



eTEACHER

Empowering Energy Education

Welcome to the second edition of the eTEACHER project newsletter!



We are about to complete our first half of the project. After 16 months of hard work, we are glad to see how our vision of changing the behavior of buildings energy users is taking shape, through a set of empowering ICT tools to facilitate energy interventions.

The main focus of the first project year was the development of social studies about the users of our 9 pilot buildings located in the UK, Spain and Romania to understand energy behaviour of buildings' users and identify key aspects of behavioural change. In this regard, we conducted a number of sites visits, surveys and workshops which have shown valuable findings. We are proud of our social experts who translated the findings of the social studies into worthy recommendations for the design of eTEACHER empowering tools. Now, we are deep inside our second project year whose main goal is the implementation of selected empowering tools. Some of these tools are: What-if Analysis to identify energy conservation measures based on behavioural change, data processing for the analysis of the energy system performance and the assessment of indoor quality, universal communication interface, dashboard and an App. Besides, our demo sites have been preliminary characterized and we are now fully engaged in the monitoring activities, in the different pilots, which will be key to complete such characterization to provide data to our empowering tools and to evaluate the behavioural change at the last stage of the project.

Since our last newsletter, the consortium met in Merida in November 2018 for a Project Progress Meeting where partners worked on and discussed about the implementation of eTEACHER tool-box and the monitoring system of the pilot buildings. In addition, we all took part in an exploitation workshop focused on Business Models. In this issue, you will be able to learn about the three pillars of our project: our Social Researchers findings, our ICT tools and our pilots. Don't forget to check out our [website](#) and use the [social media](#) to inform your network about our interesting news!

Dr. Noemi Jiménez-Redondo
eTEACHER Project Coordinator

BEHAVIOURAL CHANGE



[User engagement is key to a positive energy behaviour change.](#)

Energy use in buildings depends upon the fabric of the building, the services within the building, the building users and the wider context. **A significant influence comes from individual and social factors**, such as norms of behaviour, the ability and agency for using energy systems in the building, and the users' understanding of how energy systems work. This often means that energy use in buildings can vary dramatically from one building to the next; even between those of similar construction. Given that eTEACHER involves 12 different pilot buildings, including residential buildings, schools, health care centres and offices, located across three different European countries, with a range of different user types, the factors influencing energy use in each of these pilot buildings will differ greatly. Therefore, consideration of all these unique factors needs to be taken before implementing any energy use intervention.

Over the past year the eTEACHER project has carried out a number of social studies aimed at identifying the key behavioural factors influencing energy use in each of the eTEACHER pilot buildings. This involved collecting data on the building design and current energy systems in place, but also data on the users' energy-related needs and whether these are being met; users' understanding and use of energy controls and interfaces in practice and building users' motivations towards change and their ideas for improvements within each building. Behaviour change literature emphasises **the need to design behaviour change interventions around specific behaviours undertaken by specific actors in a given context. Therefore, an important part of understanding more about the building users was to identify the best user groups, and the associated energy-related behaviours, to target with the eTEACHER interventions.**

Broadly, the social studies looked to understand the issues affecting building users' capability, opportunity and motivation towards changing energy-related behaviours. In particular, the context of behaviours (i.e. the "opportunity" to do it) in pilot buildings, as this can be a highly significant influence, the impact of which is often under-estimated. The social studies uncovered a range of building-specific issues, such as challenges of achieving thermal comfort in many of the buildings and common wasteful behaviours being exhibited such as leaving lighting, electronic appliances, heating/cooling systems on when not needed and inefficient use of windows and doors. **This helped to create a categorisation of energy-related issues on which eTEACHER could focus on, across all of the pilot buildings: lighting use; thermal comfort; appliance use and engagement with the eTEACHER tool. User engagement is key for eTEACHER as it will ultimately determine the success of the final tool.**

As such, it is important that the eTEACHER tool is appealing to the building users and can fit with the current existing practices in each building. Research has shown that **engagement with new technology is often linked with users' perceptions of it: will this technology benefit them; will it make their life easier; make tasks quicker and make users' understand things clearer?** Since the eTEACHER project aims to develop an ICT-based tool which empowers building users to change their energy related behaviour, it was important to understand what building users' wanted from an ICT-based tool. **Workshops were held in all of the eTEACHER pilot buildings to consult building users in order to identify their current engagement with ICT and their interest in various approaches to engagement.**

