



Opere Project

ASPECTS OF INTEREST

LIFE Programme+ Governance and Environmental Policy

Total budget: 1,190,479 euros

Project duration: 42 months

July 2013-December 2016

PARTNERS

University of Santiago de Compostela (Leader)

EnergyLab

www.life-opere.org



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1 PARTICIPATION OF OPERE AT SISTEDES SESSIONS 2015

On September 16th 2015 the OPERE researcher José Ángel Taboada took part in the Software Engineering and Databases Sessions 2015 (abbreviated to JISBD in Spanish) hold in Santander, where he presented the article [“Optimization of Data Storage on Energy Management of Smart Buildings”](#).

The article focused on the design and implementation of the data acquisition system, storage and publication of the sensorization data from the buildings analysed by the OPERE project. The optimization for data storage in real time as well as for data consultation was also addressed in order to meet the required response time.

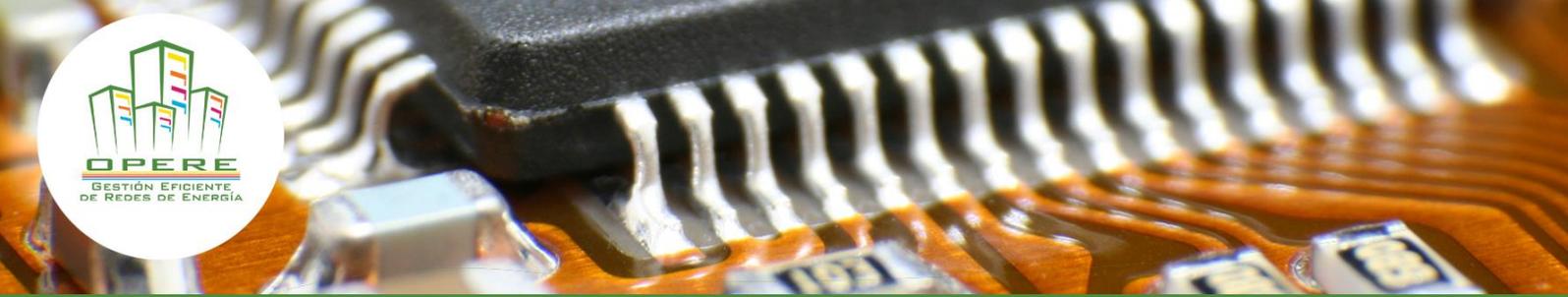
The final part of the presentation dealt with the possible migration of the system towards big data environments. It was found that, although it is not required in the context of this project, an evolution towards them is indeed considered necessary in a possible scenario of global management of the facilities of the University of Santiago de Compostela (hereinafter USC).

The JISBD sessions, organized by the University of Cantabria under the sponsorship of SISTEDES (Spanish acronym for Society of Software Engineering and Software Development Technologies), are reference meetings in the studies of Software Engineering and Data Bases of the Ibero-American area. Throughout the years, this forum has given the opportunity for researchers from Spain, Portugal and Latin America to present their work and to establish a solid community around both disciplines.

The presence of the OPERE project in this meeting was an opportunity to make the project known at an international framework, thus facilitating the exchange of knowledge and practical experiences related to information technologies applied to smart management of energy for the researchers involved.

More information about the sessions [here](#).





2 SECOND PANEL OF EXPERTS

The second panel of experts of the OPERE project, called Panel Networking, was held on October 21st 2015 as a part of the developed activities within action C.1: “Monitoring of the socio-economic impact of the project”.



In this edition, the panel has been assisted by 14 participants that represented five projects of the LIFE programme: New4Old, LIFE Smart Hospital, COOP2020, The Autonomous Office and Life OPERE, as well as institutions with great experience on management of European projects: the County Council of Ourense, the Council of Santiago and the Technological Institute of Galicia.

The purpose of the panel was to achieve the aims of the project: on the one hand, understanding the impact caused by the activities that result from the fulfilment of the project in its environment, and on the other hand, getting to know experiences of similar projects, as well as the exchange of knowledge and best practice.



