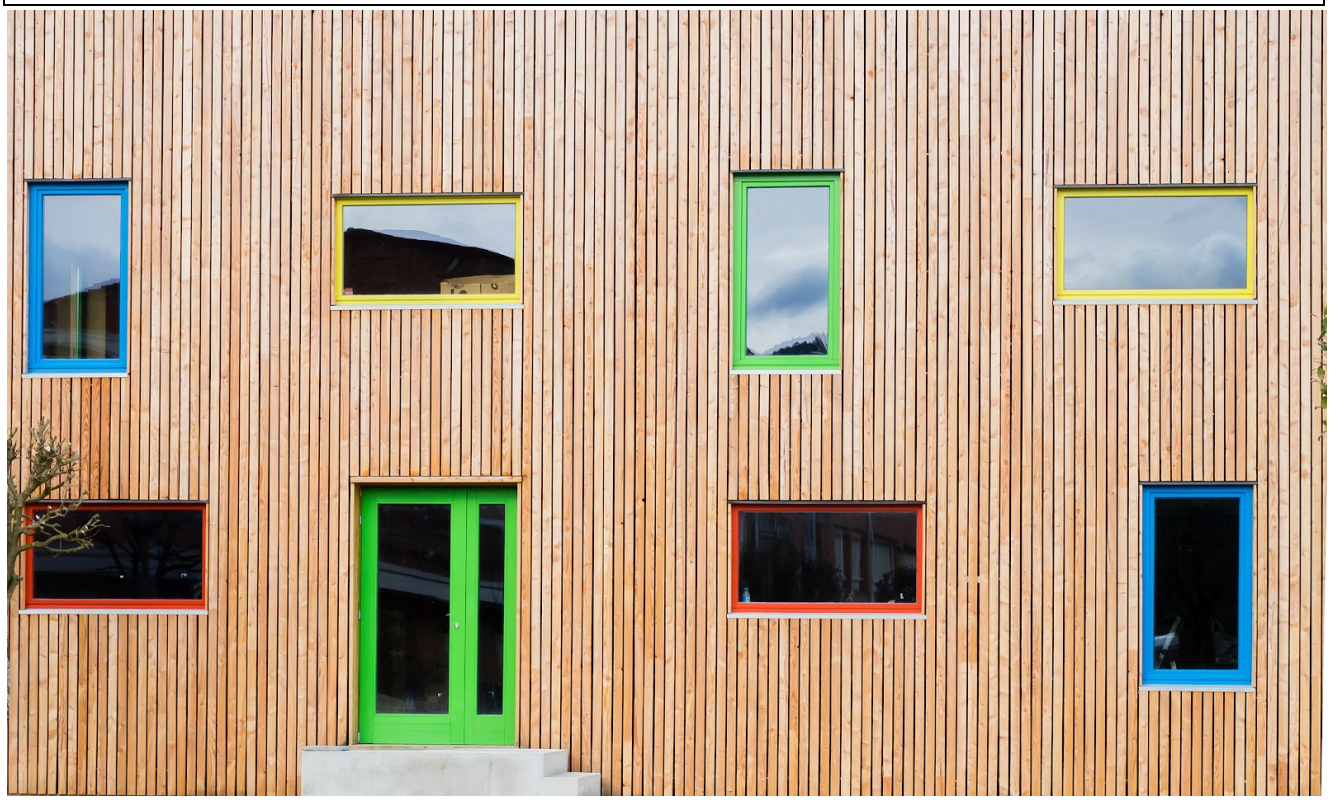
USURBILGO LANBIDE ESKOLA
CIFP USURBIL LHII

2018 WORLD CONGRESS PREPARING FOR THE SKILLS FUTURE, NOW
WFCP
TAFE Directors

ENEGUR PROJECT



USURBILGO LANBIDE ESKOLA *(www.lhusurbil.eus) is a Vocational Training school owned by Basque Country government. Is the Vocational Education reference training centre in Energy subjects related, specially* ***installation design and maintenance, electricity, energy efficiency and renewable energies****.*

For more info about the school, see the video: https://www.youtube.com/watch?v=5gyxt_J9sOY

USURBILGO LANBIDE ESKOLA has developed the ***ENEGUR*** *building (From basque, where ENERGIA means energy and EGURRA means wood).*

The ***purpose of the project*** *has been to test the technical capabilities of the school in a LIVING LAB building, combining technologies that will allow to prepare the students to work in solutions that will allow to mitigate the CLIMATE CHANGE.*

ENEGUR is a PASSIVHAUS oriented building. It was designed in collaboration with the Basque Wood Cluster (www.clusterhabic.com) and was mounted, based on pre-builded module philosophy, by the brand EGOIN (www.egoin.com), in december of 2016.

