



THE4BEES :
behavioural changes and digital tools

PROJECT SHEET



PROJECT OVERVIEW

THE4BEES is a project based on the observation that energy consumption is strongly influenced by the behaviour of the building occupants, regardless of the building structure and type. Therefore, in order to achieve energy savings in public buildings, it is essential to make the users aware of their usages and energy consumption and to support them to reduce it.

In Auvergne-Rhône-Alpes, the project allowed to test methods and tools to encourage the users of educational buildings to make energy savings. During almost three years, several actions have been carried out, by AURA-EE and HESPUL in relation to psycho-social sciences and the digital field, in two pilot high schools in the urban area of Lyon: the Aragon high school in Givors and the Condorcet high school in Saint-Priest.

 **OBJECTIVES**

- ∞ Raise the awareness of public buildings users about ecological behaviour
- ∞ Reduce the energy consumption in the targeted buildings
- ∞ Improve the policies related to carbon emissions reduction and land use planning

ACTIVITIES 

- ∞ Implement engaging techniques related to psycho-sociology for building users
- ∞ Test awareness tools and digital tools for reducing energy consumption in classrooms
- ∞ Provide recommendations for managers of public buildings and for teachers



INVOLVED ACTORS

- ∞ The Auvergne-Rhône-Alpes Region
- ∞ The supervising staff, teachers and students of the Aragon and Condorcet high schools
- ∞ Students and teachers of the Master programme in social psychology at the Université Lumière Lyon 2
- ∞ Companies that supply digital technologies (Greenpriz, DBM Technologies)
- ∞ Cabinet specialized in psycho-sociology SPYKOLAB
- ∞ HESPUL

BUDGET



2,7 M€

allocated to 14 European partners

DURATION



**December 2015 -
december 2018**



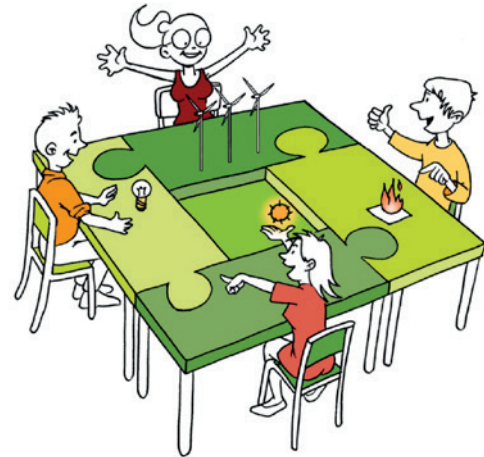
TARGETS

This project addresses to managers of public buildings who want to set up actions that involve the building users and raise their awareness about energy saving. It is also addressed to teachers who want to make educational actions with their students on energy consumption in educational buildings.

ACTIVITIES CARRIED OUT

► Raise the awareness of the building occupants about a more eco-friendly behaviour

In Auvergne-Rhône-Alpes, the project team focused on raising the awareness of high school students about energy savings. Different methodologies for involving the building users have been tested: co-creation workshops (“CC Labs”), training made by the students of the Master programme in social psychology (Université Lumière Lyon 2) for the high school students, setting-up tools that facilitate the behavioural changes (see below), online questionnaires to better understand the representation modes and attitudes of high school students, before and after the awareness-building periods.



► Set up tools to reduce energy consumption in the classrooms

By using display tools and digital tools, the target groups made of high school students and teachers were encouraged to reduce their energy consumption in the classrooms they were using.

- **Engaging posters** were produced with a group of high school students, in the places where they were able to take action. The project focused on electrical consumption (lightening, computer equipment...) and on air quality, in order to encourage turning off lights and electronic devices, and the opening of windows in case of discomfort. The actions to reduce the heating consumption were not considered, as the students did not have access to setting the radiators.
- Digital tools were proposed to the students, answering to the need to visualise their impact on energy consumption:
 - > Connected objects (temperature, luminosity, humidity, CO₂ and VOC recorders and power consumption recorders) were installed in each high school (two rooms per high school);
 - > A web dashboard was proposed for monitoring the evolution of the parameters and for their sharp analysis;
 - > A mobile application allowed showing to the students the real time values obtained from the sensors (CO₂ rate, temperature), giving examples of the behaviour to adopt in order to avoid energy waste (“tips and tricks”) and collecting information about the occupants’ feedback in terms of comfort.

► Improve the policies related to carbon emissions reduction and land use planning

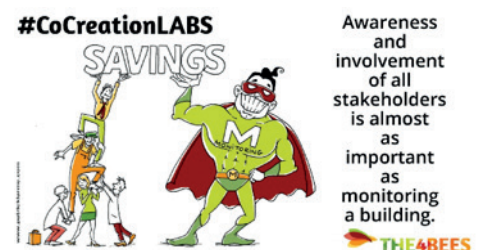
- The evaluation of the actions carried out in the two pilot high schools allowed to formulate recommendations for the Energy plan for high schools, led by the Auvergne-Rhône-Alpes Region.
- In parallel, to meet the expectations of the teaching staff, an education kit for teachers wishing to replicate the project’s experience was produced by AURA-EE and HESPUL at the end of 2018.



MAIN LESSONS LEARNED FROM THE PROJECT

► Involving the building users in energy saving actions leads to a positive change of behaviours

Thanks to the implementation of collaborative actions that involve building users, it is possible to modify the representation modes about energy and the behaviours related to energy uses. Therefore, the actions carried out within this project (training on behavioural changes, working in co-creating of nudges and posters, animating workshops on good practices, etc.) showed that they encourage energy efficiency.