The sessions were held in the facilities of the Technological Research Institute of the University of Santiago de Compostela. The first session started by presenting each of the participating projects. Later, a round table took place, where issues regarding on how to maximize the socio-economic impact of the projects in their environment together with the importance of their dissemination were discussed. Right after this, a visit to the pilot building of the OPERE project, Student’s Hall Monte da Condesa, was organized. The session finished with a networking meal.

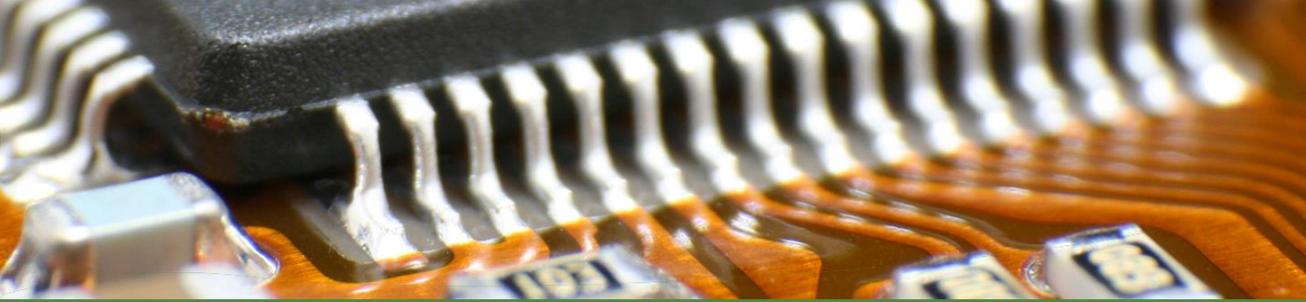
The partners responsible for the consortium LIFE-OPERE would like to thank all the experts for their attendance and active participation in the panel.

More information and access to the presentations [here](#).

3 COMPLETED IMPLEMENTATION ACTIONS

The renovation work and the start-up of the boiler house at Student’s Hall Monte da Condesa, the pilot building of the OPERE project, were both finished by December 2015. Even though the original project proposed a series of occasional remodelling in the pilot building, the preparatory actions lead to a comprehensive renovation of the installations that mainly consisted in the following thermal improvements:

- Replacing the existing boilers and the fuel (diesel-oil) for natural gas.
- Installation of buffer tanks.



- Improvement of the thermal energy recovery of the existing cogeneration process.
- Installation of new collectors and valves, as well as a high efficiency bomb together with energy and water accounting systems sectorized by areas.

The works carried out allow to improve the efficiency of the whole installation and to fulfil the diverse aims of the OPERE Project, related to the reduction of consumption and emissions, environment protection and cost saving and at the same time ensuring the supply and fostering a sustainable behaviour.

The main changes carried out are explained in more detail below:

Gas Installation and Boiler House



One of the measures taken to improve the energy efficiency of the facilities is changing the fuel used in the boilers. So far, thermal energy generating was done with conventional diesel-oil boilers which are replaced with natural gas; and 10 boilers with low performance are substituted by two high efficiency natural gas boiler bodies of 1148 kW, each of them with two units that can work independently. The aforesaid boilers have modulating burners as well. These allow adjusting the amount of fuel to be consumed for each moment according to the boilers needs, avoiding unnecessary gas consumption.

