

eDIANA
Embedded Systems for
Energy-Efficient Buildings
www.artemis-ediana.eu

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Project Background

- **More than 40% of the energy consumption in Europe is building-related** (residential, public, commercial and industrial).
- The Action Plan for Energy Efficiency estimates that **the largest cost-effective energy savings potential lies in the residential (27%) and commercial buildings (30%)**
- **Advanced, flexible and integrated ICT-based energy management systems** for both new and old buildings, in combination with widespread control of natural lighting and ventilation [...] **will help not only to reduce energy consumption but also to increase safety and security...**
- Such systems — including **smart metering and advanced visualization** — can continuously gather data on what is taking place in a building and how its equipment is operating, feeding it into a (cognitive) control system to optimize energy performance. At the same time, a heightened **energy consumption awareness** is expected to stimulate behavioral changes both at household and enterprise level.

Source: "Addressing the Challenge of Energy Efficiency through Information and Communication Technologies" COM (2008) 241 Final. (Communication adopted by the EC).

http://ec.europa.eu/information_society/activities/sustainable_growth/docs/com_2008_241_1_en.pdf



Project Overview

- eDIANA's main goal is **improved energy efficiency in residential and non-residential buildings** through the use of **embedded devices**.
- While such systems exist today, their effectiveness is often limited by a lack of interoperability, leading to fragmentation and limited overall impact.
- This project is a **strongly application-oriented initiative** which is focused on the conceptualization, design, development, demonstration and validation of new devices operating in a uniform platform called eDIANA.
- The eDIANA platform is based on Cells (living/working units), being part of MacroCells (buildings).
- Duration: **36 months**
- Start: **February 2009**

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Consortium

- **Industrial Partners:**
 - ACCIONA (Coordinator)
 - ATOS ORIGIN
 - ELSAGDATAMAT
 - FAGOR
 - FIDELIX
 - GAIA
 - I&IMS
 - INFINEON TECHNOLOGIES
 - PHILIPS Apptech
 - PHILIPS Consumer Lifestyle
 - PHILIPS Research
 - QUINTOR
 - ST MICROELECTRONICS
 - ZIV
- **Research Centers:**
 - ESI
 - IKERLAN
 - LABEIN
 - VTT
- **Universities:**
 - Mondragon University
 - University of Bologna
 - University of Roma La Sapienza

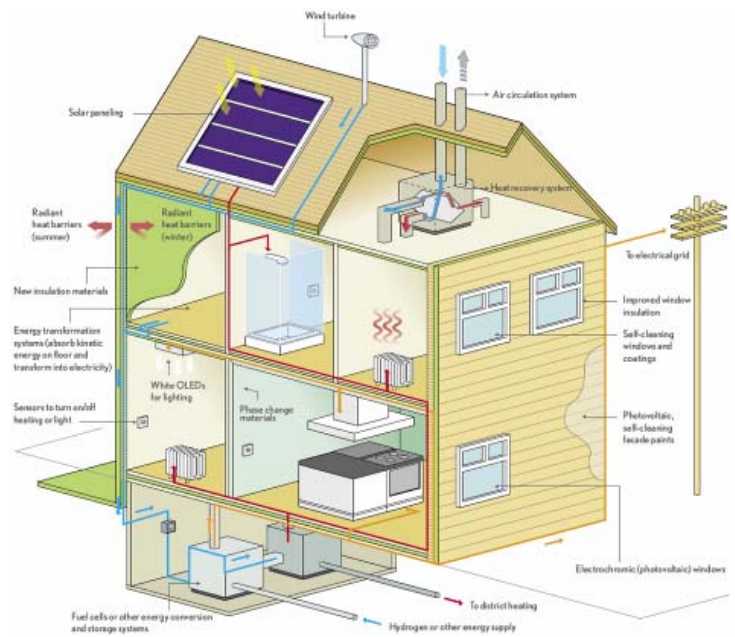


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Project Objectives

- The overall objective is the conceptualization, design, development, demonstration and validation of the **eDIANA Platform**, integrating intelligent embedded devices, installed in residential and non-residential buildings for improving their energy efficiency.
- The eDIANA Platform is:
 - A reference model-based architecture
 - Implemented through an open middleware
 - Including specifications, design methods, tools, standards, and procedures for platform validation and verification.