A photo of the mounting process

ENEGUR is a building made with basque pinewood frames, and it has thick continuous isolated walls, therefore it obtains a heat transmission value of 0.23 W/m2.ºC. Windows are double-glass, wooden made, with argon gas in the inside layer in order to improve isolation.

A time-lapse video of the mounting process had been recorded, see https://youtu.be/U8Q0w88gb8Q

A inside view of the vent and thermal installations of ENEGUR

*The ENEGUR project has been awarded by the **World Federation of Colleges and Polytechnics - WFCP** (https://wfcp.org/) WORLD CONGRESS of 2018 (Preparing for the Skills Future, Now) in Melbourne, Australia.*

*USURBILGO LANBIDE ESKOLA has received the **first price** in the AWARDS OF EXCELLENCE category of GREEN COLLEGES, recognizing outstanding contributions from member institutions to achieving the vision of the Federation and celebrating accomplishments in the global colleges and polytechnics sector.*

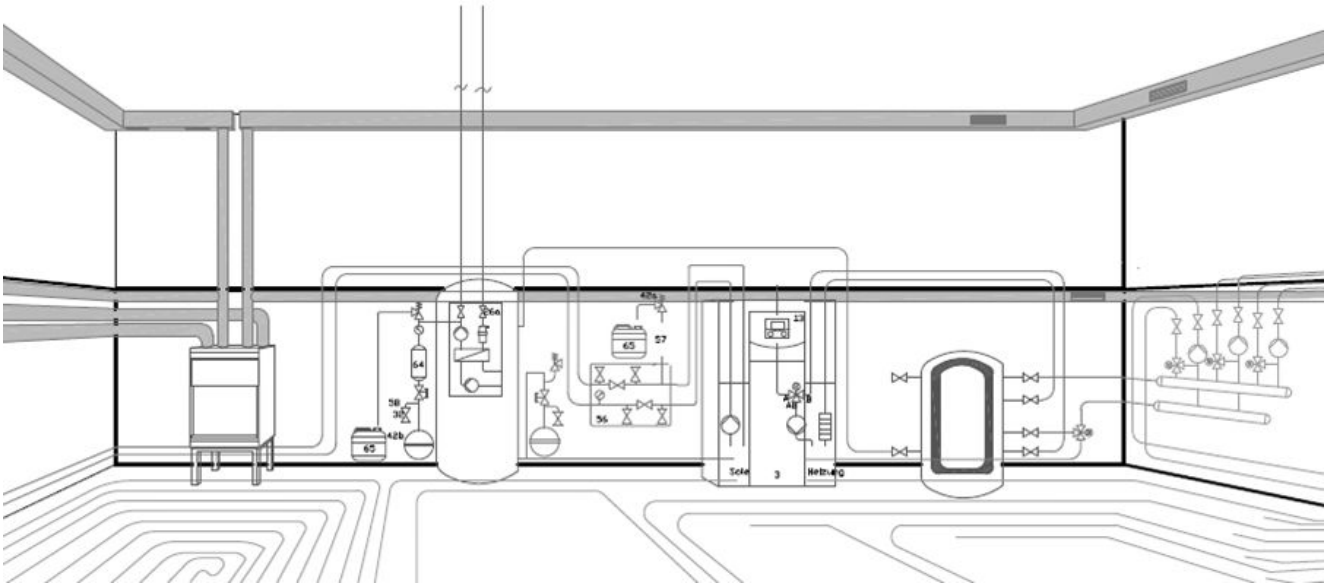
The Awards seek to distinguish WFCP member institutions, whose exceptional initiatives are strengthening applied learning and research outcomes. The Awards celebrate remarkable contributions to human resource development and the wider economic development. Awards are now matched to the Federation's Affinity Groups and recipients will be awarded for the excelling a range of categories, from entrepreneurship to leadership development.

The WFCP Awards of Excellence will honor and support higher standards in applied education institutions and are an opportunity to showcase and foster best practices in the sector.

