



**RESSEEPE NEWSLETTER**  
ISSUE 03 - November 2015

# PROJECT SUMMARY

# RESSEEPE NEWSLETTER

## RESSEEPE

RETROFITTING SOLUTIONS AND SERVICES FOR THE ENHANCEMENT OF ENERGY EFFICIENCY IN PUBLIC EDIFICATION

rESSEEPE will bring together design and decision making tools, innovative building fabric manufacturers and a strong demonstration program to demonstrate the improved building performance through retrofitting. The core idea of the rESSEEPE project is to technically advance, adapt, demonstrate and assess a number of innovative retrofit technologies. Reductions in the area of 50% will be achieved in terms of energy consumption. A systemic process will be also implemented that will allow the selection of the best possible retrofitting mix, customised to the needs of the particular building.

INNOVATIVE TECHNOLOGIES AND MATERIALS TO BE INTEGRATED IN THE RETROFITTING PROCESS

- Envelope Retrofitting: Ventilated Facades, Aerogel-based Superinsulating mortar, Wooden Insulating Wall Panels and VIP Panels.
- Integration of RES: PV Energy, Thermal Collectors
- Energy Storage Systems: Thermal storage and PCMs
- Nanotechnologies and smart materials: EC/PV Windows
- ICT: Strategies at building and district level
- Intelligent Building Controls: HVAC systems

THE SCIENTIFIC AND TECHNICAL OBJECTIVES OF THE RESSEEPE PROJECT ARE THE FOLLOWING

- To set up a diagnosis methodology for an integrated renovation of public edification at building and district level.
- Innovative development and enhancement of retrofit technologies that will be able to achieve energy savings in the area of 50%.
- Development of a systemic view for selection of the most empowering retrofitting mix: Net-zero energy renovation of existing public districts.
- To validate the RESSEEPE technologies in three different demo-sites.

## DEMO SITES

The RESSEEPE technologies will be validated in three different demo-sites:

- Coventry (UK)
- Skellefteå (SE)
- Barcelona (ES)

Image (Right): Coventry's demo site; (Coventry University).



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## PUBLICATIONS

**1. SAKKAS, N. AND KALTSIS, E. (2014) A METHODOLOGY FOR INTRODUCING M&V ADJUSTMENTS DURING AN ENERGY RETROFIT IMPACT ASSESSMENT.** Open Journal of Energy Efficiency, 3, 77-84. doi: 10.4236/ojee.2014.33008

This paper introduces a conceptual framework for taking account, in the retrofit impact assessment, of three external parameters: weather, indoor comfort and space occupancy. The broader strategy behind this work is to develop a comprehensive methodology that would allow a cost efficient, fast and accurate assessment of energy retrofits in buildings.

**2. RESSEEPE, A NEW CONCEPT OF REFURBISHMENT THAT CAN REDUCE BUILDING ENERGY CONSUMPTION BY 50%** number 518 in January 2015 of the technical review CIC Arquitectura y Sostenibilidad.

The article about the RESSEEPE project in the number 518 in January 2015 of the technical review CIC Arquitectura y Sostenibilidad (a professional publication in the Construction sector) gives an overview of the Resseepe project focusing on the importance of refurbishing the existing buildings to meet energy reduction targets, providing data from IDAE (the Spanish Energy Agency) about the characteristics of the building stock and energy consumption in the construction sector in Spain. It also highlights the new concept of energy-efficient refurbishment introduced by RESSEEPE where building is conceived, not as a whole made up of independent parts, but as a whole of interrelated parts that need to be analysed together to find the best solution to their energy problems. The article also shows the demo-sites and the potential refurbishment strategies to be developed in them.

## RETROFITTING WORKS IN HOSPITAL DE TERRASSA: STREETLIGHTS REPLACEMENT AND WINDOWS REPLACEMENT

As scheduled, part of the retrofitting works to be carried out in Hospital de Terrassa in the frame of RESSEEPE project was finished. Regarding the energy efficiency measures for the improvement of the envelope, a total of 60 old windows were replaced by high efficiency windows on 3 hospitalization wings on the 8th and 9th floors. The old windows were single-paned with aluminium frames without thermal breaks. The new windows are argon-filled double-glazing with low emissivity and solar protection, and with aluminium frames with thermal breaks. In addition to energy losses reduction achieving, user comfort was improved.



Figure 1: Hospital de Terrassa: windows replacement

Regarding the measures to reduce electricity consumption, a total of 72 old sodium vapour streetlights were replaced by LED lights throughout the parking area, achieving direct energy savings around 70% per luminaire, while at the same time the quality of the exterior lighting was substantially improved.