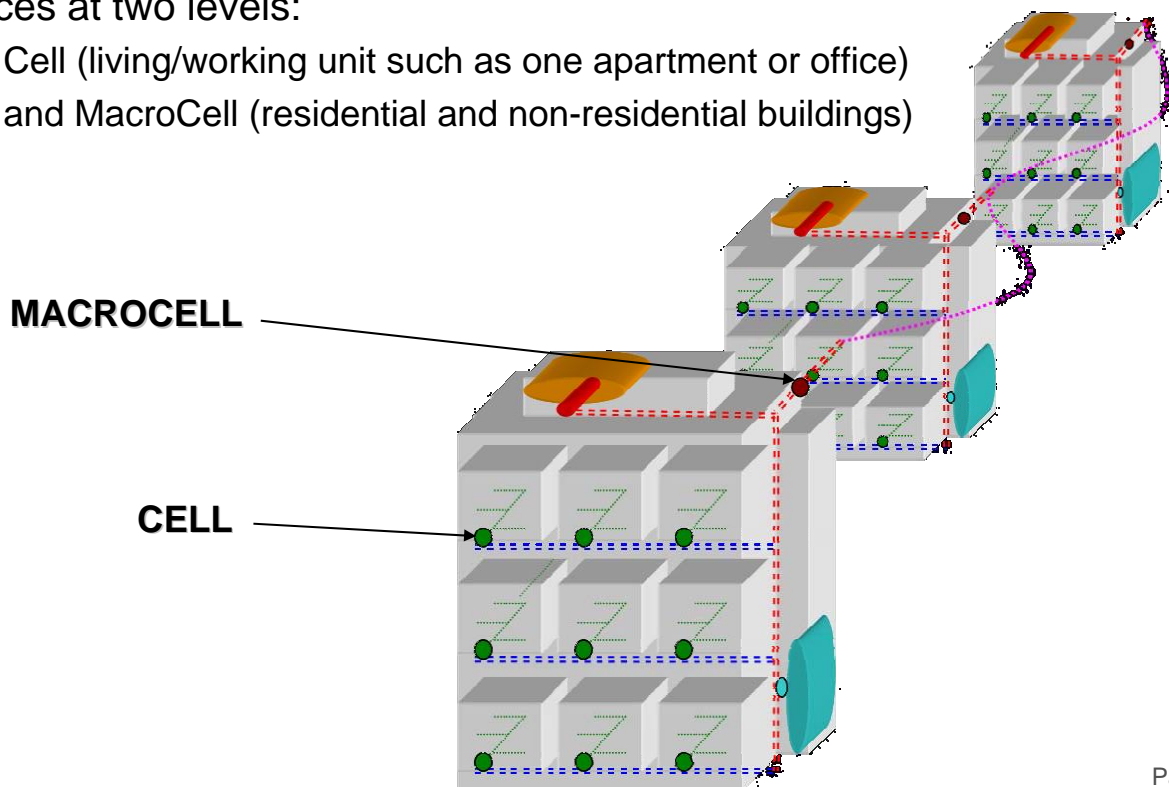


Source: SUSCHEM SRA



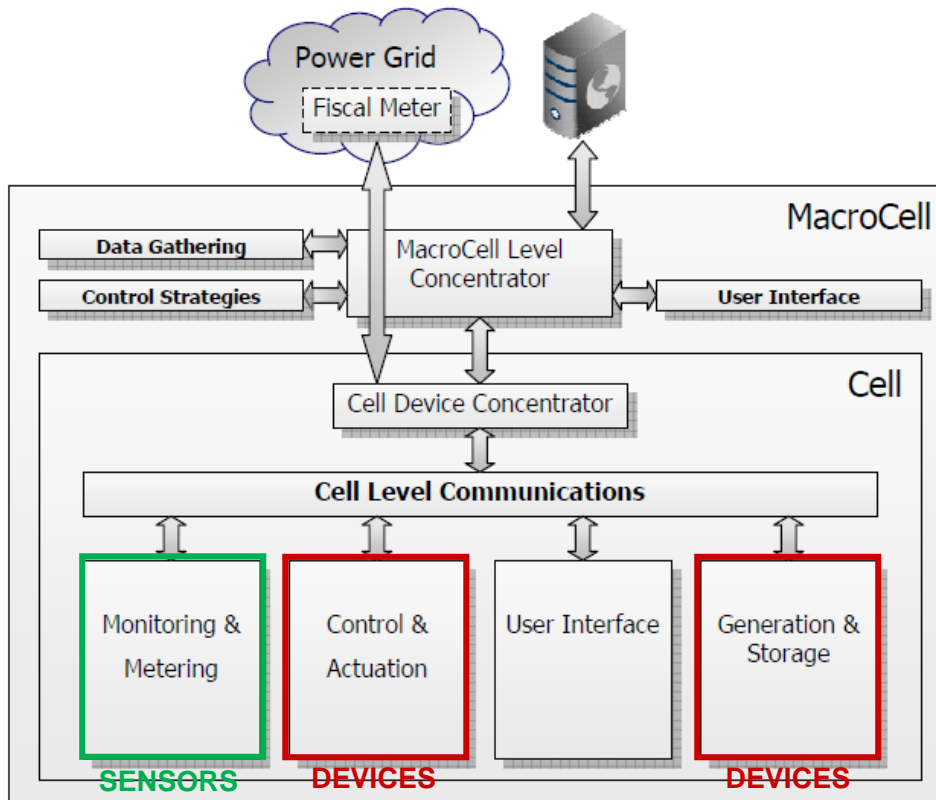
Architectural Model

- **eDIANA platform** will enable interoperability between heterogeneous devices at two levels:
 - Cell (living/working unit such as one apartment or office)
 - and MacroCell (residential and non-residential buildings)





Architectural Model



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Application Objectives

■ Application objective 1:

- **Improve energy efficiency** and optimize buildings energy consumption by 25%
- Enable the **energy production and storage in a building** (houses, offices, public buildings, etc.) providing real-time measurement, integration and control.

■ Application objective 2:

- **Improve comfort, making the user aware** and enabling user-controlled policies for household devices (lighting, domestic electronics, etc.)

■ Application objective 3:

- **Enable the building to become an “active macroCell” in the energy network**, connected to similar macroCells in a district or urban area, as energy consumer but also as producer, by including the technical means for a standard and non-technical user to become a “prosumer” (producer and consumer).

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S&T Objectives – Clusters

REQUIREMENTS ENGINEERING

EMBEDDED TECHNOLOGIES

INTENSIVE DEMONSTRATION

STANDARDIZATION & EXPLOITATION

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S&T Objectives – Clusters

■ Requirements

- To identify and formalize the eDIANA Baseline and specifications: **Functional and non functional system requirements definition**, including performance indicators, modeling and integration techniques for embedded systems for improving the energy efficiency in buildings.
