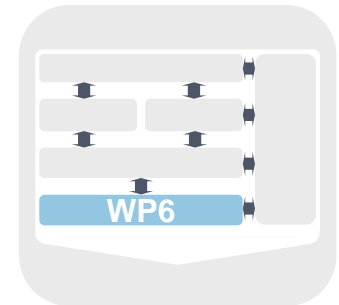
➤ WP5



4. Validate and assess

- Validate the concepts and the solutions developed at 3 different field test sites in Spain, Italy and on a French island
- Assess the solutions performance and project outcomes (concepts, architectures, ...)

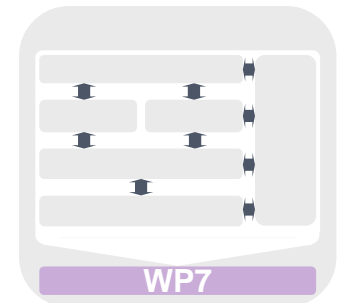
➤ WP6.



5. Recommendations and dissemination

- Define recommendations for the different stakeholders: regulators, communities, power system participants, R&D “world”, standardization bodies, ...
- Deploy and communicate the results

➤ WP7



Expected Results

Date	Description	WP
Aug. 2009	Conceptual architecture including description of: participants, signals exchanged, markets and market interactions, overall expected system functional behaviour	1
Oct. 2009	Application of the conceptual architecture in 4 or 5 specific scenarios	1
Feb. 2011	Algorithms for aggregators and consumers (and for their equipment)	2
June 2011	Prototype of Local Energy Management equipment and integration of algorithms for control of load, generation and storage	2
June 2011	Prototypes and Algorithms for network management, providing the signals sent by the DSOs to the aggregators and the markets, enabling and exploiting active demand	3
Dec. 2010	Documentation of Software Architecture and encoding in UML, including compiled software with API description	4
June 2011	Technical guide for building up a Smart Grid telecommunication infrastructure	4

Expected Results

Date	Description	WP
June 2011	Description of market mechanisms (regulations, economic incentives, contract structures) that enable active demand participation	5
June 2012	Key economic and societal factors influencing the adoption of ADDRESS architecture for power system participants. Report on the results verified by the experience in the field tests (WP6). Business cases for Customers, Aggregators and DSOs in the scenarios detailed in WP1	5
June 2011	Description of test location and detailed test program for prototype field tests, complementary simulations and hybrid tests	6
April – May 2012	Prototype field tests, assessment of the results and of the performance of the developed prototypes	6
June 2012	Evaluation of ADDRESS concepts with regard to development of active demand and large scale integration of DER	6
June 2010	Project mid term international workshop	7
June 2012	Project final international workshop and brochure Recommendations for standards committees, regulators, stakeholders groups, future R&D Final plan for the use and dissemination of results	7

Thank you for your attention !

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