



“Educational Project: Energy and its Relation with the Environment” (Peerma)

Alida Ingeniería del medio S.L. Comunidad de Madrid, España.

Summary

The Community of Madrid has an energy consumption of 9 millions of tep (2000). It only produces 2,5 % and has the aim to reduce the consumption by 10% by the year 2010.

Fields of work include education on saving energy and respect to the environment, working in the education of young men.

The Educational Project "Energy and its Relation with the Environment", made by Alida Ingeniería del Medio S.L. and supported by the Consejería of Education and Environment of the Community of Madrid, has been developed over a three year period (2000 - 2003), for 88 Institutes of Secondary Education, 350 teachers and 18 000 pupils of the ESO (from 12 to 16 years). Training experience incorporating I+D teaching showed excellent results and continues to be given with this didactic material.

End-user area

New buildings
 Refurbishment of buildings
 Transport and mobility
 Financial instruments
 Industry
 Legal initiatives (regulations, directives, etc)
 Planning issues
 Sustainable communities
 User behaviour
 Education
 Other

Target Audience

Citizens
 Households
 Property owners
 Schools and universities
 Decision makers
 Local and regional authorities
 Transport companies
 Utilities
 ESCOs
 Architects and engineers
 Financial institutions
 Other

Technical

Energy efficiency
 Heating
 Cooling
 Appliances
 Lighting
 CHP
 District Heating
 Solar energy
 Biomass
 Wind
 Geothermal
 Hydro power
 Other

Context

The Community of Madrid has an energy dependency of 97.5%. The “2000-2010 Energy Saving and Efficiency Plan” has the aim to establish a 10% yearly reduction. One of the efforts set forward was to patronize the “Energy and Environment relationship” education project. This project is aimed at:

- Second cycle education centres, by providing continuous information updates through the creation of a bibliographic fund.
- Teachers of second cycle education by means of permanent occupational training.
- Making second cycle students aware of energy saving and instilling respect for the environment to be able to live in a sustainable development society.
- Permeating the immediate environment of the participants in the project, such as family, friends, colleagues, etc.

Objectives

- Students from age 12 to 16.
- **Awareness** of energy saving from an early age.
- **Knowledge** of the advantages of renewable energies and their future development.
- Awaken their **interest** in environmental problem decision taking.



Process

	Course 2000-2001	Course 2001-2002	Course 2002-2003*
Participating teachers	397	305	400*
Participating alumni	18 400	15 300	19 000*
Participating schools	88	83	114
Participating student groups	657	545	660*

* Estimated values.

The fundamental **conceptual concepts** are:

- Energy: definitions, types and units.
- Sources of renewable and non-renewable energy: description, reserves and consumption.
- Consumption, costs and saving strategies at home and at school; electricity invoice.
- Environmental impact of the different energy sources.
- The student's attitude regarding the sustainable development challenge.

Composition of the didactic aid sets

- a) "The Energy and Environment relationship": contains 1 report and 32 activity sessions (8 sessions for each level); it is a transversal teaching, complementary to accredited studies. The teacher schedules 8 teaching hours for every level and scholar course.
1st Edition (2000) and 2nd Edition revised on paper format and slides (7 to 12 slides per session). Additional lectures for the teacher: "The electricity market in Spain" and "Cogeneration".
3rd Edition (2002) texts and slides have been completely revised. Available on CD-ROM to allow their projection. Three new activities are included with spreadsheets for computer processing.
- b) "Bibliographic fund": the bibliographic fund is made up of the most recent publications edited by organizations and companies, which normally may not be found in libraries. The following organizations have contributed 37 publications to it: Comunidad de Madrid, Ayuntamiento de Madrid, Idae, Ciemat, Foro Nuclear, Omel, Unesa, Sinae, etc. Two publications from the European Commission are also included: "European transport policy for 2010: time to decide (White Paper)" and "Towards a European Strategy for the Security of Energy Supply (Green Paper)".
- c) Visual aids: they are composed of 300 slides in the 1st and 2nd editions, and by a CD-ROM of the project in the 3rd edition. There are also 5 support videos.
- d) Computer media: the 3rd edition has been edited on CD-ROM as a way to promote the use of computers. Three new didactic activities have been included, which estimate savings and emission decrease with the aid of spreadsheets. Activity 1: "Assess the energy saving at school"; Activity 2: "The unbundling of the Spanish electricity market"; Activity 3: "Benefits from using public transport in the Madrid Community".

The Educational Project "Energy and Environment relationship" has been approved by the General Management of Teaching Centres of the regional Education Ministry, with a subsidy of 90.7 %, and collaborating with the General Management for the Promotion and Discipline of the Environment (belonging to the regional Environment Ministry), with a subsidy of 9.3 %, both of them from the Community of Madrid, being developed as a teaching R+D pilot test during the courses 2000-2001, 2001-2002 and 2002-2003 of the Second Cycle Education Centres of the aforementioned community. The expenses vary depending on the degree of management and control over the Project.

Results

The system chosen to evaluate the Project consisted in meetings between Alida Ingeniería del Medio S.L. and participating teachers of each centre, along with opinion polls. Three polls were carried out during the 2000-2001 scholar year (1st course) and another two during the 2001-2002 scholar year (2nd course). The following table shows the average values of the most representative questions, which allows to obtain a global scope of its operation. During the 3rd course no polls were made, since the Project was considered sufficiently evaluated. The polls were answered by the teachers.



Each question is valued according to the following scale: 5 very positive, 4 positive, 3 average, 2 negative, 1 much negative. 1st: course 2000-2001 2nd: course 2001-2002

	N1 1 st	N1 2 nd	N2 1 st	N2 2 nd	N3 1 st	N3 2 nd	N4 1 st	N4 2 nd
Importance of this subject in energy and environment.	4,42	4,50	4,57	4,48	4,35	4,47	4,49	4,56
Quality of the Educational Project trial.	3,58	4,18	3,52	4,20	3,64	4,23	3,74	4,21
Evaluation of the bibliographic fund.	3,80	3,55	4,03	3,83	3,90	4,05	3,77	4,06
Usefulness of the student's notebook.	3,46	3,73	3,69	4,00	3,80	3,88	3,71	3,83
Interest in energy and environment relationship.	3,62	3,58	3,50	3,63	3,67	3,70	3,83	3,97
Awareness of the advantages of renewable energies.	3,77	3,92	3,64	3,81	3,83	4,00	3,97	4,18
Degree of awareness of energy saving.	3,62	3,42	3,57	3,31	3,38	3,44	3,69	3,65
Global evaluation of the Project's development in class.	3,69	4,00	3,71	3,88	3,75	3,96	3,86	4,00

Participating departments: Biology and Geology, Physics and Chemistry, Technology, Orientation, Geography and History, Mathematics, Computing, Physical Education and Languages.

Technical visits: 83% of the IES have visited installations related to the Project, bio-mass, sewage plants, rubbish dumps, nuclear power plants, solar energy installations, radioactive waste disposal, hydro-electric plants, etc.

Lessons learned and repeatability

According to the response to the first question of the poll, this discipline is essential. It is understood that many countries in the EU have the same necessity.

Since it is an education program, the conceptual part is the same. Only the data regarding energy consumption should be changed in each case. Translation to the local language should not be a major problem either.

The fundamental problem resides in implementation. A great effort must be made in management and control; once implanted, with the contributed material, it should work on its own.

In conclusion, it is fundamental for students to adopt an individual position since they have acquired solid opinions from their daily experience regarding the influence of energy consumption on the environment, secondary school, home, public transport, etc. They will then apply them in a natural and spontaneous way to their social environment and transmit this knowledge to their friends.

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