**Impact:**  
Part of the foreseen works to be carried out in Hospital de Terrassa by CST has been finalised successfully as scheduled, therefore post-retrofit data collection related with such works will take place from now on, in order to demonstrate whether energy savings follow RESSEEPE project objectives.  
**Contributor:** Jaume Madrid - CST

## RESSEEPE EUROPEAN PROJECT: BIENNIAL MEETING

On the 23rd, 24th and 25th of June the biannual meeting of the European Project in Energy Efficiency RESSEEPE took place at Catalonia Hotel in Sabadell. This meeting coincided with the halfway point of the four-year project. Miquel Villalba and Jaume Madrid from CST, which is one of the four demo-sites involved in the project, attended the meeting, as well as other representatives of the partner organisations from different countries of the European Union. The first day of the meeting was spent in dealing with administrative, organisational and planning issues, creating working groups to discuss different topics. The second day a thorough review of the status of the tasks of each one of the Work Packages comprising the project was made. The third day, an expert on patents held a workshop dedicated to the exploitation of potentially marketable “products” that might result from the European Project.



RESSEEPE EUROPEAN PROJECT: Biannual Meeting

**Impact:**  
As internal dissemination activity, CST published a notice in its internal digital magazine regarding the 24M meeting in Sabadell. This magazine is addressed to CST personnel, which means it is sent to 1720 e-mail addresses.  
**Contributor:** Jaume Madrid - CST

## STAKEHOLDER ENGAGEMENT WORKSHOP – SUSTAINABLE PLACES 2015

One of the four stakeholder engagement workshops was held in Savona, Italy on Thursday, September 17, 2015, entitled ‘WS04 Innovative Retrofitting Activities’. This was developed in partnership with Three European Union funded projects which include RESSEEPE, A2PBEER and BRICKER. All the 3 projects are district scale retrofit project with elements of demonstration activities. Redondo Pierre from Polylogis presented the ethos of the project and the progress so far on behalf of RESEEPE project. The workshop was chaired by Guilia Barbano (IES) and Evangelos Kaltsis (APINTECH) acted as the rapporteur. The workshop was also attended by other RESEEPE partners, Abdullahi Ahmed (CU), Patricia Pérez Rodríguez (OHL), Elena Arredondo Lillo (OHL), Marta Garcia (OHL), Matthias Schuss (TUW). The three projects presented their ethos and the progress so far. The fact that the three projects are very similar in terms of their ethos (innovative district scale retrofit) and methodology (prototyping and demonstration activities), makes this workshop a very important platform for sharing ideas and ways to avoid potential future risks in project delivery and exploitation.



**Impact**  
The discussions at the workshop highlight the need for robust stakeholder engagement throughout the project life cycle and in particular at the early stages to get buy-in from important stakeholders such as building owners, users and building facilities managers. In conclusion we agreed that stakeholder engagement is essential for effective social, economic and environmental exploitation of the benefits of these projects. The workshop was attended by about 30 participants from academia and industry. The presentations have been publicized on the conference website which have the potential to reach a wider audience within the EU community. See below the links for workshop presentations and conference proceedings.

Links: [Link 1](#), [Link 2](#)

**Contributor:** Abdullahi Ahmed – Coventry University

## FINAL ASSEMBLY OF PHOTOVOLTAIC (PV) POWERED ELECTROCHROMIC (EC) WINDOW PROTOTYPE

The concept design of the lab-scale PV powered EC window prototype, dimensioning and characterization of each individual component was accomplished within Task 3.3: Solar strategies for energy and heat recovery. Detailed description can be found in deliverable D3.2: Report on energy conservation strategies. The manufacturing of components, validation of the functionalities and final design and assembly has been carried out within Task 5.8: Manufacture of Prototypes for renovation solutions and integration in the lab-building platforms. The preliminary evaluation was previously presented in the newsletter of June 2015. In this communication we report the main results of the final design and assembly of the prototype. The control of transparency is made according to a communication protocol based on the master/slave network architecture. The control unit acting as master provides the interface between the end-user and the EC window through a wireless communication protocol. It allows the command of the desired colour state and access to information about the actual status of the relevant parameters of the window (temperature, voltages, currents, last state of the window). The results of the final implementation and encapsulation are shown in figure 1.

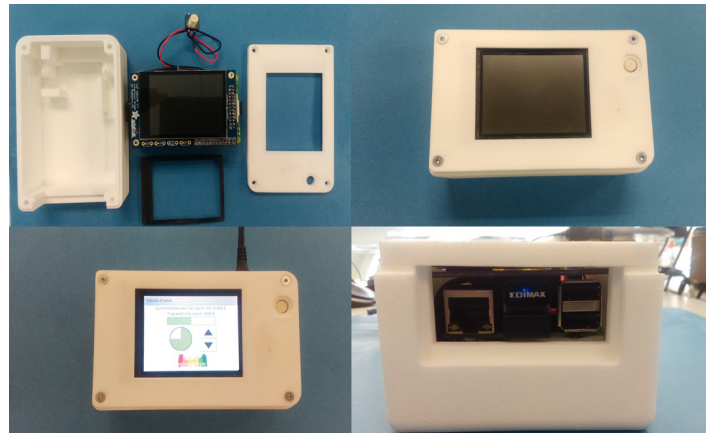


Figure 1: Final Implementation of the user interface

The PV module was encapsulated under the requirements of electrical insulation, barrier against atmosphere moisture and PV to be interchangeable. The prototype is formed by a rigid part to provide structural strength and a flexible part that surrounds the back and the laterals of the PV module to ensure isolation once the cage is tightly closed. The visual description is depicted in figure 2.

