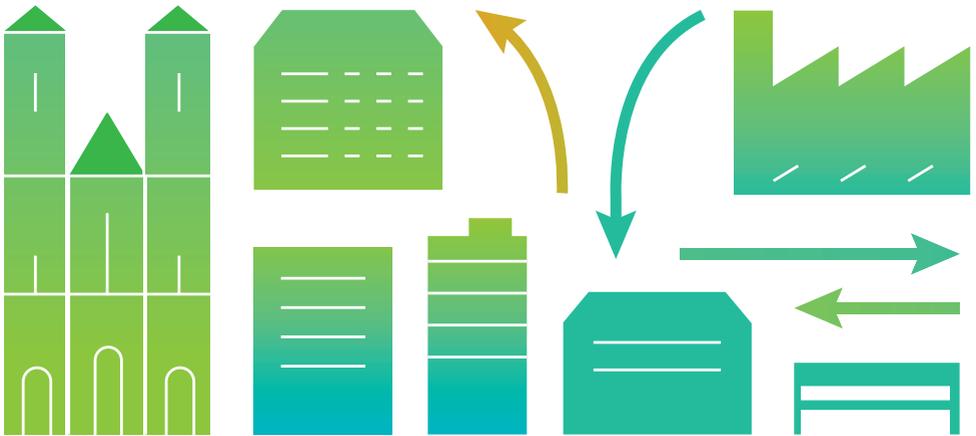


2016

EeB PPP Promising Technologies

Monitoring & Diagnostic methodologies - Design & Retrofit



ENERGY EFFICIENT BUILDINGS
AN ECTP COMMITTEE FOR INNOVATIVE BUILT ENVIRONMENT

WIRELESS BUILDING DIAGNOSTIC SYSTEM

Monitoring an Diagnostic methodologies – Design & Retrofit



The Wireless Building Diagnostics Kit (WBDK) is a flexible, scalable system which can help engineers and facility managers to quickly monitor, document and understand the behaviour of potentially malfunctioning rooms, buildings or technical systems in buildings in a fast and efficient way. This WBDK includes:

- **Minimum Installation Efforts:** The hardware platform, based on wireless components, requires minimal additional installation efforts and can be combined with commercially available sensors.
- **Flexible Configuration:** The simple and robust gateway component compiles signals from numerous types of monitoring devices, such as temperature sensors, magnetic sensors, light-sensors, or electricity meters. The gateway can communicate using either W-LAN or 3G-LAN connections. In case of temporarily lost connectivity data can be stored locally.
- **Context:** Data can be easily integrated with descriptive data from open BIM-systems (building information modeling), which substantially shortens the lead-in time for installation and usage of the system.
- **Web-based Documentation:** Data is stored in a Database Management System and is immediately accessible through the web. Facility Managers can quickly run and generate reports for tenants, building occupants and consultants in different data granularities and a broad variety of combinations.
- **Comprehensive Diagnostic Services:** Software services enable facility managers to run numerous diagnostic checks, such as:
 - **Data Validity Checks** - to check and ensure that monitoring devices are configured correctly and report in the appropriate units and times

- **Data Range Checkers** - to check and ensure that monitoring data streams are compiled consistently
- **Consistency Checkers** - to ensure that data trends and time series data demonstrate the expected behaviour
- **Integrity Checkers** - to check if selected measurement streams correspond to each other
- **Performance Evaluation Matrix (PEM):** A template guides a facility manager through the analytical tasks to be executed. The PEM can be semi-automatically populated, i.e. the facility manager gets an overview what systems are installed in a specific building and in what sequence to execute integrity checks.

The WBDK acts as an integrated, interoperable and intelligent platform capable of collecting, processing and analysing different types of building data and providing support for a more efficient facilities management.

● Standalone or integration with BIM

● Comprehensive set of data checkers and diagnostic support tools

● Easy data transfer

● Intelligent and optimized control of building services systems

- Technical completion: less than 1 year
- Can be used in new constructions
- Can be used in renovation/retrofitting
- Compatible with existing solutions

Project: **CAMPUS 21**, Control and Automation Management of Buildings and Public Spaces
www.campus21-project.eu

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INTEGRATED PROCESS FOR THE DESIGN AND MANAGEMENT OF VERY LOW ENERGY BUILDINGS

Monitoring and Diagnostic Methodologies – Design & Retrofit



This technology is an integrated 7-step process for the design and management of complex, very low energy buildings, to achieve optimum energy and comfort performances in real use conditions.

