



European Workshop on ICT for Energy-Efficiency in Buildings

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FIEMSER - Friendly Intelligent Energy Management System for Existing Residential Buildings Overview

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FIEMSER - Friendly Intelligent Energy Management System for Existing Residential Buildings

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- **Objective ICT-2009.6.3: ICT for Energy Efficiency**

- a) **ICT tools for the future electricity market**

Architectures and tools enabling the emergence of an open electricity market that allows new roles for energy brokers, that makes it possible for third parties to operate as virtual power plants and that allows for the establishment of variable energy tariffs in near realtime. This includes specific service delivery platform and uniform energy and information interfaces that are open to different business models and that can self-configure and adapt to the varying requirements of a market still in its definition phase. Projects must validate the use and the benefits of the resulting tools in concrete applications.

- b) ICT support to energy-positive buildings and neighbourhoods**

- **Monitoring and control systems able to optimize, in near-real time, the local generation-consumption matching considering all possible elements** (solar, fuel cells, micro-turbines, CHP - combined heat and power, heating, cooling, lighting, ventilation, etc).
 - Information platforms built on customizable, adaptive and open service-oriented architectures **providing connectivity to the energy grids** and information to decision makers in order to facilitate the emergence of new local business models.
 - **Intuitive user interfaces that help end-users save energy while maintaining the desired comfort levels.**

Projects shall include **tests with concrete targets under real conditions.**




- c) **ICT services and software tools enhanced with energy features**

ICT services and software tools that incorporate parameters for controlling emissions and energy consumption. Examples include, but are not restricted to: CAD and simulation tools able to assess the full life-cycle energy associated with new products, processes and services before their realization and including the influence of users' interaction; Enterprise Management Systems able to implement energy savings and emissions trading across industry boundaries. Definition of patterns, profiles, methods, energy consumption models and their interrelations resulting in building blocks for interoperable services and software tools.
The use and the benefits of the building blocks must be validated against concrete targets once integrated into concrete services and/or tools.

- **Duration: February 2010 to January 2013**

Context

- **Buildings are responsible for up to 40% of energy use in most countries.**

- **There are three key elements to achieving progress:**
 - Use less energy 
 - Make more energy locally 
 - Share surplus energy 

Objectives

- **Main objective:**

The development of an innovative energy management system for **existing and new residential buildings** (BEMS), which pursues the **increase of the efficiency of the energy used** and the **reduction of the global energy demand** of the building, but **without penalizing the comfort levels of the users**.

- **In order to achieve this goal, two main strategies will be followed:**

- **Minimizing the energy demand from external resources**, through the **reduction of the energy consumption** in the building and the **correct management of local generation** (heat and electricity) and energy storage equipment to satisfy the energy demand of the building, and even provide the capability to export energy to the utilities when needed.
- **Interaction with the building user**, in such a way as to increase the consciousness of the consumer of his energy consumption and CO2 emissions, providing hints to make punctual changes in his behavior without major disruptions of his comfort conditions.

S&T Objectives

1. **Definition of 6LowPAN standardized profiles for energy management systems** that will make easier the integration of FIEMSER with the current housing monitoring and control standards, as KNX, LonWorks, ...

Achieved1 by M1 – FIEMSER Definition

2. **Development of an intelligent indoor environment control system**, which minimizes the energy consumption in HVAC and lighting, This system will take into account thermal and lighting characteristics of the building (thermal mass, insulation, lighting features ...), current weather conditions (wind, temperature, solar radiation...) and occupant behaviour (presence, activity...).

Achieved by M3 – FIEMSER Modules

3. **Development of an innovative BEMS, which doesn't only focus on energy consumption, but also integrates and manages local generation and energy storage systems.**

Achieved by M3 – FIEMSER Modules

4. **Development of an ubiquitous user interface** that permanently allows home users setting FIEMSER to his current preferences and control the balance among energy cost – CO₂ emissions and comfort.

Achieved by M3 – FIEMSER Modules

5. **Integration of the BEMS with the digital television**, a well-known and familiar device for the home users of any generation (children, elder people...) to offer permanent advice about the impact (in € and CO₂ emissions) of the current operating conditions and potential actions to reduce it with minimum disruption of the comfort conditions.