The manufacturing methodology considers the concept CAD design and validation using rapid prototyping techniques such as Fused Deposition Modelling (FDM) to validated tolerances and Selective Laser Sintering (SLS) to produce the functional prototype.

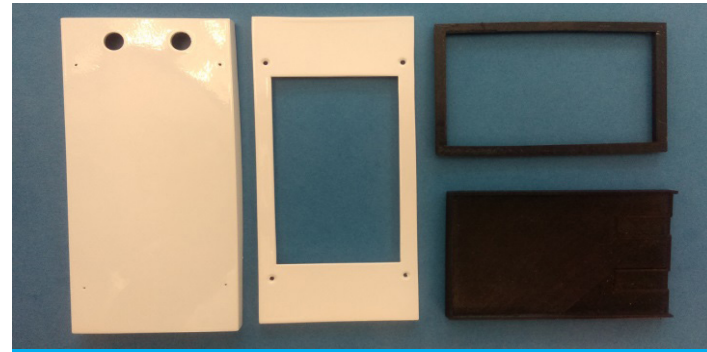


Figure 2: Encapsulation of the PV module

The integration of the EC window, battery and window's control unit has been performed through a PVC frame. It hosts the electronic components and provides access through the rear part of the window. It was designed under accessibility requirements in case of electric failure such as faulty batteries that need a replacement or reset the electronic. Figure 3 shows (left) the wiring configuration of electronic components and (right) the final assembly and appearance of the prototype, where the PV module is attached to the front side. Its wires are accessible from the rear part where the electrical connection to the electronic board is also performed. In conclusion, the final design and assembly of the PV powered EC window prototype is successfully implemented. Optimization of the configurations and long term performance analysis under outdoor conditions will be performed within Task 5.9: Testing of renovation solutions at lab scale.



Figure 3: Integration of the EC window, battery and window's control unit

### Impact:

The concept ideas of PV powered EC device and stand-alone PV powered EC window has already been patented by the Midwest Research Institute in 1992: US005377037A and WO 94/11778 respectively. However, no large size device is currently in the market and just SAGE Electrochromics, Inc. is currently developing this solution. The concept idea about the PV powered EC window prototype has been successfully proven within the RESSEEPE framework at laboratory scale and detailed evaluation under real weather condition will be performed in subtask 5.9.

Contributor: Rubén Roldan – EMPA

## 12TH INTERNATIONAL VACUUM INSULATION SYMPOSIUM IVIS2015

Va-Q-tec AG presented a Key Note Lecture at the 12th International Vacuum Insulation Symposium, held from the 19th-21st of September in Nanjing, China. The paper entitled "Methods for Evaluation of Thermal Conductivity Increase of VIPs" discusses the determination of Service Life Time of VIPs. In order to determine the mean thermal conductivity of VIPs during service life time a common procedure is accelerated aging by storing VIPs at elevated temperatures with and without humidity. Increase of thermal conductivity, water intake and gas pressure is measured during storage. For evaluation of the results data on the relation between thermal conductivity and gas pressure, the influence of water content on thermal conductivity (for silica), the absorption isotherm of core material (silica) or dryer and wetter capacities have to be known. As usually only small variations of thermal conductivity can be detected, a detailed evaluation of the measurement methods and their potential accuracy is necessary. The paper reports on results of measurements on various barrier films and core materials. Advantages and disadvantages of different methods including fast measurement procedures are discussed.

### Impact:

Presented research has impact on the European standardization efforts for VIPs in building industry (CEN TC 88 WG11)

Contributor: Kenny Rottenbacher – Va-Q-Tec

## CONCREEP-10 "MECHANICS AND PHYSICS OF CREEP, SHRINKAGE, AND DURABILITY OF CONCRETE AND CONCRETE STRUCTURES"

TECNALIA participated in the conference CONCREEP-10 "Mechanics and Physics of Creep, Shrinkage, and Durability of Concrete and Concrete Structures" which took place in Vienna, Austria on the 21-23 September 2015. With a history going back to 1958, the CONCREEP conference series has remained the key driving force when it comes to gathering prominent scientists and engineers from around the world to discuss the peculiar time-dependent behaviour of one of the oldest and most used, yet at the same time least fundamentally understood construction materials: concrete. TECNALIA gave a presentation entitled "Energy efficient cement-based building materials" in the session: Nanotechnology applied to concrete.

Contributor: Eunate Goiti and Ana Huidobro – Tecnalia



### LET'S GET IN TOUCH



[www.resseepe-project.eu](http://www.resseepe-project.eu)



[ab2188@coventry.ac.uk](mailto:ab2188@coventry.ac.uk)



RESSEEPE



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@RESSEEPE