▶ Designing, with the building users, digital solutions for energy monitoring is a way to engage them in environmental issues

#BENEFITS



Digital solutions designed for and by users contribute to energy and CO2 savings, comfort and health improvement.



The technical solution tested in the project (open source programs available online, boxes with sensors and developer guides, web dashboard source code and mobile application, Greenpriz teaching kit) can be used as a teaching aid to set up practical work with students. The pedagogical kit also describes the participatory methods that have been used and that are reproducible in other schools.

▶ Installing measuring instruments and displaying real time results is an awareness tool that challenges the users

The implementation in buildings of visible measuring tools challenges the users. It is useful to add posters with explanations about their role and how to use these tools. It has also been shown that displaying the information resulting from measuring instruments participates to changing user behaviour. In particular in high schools, teachers and students suggest using the existing display devices (tablets in classrooms, TV screens, Pro-note tool) rather than developing specific applications and websites that they cannot always use in the high school area (students are not allowed to use their smartphone in class).

#NUDGES



▶ An approach for raising awareness and involving the users has to be conducted as a continuous improvement process



An approach for raising awareness and involving the users has to be considered as a continuous improvement process. The users who have been involved need to see that things are changing over time. Therefore, regular information for building users must be planned through an adapted communication plan. Also, messages, posters and nudges have to be updated regularly. Another important element is the following: the feedback from users has to be seriously taken into consideration for improving the proposed tools and the users need to be informed about this adaptation.

▶ To properly monitor the energy in a building, it is necessary to set up an alert system in case of a consumption peak or sensor failure

In the implementation of an energy monitoring system in a building, it is necessary to set up an alert tool in case of a consumption peak and/or sensor failure. If this is not the case, the corrective actions will be done with a lag time and will need important human means. In order to better analyse the possible drifts, it can also be useful to add additional equipment to the system (such as temperature and consumption recorders), that can be installed in rooms or on specific equipment. Sometimes, the follow-up of particular uses (for example, the lighting of a room) can require the installation of boxes in the electric boards. This demands an electrical authorisation and an appropriate installation, which have to be anticipated.





DOCUMENTS PRODUCED



« Involving the students in an educational project about energy saving: digital and psycho-social tools »

Education kit for teachers developed by AURA-EE and HESPUL.

Dec 2018

<https://bit.ly/2Cioz5K>



« Technical recommendations for the instrumentation of a public building »

Update of the website guidenergie.fr.

Dec 2018

<https://bit.ly/2A1LYH7>

« How to involve high school occupants in energy saving actions? »

Update of the website guidenergie.fr.

Dec 2018

<https://bit.ly/2ECI50e>



« Impact of users in energy consumption of public buildings »

Video presenting the involvement of students in the two French pilot high-schools: Condorcet in Saint-Priest and Aragon-Picasso in Givors.

July 2017

<https://www.youtube.com/watch?v=3mxAqpV8-3E>



FUTURE PROSPECTS

▶ Taking into account building users

THE4BEES has shown that co-construction, by narrowing the gap between tools and users, could be a driving force for behavioural change. However, the pilot initiative that was undertaken was limited in terms of timing (two six-month test periods), target (two classes actually involved in the actions) and space (two high schools out of 300 in the Auvergne-Rhône-Alpes region), and thus it had a limited impact on energy savings. The participating students, however, confirmed that they changed their behaviour, during testimonial sessions organized at the end of the project.

▶ A device to evolve

For a real impact of these actions on energy savings, the approach has to be complemented. First of all, the measurement issue has to be correctly considered. The lessons learnt from THE4BEES (the need to set up an alert system, using mobile recorders for a better consumption analysis,...) should allow to obtain better quality data sets, which was not the case of the experimentation conducted in the two pilot high schools. Then, it could be envisaged to extend the actions to other themes, such as health or food: How a good use of space is better for my health? How can I help to reduce energy consumption with my eating habits? (in line with the season and the place one lives)

▶ New work related to the dissemination of good practices and messages between peers

In a second phase of experimentation of this project, in the high schools Aragon in Givors and La Martinière in Lyon, work could be done about the means to disseminate good practices and peer-to-peer messages. These actions could be considered in order to embed the change and with the same approach that encourages users to become responsible actors. For example, the regional scheme of “Sustainable development agencies for high schools” could be an opportunity to develop this approach. In order to improve the consumption monitoring, advanced practical work could be organized with scientific and technical classes, including the display of results in the high school website, the organisation of festivities around the progress of the project that is led by the high school students themselves, occasions to exchange ideas and competitions between high schools...

▶ Better consideration of users in the specifications for the renovation of high schools

Finally, this type of approach, involving users and encouraging them to save energy through actions for behavioural change and digital tools, could be detailed in the specifications for renovating high schools.

TO FIND OUT MORE

- The project website: <http://alpine-space.eu/projects/thefourbees/en/home>
- The website for energy management in high schools: guidenergie.fr
- AURA-EE website: auvergnerhonealpes-ee.fr
- HESPUL website: hespul.org
- Twitter: [@eu_THE4BEES](https://twitter.com/eu_THE4BEES)

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Project sheet made
by AURA-EE

Drawings made
by HESPUL

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