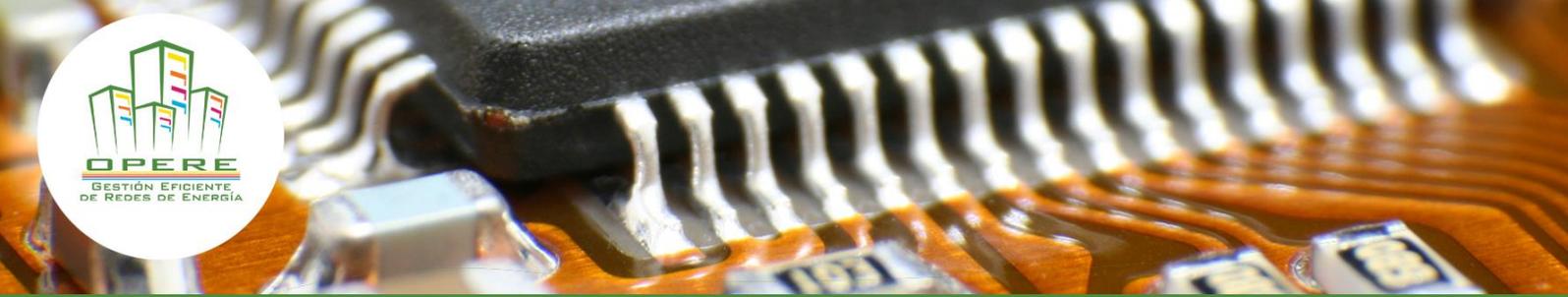
Important savings in terms of CO₂ emissions and financial costs are achieved thanks to this change. This is due to the fact that CO₂ emissions produced by natural gas are lower than those originated by diesel-oil and also to the high energy performance of the condensing boilers.

Battery Room



Ten new 5000-litre tanks were installed in this room, each of them with differentiated systems. Five are only inertia ones used to generate hot water for heating, and another five of inertia equipped with an internal heating coil meant for the production of hot water for sanitary use.

It should be emphasized that with this new system the production of hot water is instantaneous: through two corrugated stainless steel coils with their corresponding accumulators in their inside, cold water enters at the bottom of the coils and as it rises up through the inside, it gradually warms up until the water comes out on the top of the coils. Treatment against the legionella disease will not be necessary since the hot water tanks contain an internal coil. Anyhow, the operation of these tanks will follow the instructions mentioned in the regulation UNE 100-030:2005 IN, Royal Decree 865/2003 and Decree 9/2001 on legionella prevention.



Thanks to the incorporation of inertia accumulators and the production of immediate hot water, a great volume of water is generated. This allows a better use of thermal energy recovery from the cogeneration.



Improvement of the Thermal Energy Recovery of the Cogeneration Motor

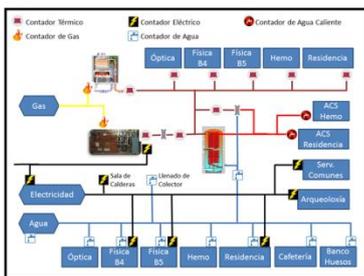
It was necessary to increase the exploitation of the thermal energy that the cogeneration machine produces to improve the efficiency of the same. Therefore, and besides increasing the accumulation volume as explained earlier in the previous section, an adjustable speed drive was installed in the bomb of the secondary circuit. This allows adjusting the flow in order to achieve the required set temperatures.

The usable thermal energy of the cogeneration installation is done in two stages:

- In the liners → 190 thermal kW.
- In the fume recovery system/machine of the chimney → 129 thermal kW.

This way, we obtain a cogeneration energy that can reach 319 thermal kW.

Development of the new Smart Grid and Monitoring System



New Smart Grid

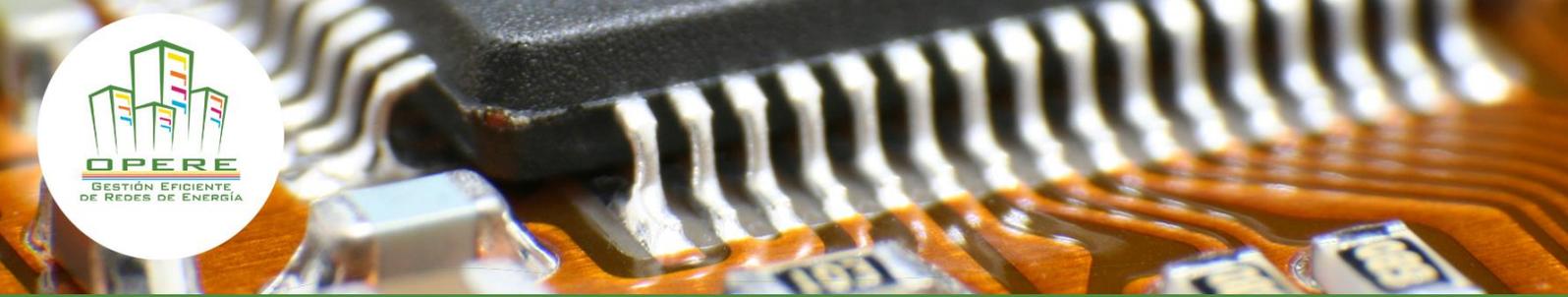
The execution of the works implied to reprogram the automatons that control and adjust the technical rooms, as well as an adaptation of the layers and of the acquisition model of the system that evolved in this action, from the first version 0.1 to the 0.3 one.

