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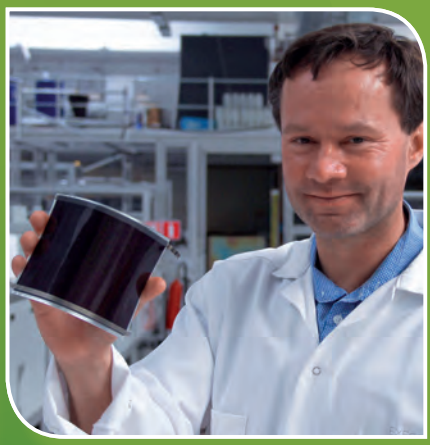
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BEST LIFE ENVIRONMENT PROJECTS

BEST PROJECTS

Spain: **Smart building technology for improved energy efficiency**

The DOMOTIC project showed how intelligent construction with smart technologies can improve energy efficiency in buildings with high energy consumption, while also reducing carbon dioxide (CO_2) emissions to help mitigate climate change.

Domotics is the term used to describe automated or semi-automated appliances that improve the efficiency of energy consumption in homes; inmotics is the equivalent term for such appliances in industrial buildings. This emerging smart building technology encompasses heating, ventilation and air conditioning (HVAC) and lighting systems. Given that HVAC and lighting account for over 40% of total energy use in the EU, models for 'intelligent systems' can significantly contribute to improved energy efficiency, and the reduced CO_2 emissions necessary to mitigate the negative impacts of climate change.

The main objective of the DOMOTIC project (**LIFE09 ENV/ES/000493**) was to show the potential of domotics and inmotics to reduce energy consumption in buildings with high-occupancy and high energy consumption. To achieve this goal, coordinating beneficiary San Valero Foundation (FSV) collaborated with the Natural Heritage Foundation of Castilla y León (Spain), Europe Innovation and Development (Spain), Association for Development and Sustainability (Spain), and Graz Energy Agency (Austria).

Three demonstration buildings

The project implemented three models of automation in three demonstration buildings in Spain: FSV's training centre in Zaragoza; San Jorge University campus in Villanueva de Gállego; and the Environmental Education Proposals (PRAE) building in Valladolid.

Software and computer models were deployed to control automated devices in the demonstration buildings. The project used KNX-certified technology to enable products from different manufacturers to communicate with each other. Presence detectors, light brightness sensors, air quality, temperature and humidity probes, and daily and seasonal timers fed information into integrated control systems that adjusted HVAC and lighting. This took the form of automated opening and closing of windows and blinds, the automated dimming or switching off of lights when rooms are unused, the control of fuel consumption through metering, and the detection of 'phantom energy consumption' to facilitate the repair of leaks and malfunctions. In the PRAE building, the project also deployed renewable energy (solar thermal and biomass). The effects of the different energy-saving actions were closely monitored in all three buildings.

The project proved the CO_2 emission reduction potential of domotics and inmotics

The project team made innovations in design, methodology and approaches to produce good building governance

models based on the use of domotic applications. Overall, the implementation of automated solutions in the three buildings led to a 63.9% annual improvement in energy efficiency, an emissions reduction of 680 tonnes CO_2/yr, and an economic benefit of €162 000/yr. The average return on investment was calculated to be four years, with a durability period of 15 years.

In all three cases, savings of between 40% and 50% in electrical energy consumption were recorded. These savings were mainly achieved through the installation of presence detectors (20%), and changes in lighting systems (e.g. switching to LEDs) and the use of computerised lighting controls (50% with fluorescent and 71% with LED lighting).

Heating-energy savings of over 40% were achieved with the Building Management System (BMS) model used in the PRAE building, mainly due to the automated control of the HVAC system and the performance of the biomass boiler. The project's BMS model controlled four sub-systems (HVAC, lighting, computer equipment, and solar and biomass energy production) facilitating their integrated management. It enabled problems in temperature and flow in the heating system to be detected and corrected.

The demonstration buildings were of different ages and construction types, to demonstrate that the approach can be widely replicated. The project's models were designed to be versatile and scalable for ease of transfer. High replication potential is ensured due to the ready availability of automated devices on the market, the short payback period, and the considerable cost-saving and environmental benefits. In addition, the project's results are contributing toward the standardisation of smart installations across the EU.

Raising awareness about energy consumption

To encourage building users to adopt more responsible behaviour in terms of energy use, the project created an online information tool to track energy consumption and savings in real-time in large buildings. The tool evaluates energy performance and CO_2 emission reductions for different energy-saving actions.

DOMOTIC's Manual of Good Practices summarises the project's findings in areas such as heating systems and interior and exterior lighting. The project contributes towards achieving a range of EU policy objectives, such as those in the Directive on energy performance of buildings (2002/91/CE), the Directive on energy end-use efficiency and efficiency services (2006/32/CE), and the European Climate Change Strategy - which identifies the building sector for special attention.

The project tested a range of techniques, including integrated control of lighting (pictured)

The project team established the Network of European Models of Energy Efficiency. This network, which already includes over 50 members, brings together managers of public and private buildings to facilitate the commercial uptake of domotics. Members of the network can display a plaque, which acknowledges their commitment to improving energy efficiency in buildings and taking action to mitigate against climate change.

After LIFE, the project beneficiaries are applying the models developed during the project in two buildings of heritage importance, the Diocesan Museum of Zaragoza and the Parish Church of La Magdalena, as well as in the San Valero Group's new headquarters in Zaragoza.

"The environmental and economic benefits obtained exceeded expectations, which demonstrates that domotic solutions have major potential for reducing energy consumption and CO_2 emissions," says Nieves Zubalez of FSV. "This is mainly by facilitating the control of consumption and thereby making it possible to manage energy better, improve efficiency, and detect leaks or malfunctions in the installations."

Project number: LIFE09 ENV/ES/000493

Title: DOMOTIC - Demonstration Of Models for Optimisation of Technologies for Intelligent Construction

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