



Building a sustainable future: Bioclimatic house

Esther Gomez Mallen and Oriol Rivera Fusalba
(esthergomez@gmail.com)

The application of bioclimatic principles is a critical factor in reducing energy consumption and CO₂ emissions.

This poster develops a sequence of experiments and building working models in order to form students of secondary school and make progress towards real applications of new energy technologies. The activity has been carried out by 14 and 15-year-old students using a Power House building kit.

Scientific method and Information and Communication Technologies (ICT) were used as an effective system of acquiring new knowledge. Students were asked to form cooperative groups. Firstly, each group had to choose the best location and orientation in the imaginary Dragon Island for the construction of the house. The house consisted of eight Styrofoam parts and one transparent plastic part. The Styrofoam parts formed the house structure (floor, walls and roof) with two interior chambers and the attached greenhouse. Once the house was assembled in a few steps, it was ready for the students to start adding more components. Students then conducted several experiments related to the heat and light energy of the Sun and the energy of the wind. Some of the experiments and building projects realized were: how to capture the Sun to heat the house by passive solar heating, how to collect the Sun's rays to heat water using a Sun Collector and how to extract electricity current from Sun Power station and from wind power plant. For most of the assays it was necessary to record the temperature and students used for that purpose a temperature sensor that comes with Multilog Pro, a portable, graphic data collection and analysis system.

Groups of students were really engaged in the project and each of them ran a different test with the house. Finally they proved if their initial hypothesis was correct and they had to expose the results to the rest of the class members. Students demonstrated how we can transform and use renewable forms of energy. With the experiments students demonstrated that the air can circulate between the house and the greenhouse through the windows. The heated air in the greenhouse rose through the windows into the main house. It was cooled off as it delivered heat and returned again to the greenhouse. It happened naturally due to the materials and the configuration of the house. A solar collector gathered heat from the Sun in order to heat water until 40° C, what was enough for showering, laundry, and washing dishes. Solar cells and homemade wind power unit delivered electricity to light up a small light bulb.

With these experiments and building kit we explored and used natural, renewable forms of energy. These are forms of energy that we can use without damaging our natural environment and ourselves. Perhaps this kit will give students the incentive to build something on a larger scale after they have learned from the smaller scale model devices.