As opposed to the traditional SCADA used in the USC before the OPERE project was implemented, this new developed monitoring system can store historical data that can be put as time series into a graph. It consists of a complex monitoring system that includes automatic supervision mechanisms, advanced diagnosis tools and information analysis. It is based on a 3 layer architecture with the following software modules:

- Acquisition and data storage module.
- Use of data module.
- Visualisation and analysis of data module.

The system allows the data storage on a 10-second frequency for synchronous signs, applying the mechanism by COV (Change of Value) for asynchronous signs (the new value is notified when it has changed).

The system was initially implemented in the pilot building *Monte da Condesa*, as well as in other three buildings of the USC: Student's Hall Cadarso, Faculty of Physics and CITIUS (acronym in Spanish for ICT Research Centre).



4 LOCAL DIALOGUE FORUM: SMART CITIES AND ENERGY



As part of the activities of Action D.5 “Dissemination and Transfer Events”, the OPERE project organized on November 26th 2015 the “Local Dialogue Forum: Smart cities and Energy”.

The meeting had a technical nature and was organized in collaboration with the European Project PLEEC (Planning for Energy Efficiency Cities) as part of the Programme FP7. The topic of the session focused on SmartCities and Energy Efficiency.

The Forum set the following aims:

- To analyse the current strategies of energy management in smart cities.
- To present different European projects about energy efficiency.
- To analyse the future trends regarding energy saving and energy efficiency.



The sessions were celebrated at the main lecture hall of the Faculty of Mathematics- Campus Vida of the USC. Approximately 50 participants from different spheres attended the event: technological institutes, public administration, business sector, researchers, USC teaching staff and students.

During the event, the concept of smartcity was presented. This term includes six main areas that were explained: environment, economy, mobility, citizens, life quality and government and administration. Related to these fields the following were addressed in further detail: the energy planning of cities, the future of the mobility at urban area, the planning of the lighting in a smartcity and also ICT innovation applied to energy efficiency.

Later on, several projects developed in the field of the planning along with the continuous improvement for the efficiency of the cities were presented. In addition the PLEEC and OPERE projects, both the organizing committee, were introduced.

The forum ended with a round table moderated by Oriol Sarmiento, Dean of the Galician Association of Industrial Engineers, during which the different visions about the future of Smartcities in Spain as well as at European level were debated.

Once the Forum had finished a technical visit to the OPERE project pilot building and its thermal installations took place.

More information and access to the presentations [here](#).





5 THE EUROPEAN COMMISSION'S VISIT AT THE OPERE PROJECT



In June 2016 the OPERE Project received the representatives of the European Commission in order to carry out the financial-technical monitoring of the Project. At the meeting, celebrated in the facilities of the University of Santiago de Compostela, everybody in charge of the OPERE consortium were present: the technological centre Energy lab and the University of Santiago.

The meeting enabled to present in detail the progress of the project and its status of implementation, as well as the actions that are taking place to address the final stage, focusing on the data analysis and the results, together with the optimization of the system that will allow the fulfilment of the set goals of the Project.

We must point out that, up to the date of the visit, the OPERE project had developed 67% of the technical actions and had achieved more than 60% of the established indicators, monitoring a total amount of 12 buildings, in comparison to the three established at the beginning.

6 CONTACT INFORMATION

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