Production to consumption energy efficiency for smart cities

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Credit: AI-generated image ([disclaimer](#))

By integrating energy management systems the EU funded BESOS project contributes to the efficiency and sustainability of 'smart cities', while further empowering citizens to make informed choices.

For a city to be considered 'smart', where its inhabitants have their daily

needs met in the most efficient and sustainable way, requires the coordinated management of resources, whether material, environmental or human, by urban authorities (public and private). Currently however, the running of many urban services is distributed across multiple suppliers. With energy provision, supply for services such as urban heating and lighting is run by various Energy Management Systems (EMS) that are not integrated and so miss opportunities for increased efficiency and cost savings.

The EU-funded BESOS project set out address this lack of coordination by developing an advanced, integrated, management system. This system was designed to enable neighbourhoods to have access to support tools for making public infrastructure decisions. Crucially, another objective was to provide citizens with access to more information to also help them make decisions.

Information platform for decision making support

The BESOS approach enabled disparate IT management solutions to connect and share data through the creation of what it called an Open Trustworthy Energy Service Platform (OTESP), also accessible to third party applications. The OTESP functions as an information hub designed for different energy stakeholders. Its development involved a number of stages.

Firstly, the specification of requirements, use-cases and Key Performance Indicators (KPIs) for specific scenarios such as public lighting or heating/cooling systems had to be generated. Next a common architecture and data models were developed and deployed such that they were adoptable by the end users, whilst also ensuring the integrity of data privacy. Crucially, it was designed to be able to interact with a neighbourhood's different Energy Management Systems (EMS).

The methodology was targeted principally at both the infrastructure owners, typically municipalities, and the Energy Service Companies (ESCOs), or operators. The data sharing platform supplied infrastructure owners with a Business Balance Score Card utilised to assess the actual performance of Service Level Agreements (SLAs) with Energy Service Companies and Facility Managers. To be able to monitor and control infrastructure and implement integrated energy efficiency strategies, they also had access to a Decision Support System (DSS) Cockpit. The project also created an Energy Forecast Engine which the Project Coordinator Manuel Serrano Matoses refers to as, 'One of the main outcomes of the project, as it is able to forecast the production of wind mills and PV panels, but also the consumption of different assets - i.e. Buildings, public lighting, EV, etc. so a crucial tool for planning.'

The trial had access to a range of public infrastructure assets such as public lighting, public buildings, residential buildings, Photovoltaic micro-generation (55 installations), wind turbines, smart heating, cogeneration, electrical vehicle charging points, and mobility systems. In total the trial encompassed 168 MWh/year of produced electricity and >250GWh/year of consumed electricity and was conducted in both Barcelona and Lisbon, exercising different scenarios in each.

150 experts and citizens were involved in evaluating the project results which found that in terms of cost-benefit, participating cities would recoup their investment within 4-5 years and demonstrated a reduction of costs by more than 30%. The pilots also surpassed their 20 % CO_2 emissions reduction target (20.65% in Barcelona, 23.91% in Lisbon), resulting in what Mr Serrano describes as, 'A notable improvement in quality of life for EU citizens.' He elaborated that, 'considering the current economic situation and the dependency on energy resources, providing a tool for better management and monitoring of electricity, as an information tool for public authorities, will help stabilise citizens' and service suppliers' budgets.'

New opportunities for digital pioneers

As the BESOS system is open access, as well as being open for stakeholders such as ESCOS and public authorities, it is also open to domestic users. In this way aside from increasing service efficiency, one of the immediate impacts of BESOS, is the empowerment of consumers and citizens to make decisions which can keep costs down and by increasing efficiency, contribute to overall sustainability. Indeed, it is anticipated that this consumer empowerment will inspire digital entrepreneurs to come up with new business opportunities.

As the technology is designed to integrate into EMS devices of various complexities, the project results are highly transferable and scalable to other worldwide capital cities, regardless of size or location. The project has already identified business opportunities for 2017 and intends to bring to market a range of products such as 'smart cities cockpits' and the 'energy forecast engine'.

Additionally, to encourage uptake of the technology, the BESOS project consortium is involved with various international alliances seeking to advance the smart city agenda.

  More information: Project website: besos-project.eu/

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