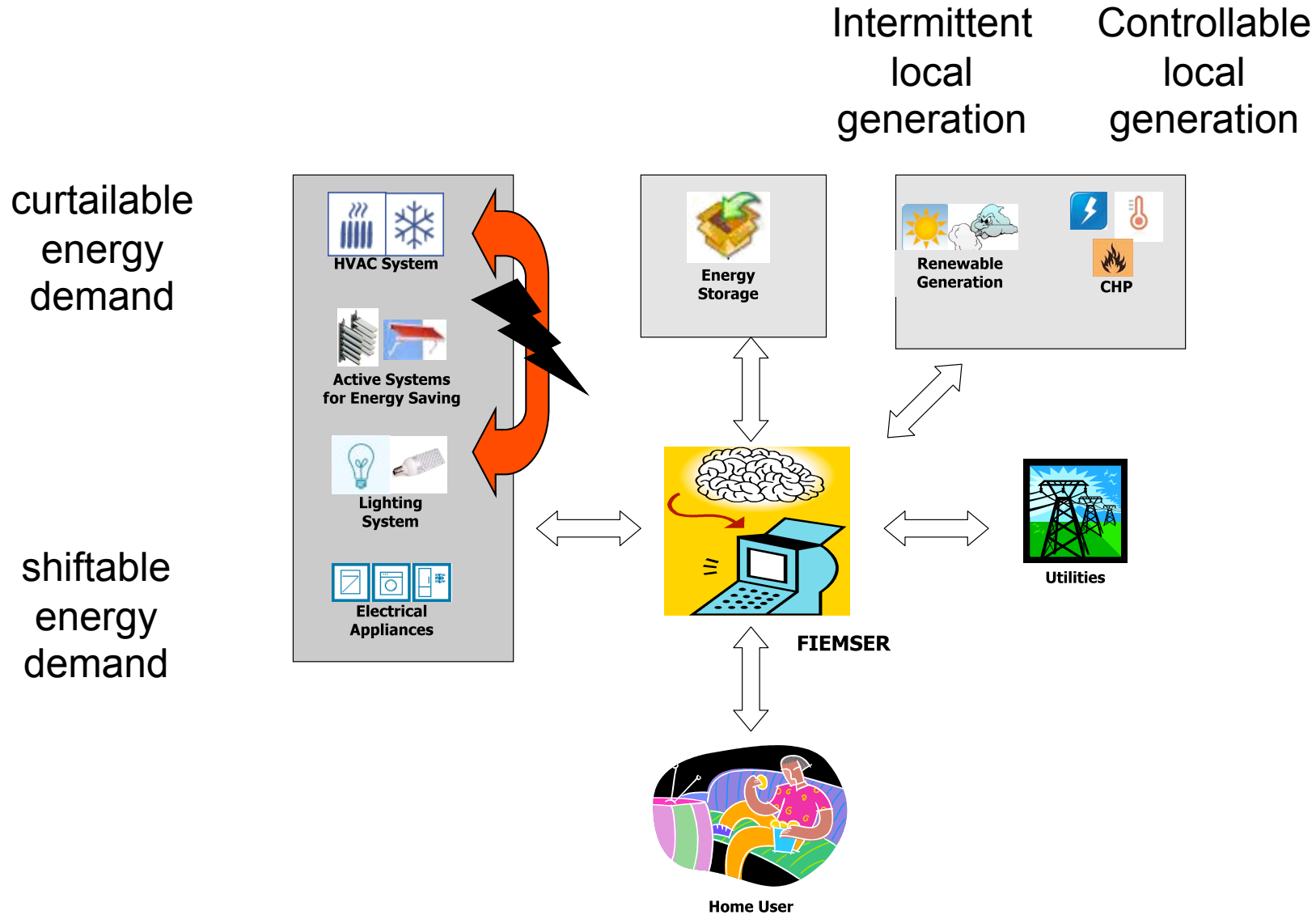
Achieved by M4 – FIEMSER Prototype

6. **Testing of FIEMSER platforms** in real buildings to verify that the energy efficiency of the building will be increased by around 30%. This testing process will also validate the FIEMSER platform from exploitation point of view: usability, acceptance by end users, purchase price, maintenance costs ...

