



PARSEL teaching –learning materials compiled by the consortium
as part of an EC FP6 funded project (SAS6-CT-2006-042922-PARSEL).



How can we avoid energy losses in our school? (Students)

Instructions

With this task, we want you to solve one problem related to school energy management practice, in order for the school remaining warm during the winter and cold during summer time. For instance: How can we avoid energy losses in school?

Procedure

1. All students should discuss about which goals they want to reach and how they can solve the presented problem. All students should participate in the discussion, suggesting ongoing paths, pointing research problems and how they can be organized. Annexes (at the end) can provide further clues and information for developing work.
2. Teacher divides the class into smaller groups and each group will be assigned with a different sector of the school (for instance, dining-hall, resource centre, classroom).
3. Each group has to identify and to point, either on the school plan or school drawing made by the group itself, all the places and “equipments”, from where can be energy losses or gains, during winter as during summer. For instance: doors, windows, radiators, chimneys. All sources of energy, energy types and/ or energy transferences should be described.
4. Based on information collected from the websites, each group has to suggest a number of well-grounded, possible actions (hypothesis) for reducing energy transference, in order to reduce energy losses during the winter and energy gains during the summer. In suggesting an action, you have to consider several factors and to balance between desirable actions and possible ones. For instance:
 - a) Size of the studied sector and medium number of frequent users;
 - b) School place in relation to climatheric conditions;
 - c) Windows’ spatial direction, according to the sun;

Developers: Galvão, C., Reis, P., Freire, A. e Oliveira, T. (2006). Avaliação de competências em ciências: Sugestões para professores do ensino básico e do ensino secundário. [Competence evaluation in science. Suggestions for basic and secondary education teachers]. Lisboa: ASA.

Institute: University of Lisbon
Country: Portugal

- d) Windows and doors' thermic insulator material;
 - e) School financial resources.
5. Each group has to test some of its hypothesis, by constructing a small scale model of the school (or allocated sector) and by using daily materials. Alternatively, each group can test its hypothesis using a room and its own materials and resources.
6. After testing hypothesis, the group will write a report with suggestions and actions required to make allocated sector energetically efficient.
7. Lastly, all groups could work together in developing a pamphlet or a model about ways to render school energetically efficient and could present it to the school community. This pamphlet or model would be a product of all the groups' suggestions.

List of useful Websites

The following websites contain a lot of information on energy conservation. Information provided by these (or other sites) should be used by you during hypothesis construction phase.

Energy Conservation in Building and Community Systems – <http://www.ecbcs.org>

European Commission Directorate-General for Energy and Transport – <http://www.buildingsplatform.eu>

Green Building – <http://www.eu-greenbuilding.org/>

For assessment, see tables presented in the energy-decision making_assessment.doc

Annexes

Energetic efficient buildings: revolution in the sector of construction and increased cost of new houses. Those are the impacts of the new European legal orientation

European Union published new orientations concerning energetic efficient buildings, as a result of the growth of energy consumption, commitments related to Kyoto Protocol (e.g. reduction of carbon dioxide emissions) and pressing to provide sufficient energy to satisfy European citizens' energetic needs. Those orientations oblige all member states to define concrete actions guidelines. Portuguese government transposed those guidelines into a legislative set by creating the National System of Energetic Certification and of Buildings' Quality [Sistema Nacional de Certificação Energética e da Qualidade dos Edifícios]. This system will aim at guarantying construction of less energy consumer buildings. Two actors will be central within the new system: Qualified experts, who certify that a building conforms the guidelines, and Energy Agency [Agência para a Energia (ADENE)] which will manage all the process. Mechanisms of periodic inspection of acclimatization installations will also exist. Such applies to buildings equipped with heating boilers (with power superior to 20KW) or to installations of air conditioned (with power superior to 12KW), enclosing many domestic installations. Some issues of the