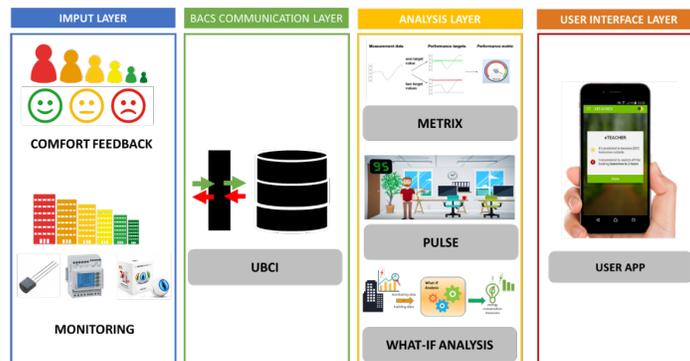
These workshops led to conclusions on how to deliver the eTEACHER tool, including developing a single web-based app for all users (accessible via multiple devices) and using gamification principles to promote engagement rather than framing eTEACHER as a game for users to 'play'. The resulting recommendations for the design of eTEACHER, also rely upon further user engagement. For example, **app-based challenges may motivate behaviours to form daily habits to turn off appliances, but the specific wording of such challenges can benefit from testing with users. Continued engagement with building users throughout the project will help develop and implement a tool which works for the users across all pilot building, saving energy and empowering users.**

The eTEACHER's social studies have generated recommendations for the design and implementation of the eTEACHER tool. One tool which can be accessible on different platforms; focused on enabling users to change their current lighting use, thermal comfort and appliance use behaviours; facilitating communication between building users; customisable to users' individual preferences (through layers of information) and using gamification elements instead of being a playable game. The project is now in the exciting depths of developing the eTEACHER tool based on the outputs of Year 1, and throughout this development the building users shall be consulted on different elements of the tool design, ensuring eTEACHER develops a tool which takes the building fabric, energy services and the building users all into consideration.

eTEACHER TOOLS

eTEACHER empower tools

The Empower tools are a set of information and communication technologies that aim to encourage and enable energy behaviour change of building users to save energy and

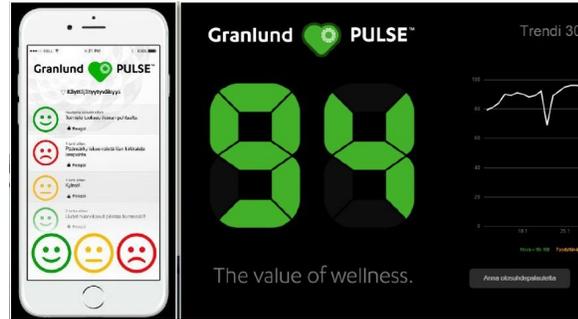


optimise indoor environmental quality. eTEACHER empower tools have a BACS (Building Automation and Control System) communication layer, an analysis layer and a user interface layer with following interfaces and services:

- **UBCI is an universal BACS communication interface** whose mission is to collect, and store monitoring data from buildings and facilities.
- **Metrix is a data processing service** aiming to transform inputs from sensors data in buildings into performance metrics on energy and indoor environmental quality by comparing actual measurements with predetermined targets.
- **Pulse is a digital service that analyses end-user feedback on indoor environment quality** and its relation to buildings' systems performance.
- **What-if analysis (WiA) is a service that identifies energy conservation measures based on behavioural change of building users** by processing monitoring data and by taking into account building and facilities features.
- **The Users' Application provides tailored advice on energy savings and indoor environmental quality** based on the analysis of the above mentioned services. It uses gamification methods such as notifications and missions, bonus system, energy literacy and energy visibility to encourage end-users on behavioural change.

eTEACHER building analytics tools

[Granlund](#) is developing web-based building analytics tools and methods where building performance and users feedback are combined and represented through a single PULSE score.



This way we can better understand people's level of comfort, energy consumption in the building with the building functionality and make the necessary adjustments. Building users can provide user feedback via the web-based user interface or through feedback buttons.

Metrix is aiming to transform inputs from sensors data in buildings into a performance metric by comparing actual measurements with predetermined targets from three different perspectives, system energy efficiency, indoor air quality and functionality.

Pulse value combines the performance metric of a building with user feedback into one wellness score.



PILOTS' CORNER



[Focus on Nottingham: energy challenge for students and managers](#)

The eTEACHER project has 12 pilot buildings located in Spain, UK and Romania that have been visited and preliminarily characterised by our team. In this issue, we will focus on UK pilots which are coordinated by our partner [Nottingham City Council \(NCC\)](#): the [Djanogly City Academy](#) and the [Nottingham Council House](#).