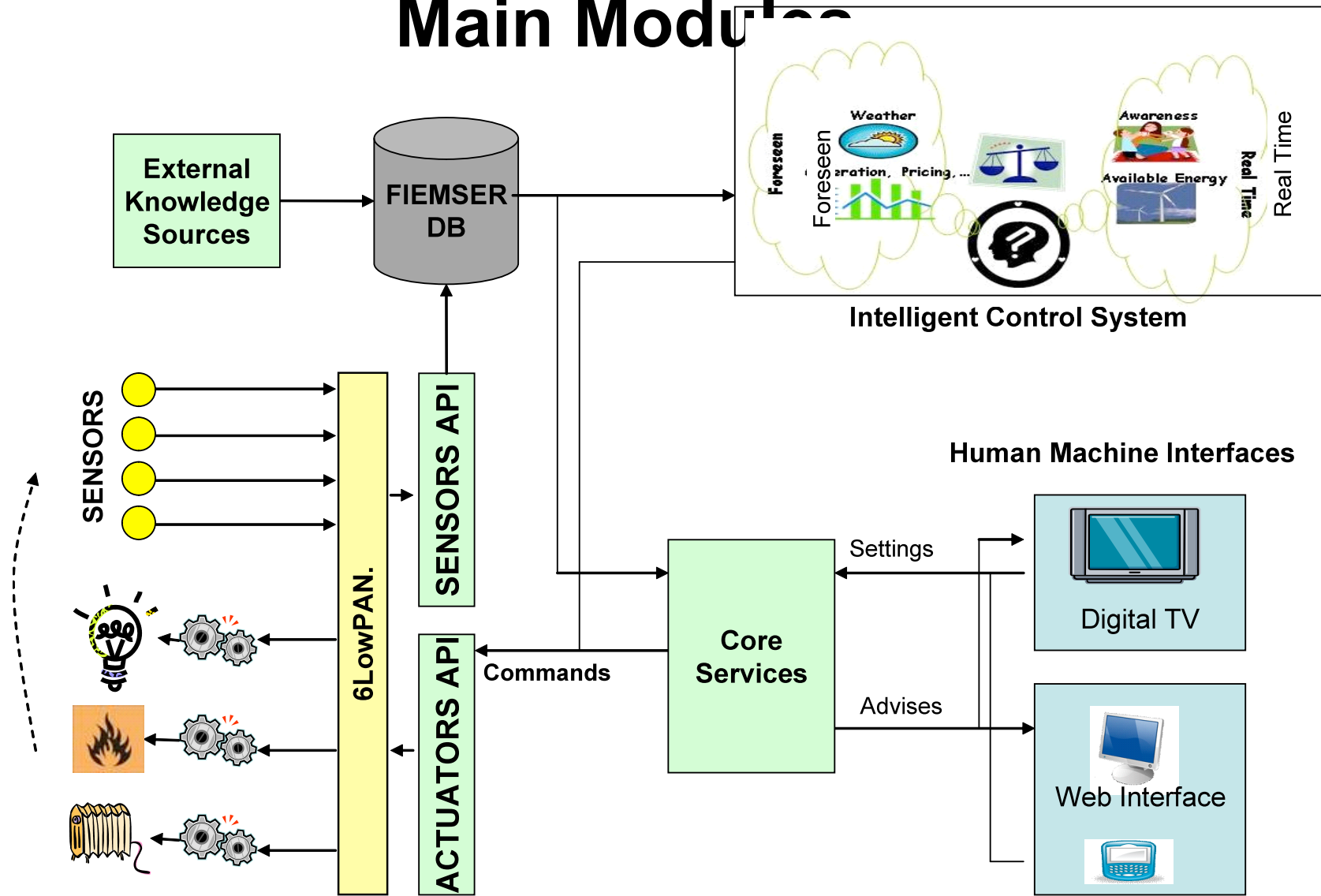
Achieved by M5 – FIEMSER Validation

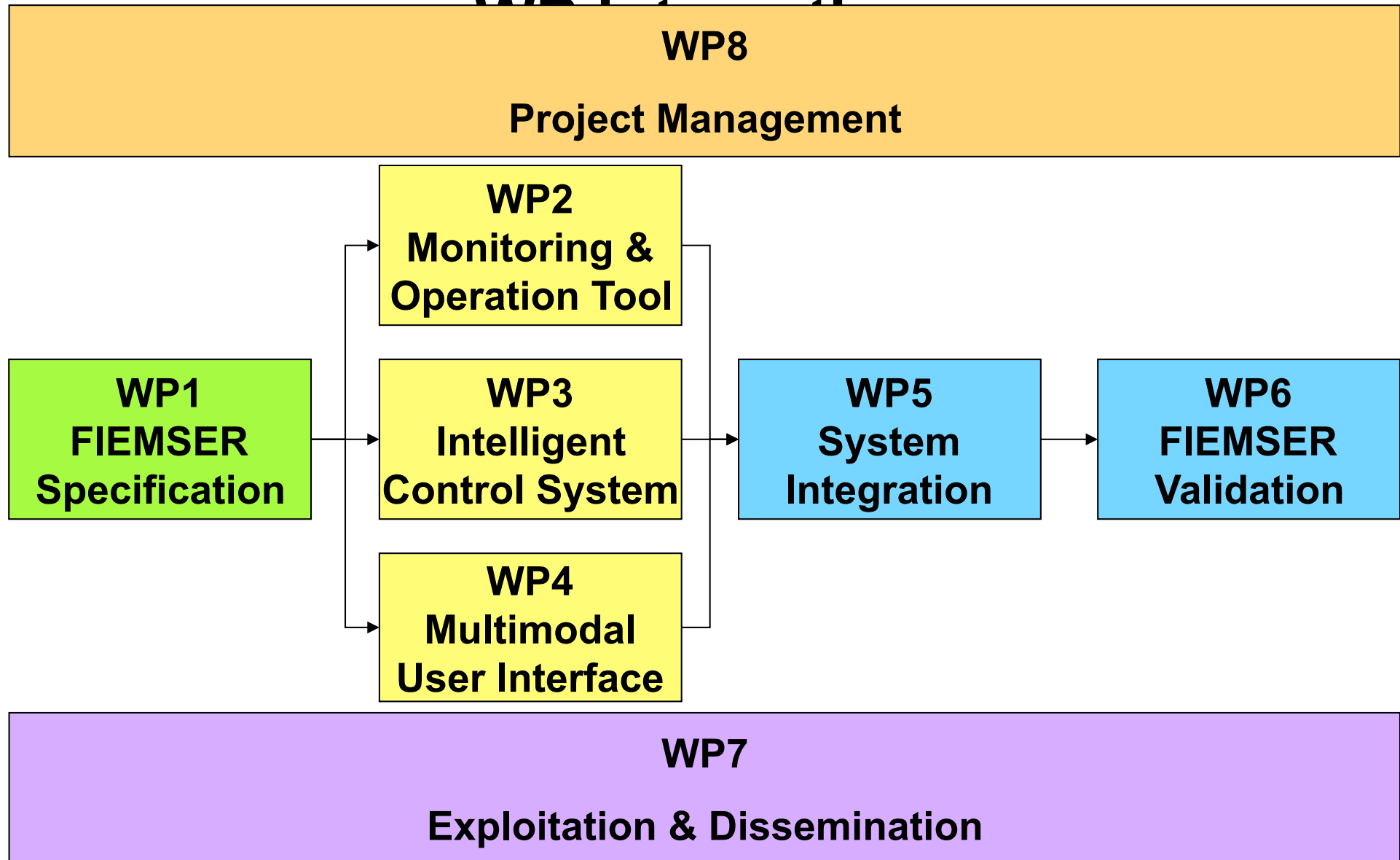
SoA and Beyond

- **Building Energy Management System (BEMS)**
 - *SoA*
 - Predefined energy control strategies.
 - Lack of integration of the local energy generation in the building with the energy consumption and the utility supply conditions
 - *Beyond*
 - Holistic energy management strategy, which takes into account the current building operation conditions and expected evolution
- **Wireless Control & Monitoring Networks**
 - *SoA*
 - Wired infrastructure.
 - Low battery life
 - Reliability problems
 - *Beyond*
 - Dependable and energy efficient C&M network
 - Interoperability with existing control communication systems in commerce
- **Digital TV as BEMS user interface**
 - *SoA*
 - Web services are being offered to access TV programs in dedicated .
 - *Beyond*
 - Interactive TV for operating more complex systems, like the energy management system of a building.
 - Moving the BEMS user interface to the most common and friendly system in homes, the TV.



Main Modules







Main Expertise	
ACCIONA	End-users requirements
UCD Clarity	Wireless communication networks
LABEIN Tecnalia	Energy efficiency in buildings
TENESOL	Local Generation
CSTB	Standardization and data models
THALES	ICT Platforms
PHILIPS	Digital TV
Fhg IBP	Evaluation of energy performances

WP leaders

Work Package		Leader	Start month	End month
WP1	FIEMSER Specification	ACCIONA	1	9
WP2	Monitoring&Operation Tool	NUID UCD	10	24
WP3	Intelligent Control System	LABEIN Tecnalia	10	24
WP4	Multimodal User Interface	PHILIPS	10	30
WP5	System Integration	CSTB	16	30
WP6	FIEMSER Validation	Fraunhofer IBP	24	36
WP7	Exploitation & Dissemination	THALES	1	36
WP8	Management	LABEIN Tecnalia	1	36

WP interaction