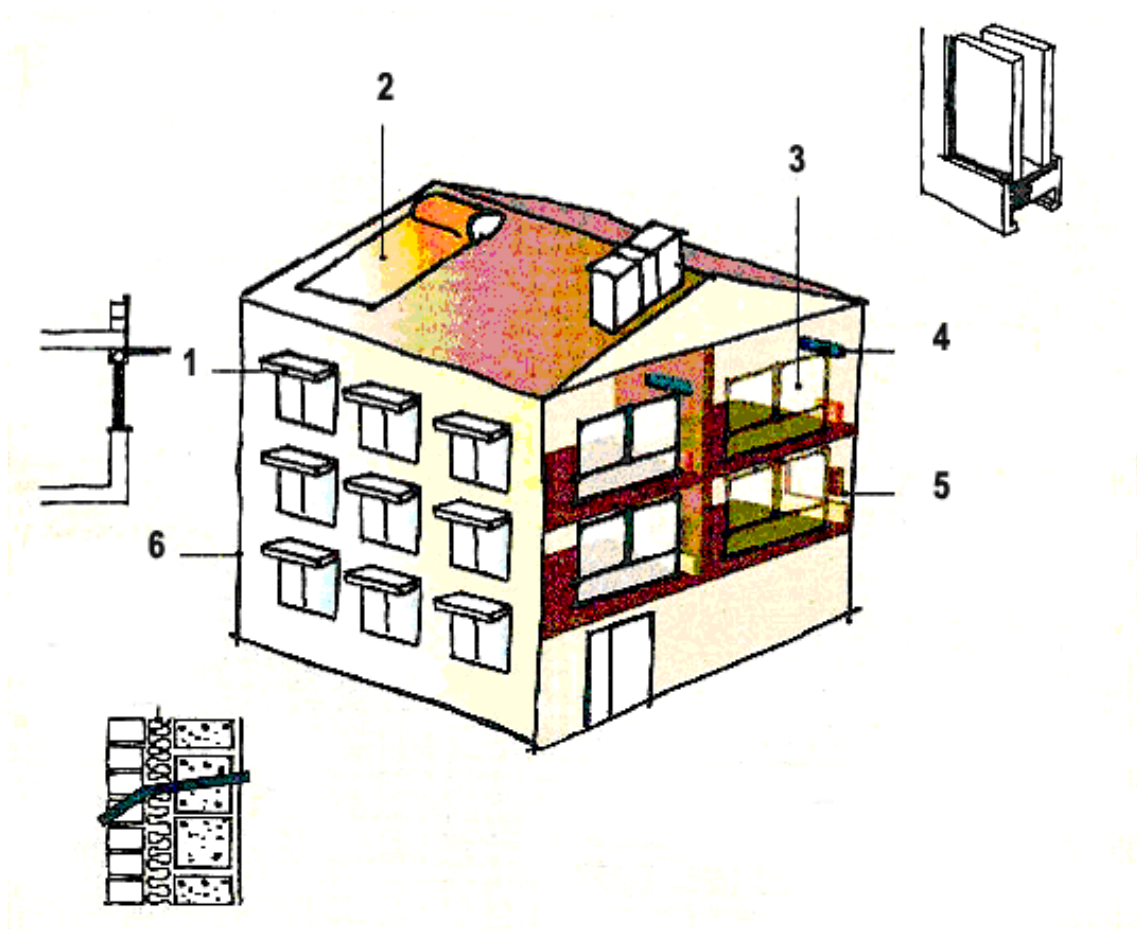
Developers: Galvão, C., Reis, P., Freire, A. e Oliveira, T. (2006). Avaliação de competências em ciências: Sugestões para professores do ensino básico e do ensino secundário. [Competence evaluation in science. Suggestions for basic and secondary education teachers]. Lisboa: ASA.

Institute: University of Lisbon

Country: Portugal

Regulation about Building's Thermal Behaviour Characteristics [Regulamento das Características de Comportamento Térmico dos edifícios (RCCTE)] are presented in the illustration above. Construction and habitation licences, which will have to take into consideration issues related to energy efficiency, are central on that Regulation. A minimal interior air quality condition is a new idea in the Regulation. In addition to ventilation needs, this Regulation created limits for micro organisms and polluting agents according to each kind of building.

(Adapted from Proteste 271 Julho/Agosto 2006)



(From Proteste 271 Julho/Agosto 2006)

Picture 1 – Some issues of the Regulation about Building's Thermal Behaviour Characteristics

Developers: Galvão, C., Reis, P., Freire, A. e Oliveira, T. (2006). Avaliação de competências em ciências: Sugestões para professores do ensino básico e do ensino secundário. [Competence evaluation in science. Suggestions for basic and secondary education teachers]. Lisboa: ASA.

Institute: University of Lisbon

Country: Portugal

- 1- Window peaks (By avoiding direct sun radiation, they have a shadowing effect).
- 2- Solar panels (They will mandatory for water bath heating, in case of good solar exposition).
- 3-Double glass (During winter they keep warm the house and, with proper window shades and reflective glass windows, they will avoid over warming during the summer. With a thermal cut framework, performance will be further improved).
- 4- Air conditioning and thermal radiators (These equipments and their installation will undergo mandatory inspections).
- 5- Thermal bridges inside the walls (The spots with significant heat losses will be under prudent inspection).

- 6- Thermal insulation (A layer of insulating material inside the walls helps improving house comfort and reducing noise from the exterior).