- Formalization and application of **new model driven requirements management techniques** will be linked with cross-industry related standards and techniques like ICT, energy, building management and safety, fostering cross-domain usage of eDIANA devised requirements artifacts.

■ Embedded Technologies

- To define the **eDIANA Reference Architecture and Platform** and develop the eDIANA seamless connectivity and middleware technologies
- To develop the eDIANA Platform **Cell and MacroCell level devices**
- To apply new **techniques, methods and tools assisting testing, validation and verification processes**

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▪ Application Scenarios

- To **validate eDIANA platform** through:

• Pre-industrial demonstration:

- Two dedicated facilities will be used as demo-labs: communications testbed (University of Bologna - Italy) and HomeLab (FAGOR-Spain)

• Real-scale demonstration:

- Four demonstrators in different climate areas are planned (two residential buildings in Eindhoven and Helsinki, and two office buildings in Madrid and Espoo)

▪ Standardization & Exploitation

- **Pre-normative research on embedded systems** towards standardization, with significant involvement in diverse standardization bodies/groups such as HES, CENELEC, CEN, X10, ETSI, IEEE or ITU.

- Towards replication and **exploitation of the project results** and eDIANA Platform sustainable ecosystem



eDIANA

Thanks for your attention!

Project Website:

www.artemis-ediana.eu

(newsletter, public deliverables, scientific publications, events, etc.)

eDIANA LinkedIn Group:

http://www.linkedin.com/groups?home=&qid=2201538&trk=anet_ug_hm