The technology is a design procedure that combines parameters affecting the design of the building envelope, the installations (HVAC, lighting, etc.) and the boundary conditions (e.g. energy sources) of the building, considering also procurement and construction/logistic phases, as well as economic perspective such as lifecycle and operational costs.

The design procedure uses numerical simulation models allowing the prediction of the building performance in different situations with a better correspondence to the final real performance. The simulation model used in the procedure can handle data from a monitoring platform, e.g. a set of sensors embedded in the building, and uses this data to make efficient building management decisions, such as interactive switching of the HVAC system or interaction with BEMS–Building Energy Management Systems.

The procedure is compatible with the use of a novel set of KPIs developed in the DIRECTION project, which allows a standardized performance comparison with other buildings, taking into account different construction aspects and climatic regions. The procedure

is also compatible with a novel monitoring platform developed in the DIRECTION project, which allows complex monitoring of building performance and direct interaction with many building management systems/building automation systems on the market.

- Simultaneously supported by simulation, building monitoring, and BEMS systems
- Smart integrated design approach
- Better predict building energy and comfort performances

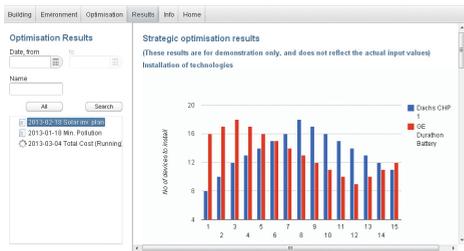
- Technical completion: less than 1 year
- Can be used in new constructions
- Compatible with existing solutions

Project: Direction, Demonstration of very low energy new buildings
www.direction-fp7.eu

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LONG-TERM STRATEGIC MODEL FOR BUILDING RETROFITS

Monitoring and Diagnostic methodologies – Design & Retrofit



EnRiMa's "long-term strategic model for building retrofits" is a Decision Support System (DSS) which uses optimization at the building level in order to minimize energy consumption. The technological service is designed to assist decision makers with retrofitting in energy efficient buildings, as well as energy auditors with analyzing behavior and improved scenarios.

The EnRiMa strategic DSS model suggests a strategy for the investment in technologies or the decommissioning of existing ones, given a set of parameters that describe these technologies and the tariffs used to buy and sell energy. The DSS generates a number of scenarios, each describing a possible future development of the parameters, and then determines the best strategic decision. Additionally, the DSS calculates future building performance and investments for each possible scenario. This strategic decision model presents investment advice, in the form of which technologies to buy and when to buy them. Decision support can be foreshadowed for up to 15 years.

The strategic decision support system's ability to directly deal with risk management provides ESCOs, engineering consultants, policymakers, and others involved with design and refurbishment of buildings a decisive tool that optimizes long-term energy fulfilment.

An independent auditor found that there is an expected 20% decrease in energy consumption, a 20% carbon emission reduction, and a 10% reduction in risk.

The technology has been implemented by the INNOSPIRIT project, as well as in a demo at Hidrocantabrico Energia's building. Successful prototypes are ready to be manufactured.

- 20% decrease in energy consumption and carbon emission reduction

- 10% reduction in risk

- Technology investment analysis (advice)

- Technical completion: less than 1 year
- Can be used in new constructions
- Can be used in renovation/retrofitting
- Compatible with existing solutions

Project: EnRiMa, Energy Efficiency and Risk Management in Public Buildings
www.enrima-project.eu

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This technology brochure highlights the highly promising innovations from selected co-funded European projects under the 7th Framework Program (FP7).

The Energy-Efficient Buildings (EeB) Public Private Partnership (PPP) is a joint initiative of the European Commission (EC) and the Energy Efficient Buildings Committee of the European Construction Technology Platform (ECTP).

This initiative aims at promoting research on new methods and technologies to reduce the energy footprint and CO2 emissions related to new and retrofitted buildings across Europe.

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