Djanogly City Academy (Djanogly) – UK

“Djanogly City Academy” is a school with space for over 800 students that was built in 2005. The building has 9163 m² and is on the edge of Forest Recreation Ground. The Academy’s design exploits this natural setting, with full height glazing to draw the landscape into the building and wide terraces, sheltered by a canopy of brisesoleil. A simple rectangle on plan, the teaching spaces extend from a long central atrium.

This academy is a modern building with monitoring and control technologies. Its energy sources are electricity and natural gas. The heating system consists of gas boilers, supplying hot water to underfloor heating, and radiators. The cooling system consists of electric chillers supplying cold water to the ceiling. It also has Air Handling Units and automatic windows for ventilation. The main appliances are computers, printers and projectors. The potential eTEACHER users are managers, teachers and students. The target behaviours identified are the use of: windows and blinds, appliances, lighting, temperature set-points for cooling and valve control for heating.

After a number of visits and a preliminary characterization of the building, the Nottingham City Council, supported by eTEACHER coordinator CEMOSA, is currently working on the monitoring system which will provide more information for



the building characterization and input data to eTEACHER empower tools. The monitoring system will collect information about lighting, cooling, heating and appliances consumption at building level. At classroom level, windows opening, presence, lighting level, temperature, humidity, CO2 level, lighting consumption, appliances consumption and radiators temperatures will be monitored.

Nottingham Council House (NCH)

This building is the Council House in central Nottingham . It was built in 1927 at a size of 5862 m2 and is an important part of the city's heritage. Due to its age and complexity it poses a big challenge regarding energy efficiency improvements, monitoring energy parameters and integrating ICT solutions. The main function of this building is providing administrative services for citizens, weddings and other kind of official events.

The Council House has a rectangular shape and 7 floors. The energy sources are electricity and district heating. The water from the district heating is distributed with radiators, convectors and some Air Handling Units. The main appliances are computers, printers and electric radiators.

The potential eTEACHER users are energy managers, staff, cleaners and security officers. The target behaviours identified are the use of: windows, appliances, lighting and radiators. The monitoring system, which is being currently deployed, will collect information about lighting and heating consumption at building level. At office level, windows opening, presence, lighting level, temperature, humidity, CO2 level, lighting consumption, appliances consumption and the use of radiators will also be monitored. Information collected by the monitoring system will be used to complete the building characterization and as inputs for eTEACHER empower tools.

NEWS

[A 2,000 years step back in history: eTEACHER gathers at the Roman city of Merida.](#)

The 3rd progress meeting took place on the 27th and 28th of November among the Roman ruins of the city of Merida, in Extremadura.



[eTEACHER celebrates its first year: projects' results and next steps.](#)

On October 2018, the H2020 funded project eTEACHER celebrated its first year of implementation. Now it's time for partners to recapitulate the main results achieved and design a roadmap for next objectives.



[Becoming energy literate users through smart technology](#)

Technology is more and more present in our daily routine. It can simplify our lives and avoid waste of time and money. But how can users truly benefit from the advent of smart technologies? And are citizens ready to deal with the innovations?

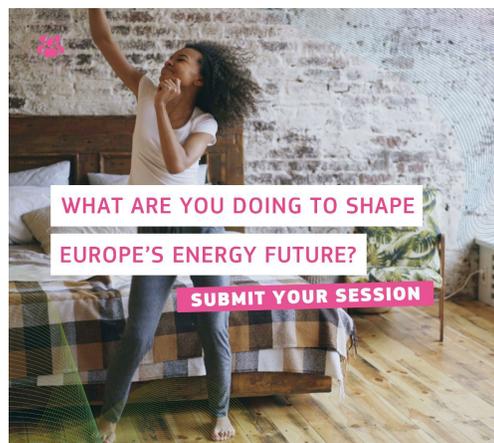


EVENTS

[EUSEW 2019: European Sustainable Energy Week](#)

17 - 21 June 2019

The EU Sustainable Energy Week is the annual Policy Conference that features leading figures and a diverse programme of sessions and side events aimed at discussing and shaping Europe's energy future.



#EUSEW19

[WSED 2019: World Sustainable Energy Days](#)

27 February - 1 March

The EU Sustainable Energy Week is the annual Policy Conference that features leading figures and a diverse programme of sessions and side events aimed at discussing and shaping Europe's energy future.

**World
Sustainable
Energy
Days 2019**



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