Green Colleges *– To be awarded to an individual, institution or institutional association that has demonstrated excellence in advancing environmental sustainability through knowledge, tools, practices and technologies*

ENEGUR has been completed with 4 different renewable installations:

1.- THERMAL INSTALLATION:
The heating and cooling system of ENEGUR is based on solar thermal energy, so it has 2 vacuum-based solar panels on the roof that heat a 300 litre water deposit. This heat is moved, depending of the needs, into the building at 3 different temperature levels, in order to feed a radiating floor, 2 fan-coils and 5 radiators. The needed temperature of each circuit is obtained mixing the return water from each circuit with the hot water. Each circuit has a high efficiency GRUNDFOS pump that consume as low as 3 Watts, and the water temperature of each circuit is calculated by a controller depending on the temperature request and the external temperature at any time.



Thermal and vent installation schema

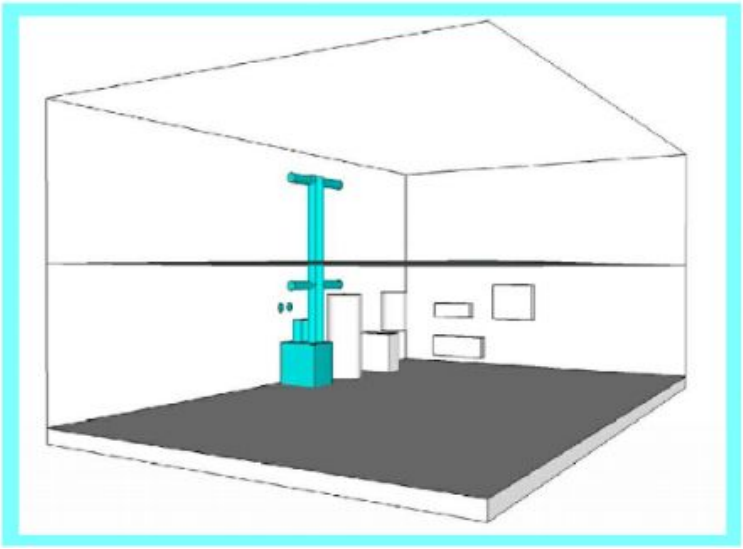
2.- LED ILLUMINATION

Inside illumination of the building has been calculated and mounted by Electricity Medium Level Students, and is based on high efficiency led lights of different brands, combined with DALI technology and remote controlled.

A photo that shows a student mounting DALI based LED illumination.

3.- VENTILATION

We also mounted a Vaillant continuous mechanical ventilation system. This high efficiency installation has a cross flow exchanger, so it crosses the inlet air with the air that goes out, transferring the heat from one another.



Also, the air inlet has been connected to a REHAU canadian well; basically, the air that comes inside the building passes previously through a 200 mm diameter specific pipe that has been buried 2 metres under the soil. Therefore, the inlet air is pre-heated in winter, and pre-cooled and de-humidified in summer by free. We are now mounting a monitoring system based on a Raspberry pi and Openhab technology, therefore measuring external air temperature and inlet air temperature and air-flow, we will be able to calculate the amount of energy that we take from or leave to the ground (in winter or summer, respectively), and so the energy we save and the Return of Investment of the canadian well.

Canadian well installation

4.- RENEWABLE-BASED ELECTRIC MICRO-GRID

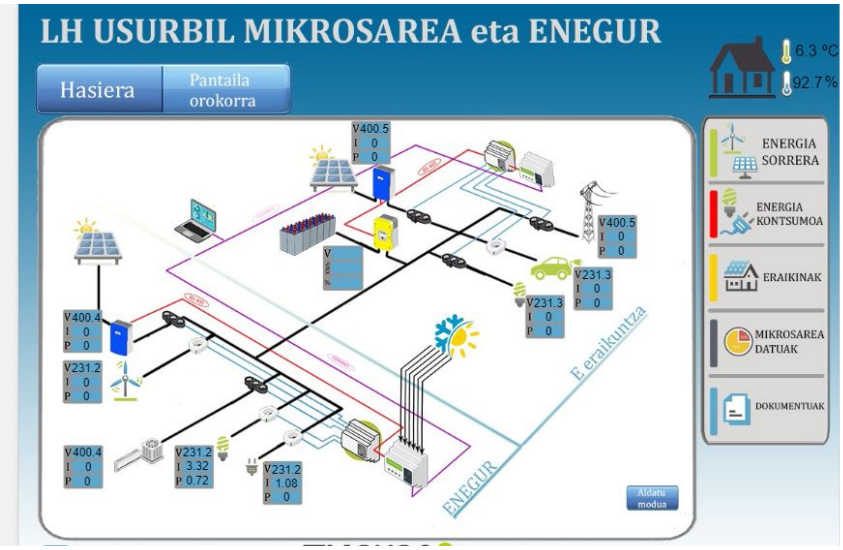
We also mounted an electrical micro-grid that supplies electricity to ENEGUR using 3 renewable generators:

- *a 3 kW peak photovoltaic installation, located on ENEGUR roof.*
- *a 6,5 kW peak photovoltaic installation, located on a neighbouring building.*
- *a 3 kW peak WINDERA S wind turbine, from the brand ENNERA (http://www.ennera.com/en/windera-s).*

This autonomous 3-phase AC micro-grid is based on SMA technology, has a 120 kwh PB-Zn battery storage and feeds with electricity the ENEGUR building and the bioclimatic building of USURBILGO LANBIDE ESKOLA, and also charges our NISSAN LEAF electric car.

This micro-grid is also connected to the grid, so in the case that we have consumption and no wind neither sun, and the batteries reach 30% storage, we automatically get electricity from the net. Also, whenever we have lots of sun or/and wind, low consumption and full batteries, the controllers stop energy generators by rising the internal frecuency of the micro-grid from 50 to 52 Hz. What we can't do from now is to sell the extra energy we could create in the second scenario, because of the spanish law. But, we expect that it will soon change thanks to the new European Winter Package Law, so hopefully we will be able to sell our renewable energy exceeds.

A monitoring SCADA based on CIRCUTOR technology has been developed; the micro-grid has been ***monitored*** *using CIRCUTOR technology by school teachers, aiming to convert it in a international micro-grid reference:*
http://scada.lhusurbil.eus:1025/html5/index.html



the main view of the monitoring SCADA.

Thanks to this monitoring tool, real-time solar photovoltaic and eolic generation data to the micro-grid can be observed. Also, battery level and electrical consumption of the lighting, vent system and thermal installation can be observed, and so the electricity that any time the grid buys from the main grid.

The SCADA has many different screens where the user can observe real data and also the stored info, easily observed using graphics, of the history of generation or consumption of the past months.

The link to this scada is available at our web page (www.lhusurbil.eus), so anyone anywhere in the world can access to the monitoring scada and get the instantaneous values of generation and consumption of the micro-grid and the thermal and vent installation. This is interesting not only for our local and international (i.e. chile, EEUU) students, but also anyone who wants to get this information from anywhere in the world.

We strongly believe in a micro-grid based distributed generation electrical grid model for the future, based mainly on photovoltaic renewable generation, so we are decided to go improving constantly our micro-grid.

Many brands collaborated in the project, giving material and technological resources, so this multi-partner collaboration has been itself innovative. Thanks to this collaboration, we implement their latest technical innovations in our school, and we offer them using the building whenever they want without cost:

The new building has created new bridges between educational institutions, students and brands, and has promoted collaboration with companies; see the video of the inauguration day promoted by KURSAAL GREEN company: https://www.youtube.com/watch?v=BDWXUXLA67A

USURBILGO LANBIDE ESKOLA trains in ENERGY EFFICIENCY and RENEWABLES to students of the Basque Country and other countries from all over the world, i.e. chile and EEUU.

http://www.lhusurbil.eus/web/es_eficiencia_energetica_y_energia_solar_termica.aspx

http://www.lhusurbil.com/web/es_alumnos_de_eeuu_en_usurbilgo_lanbide_eskola.aspx

In the regional level, we train the technicians that in the future will manage micro-grids: electricians, installation designers, installers and mantainers, building efficiency technicians, automatisation and robotics specialists.

We also train in energy efficiency and renewables students from basque second grade schools, also internationally through Erasmus+ projects, and the society through training agreements with local and regional council.

This is the ENEGUR Project presentation to society in a public event promoted by Gipuzkoa Regional Council: https://www.youtube.com/watch?v=pTQ6Tfp1iIQ

USURBILGO LANBIDE ESKOLA also gives technological services named TKGUNE, see these references: www.tkgune.eus

This is a sample of a developed urban photovoltaic tree developed by the school in Tkgune: https://www.youtube.com/watch?v=gF8AQjWummY

A previous project on efficiency is the multi-energy heating chamber, developed with different brands and the council in 2015, and which got a prize from the Spanich Education Board: https://www.youtube.com/watch?v=DT479OMoejM

These new installations are totally necessary for the positive development of this huge training effort.