
Reflection Document on a EU-wide Co-operation of Local Actors on Sustainable Energy Education

August 2004

1 Introduction

Local and Regional energy agencies play a key role in regional and urban energy management to improve energy efficiency, to make the most of local energy resources to foster the use of renewable energy sources and to address the issue of energy efficiency in the transport sector. In order to achieve these objectives, the agencies provide expertise, advisory services, and assistance on energy management in the geographic area of competence (municipality, province, or region). Local partners of the agencies are public authorities but also typically companies, consumer associations, chambers of commerce, utilities and universities.

Education is an effective means of achieving energy sustainability. Children – and even young adults from university - are the decision makers of the future, are more receptive to new concepts and new behaviours, can introduce new habits at home and later during their professional career. Professional formation can also be effective since it can be a means to introduce a sustainable energy component in a given activity, directly related to energy use, e.g. building managers, or less directly e.g. teachers. Also, schools are a privileged place for serving as leader by example, namely in using and promoting the use of energy in a sustainable way.

Local and regional energy agencies have an important role to play as schools are traditionally under the responsibility of local or regional administration. The agencies are therefore the natural actor to serve as a promoter of activities to incorporate sustainable use of energy in education.

A key area of activity of most of the energy agencies in Europe is targeted to education and schools. A lot of initiatives and tools have been developed at various levels by the agencies in recent years trying to respond to the important need of educating children (and indirectly parents and adults) towards energy saving behaviours. Most of the information on this activity is available in different languages and formats and requires a significant effort to be put at the disposal of schools all over Europe. However, most of the agencies lack material and expertise to develop their own activities and would certainly benefit from external contributions.

The ManagEnergy initiative, created by DG TREN, has been developing some activity on the area of education, through the publication of good practices for replication and organising events on the theme. However, it is our conviction that ManagEnergy could be more active in the field of education. In order to have a more targeted and professional approach, ManagEnergy would certainly benefit from developing common facilities and engage in horizontal activities in collaboration with DG EAC.

1.1 Objectives

The aim of this document is to provide preliminary recommendations on how ManagEnergy, as a tool to animate local and regional actors at EU level, could support activities on education as a means to promote end-use energy efficiency including in transport, and renewable energy sources.

In order to address this overall objective, this report has the following specific objectives:

- to provide a picture of the activities carried out by energy agencies in Europe;
- to understand the factors of success of these activities;
- to understand the obstacles and the needs for further actions;
- to formulate recommendations on the content of a possible contribution from the ManagEnergy initiative.

The target for the activities proposed in this report are any actor contributing to the promotion of sustainable energy at local and regional level. However, the activities are designed for local and regional agencies.

1.2 Methodology

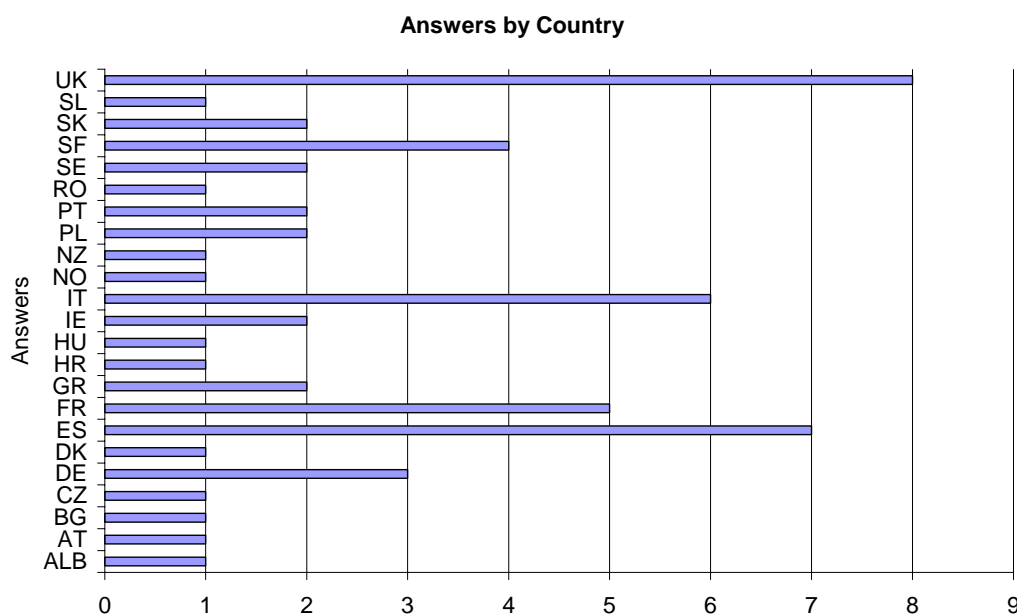
In order to address the objectives mentioned a questionnaire targeted at energy agencies was launched. A questionnaire entitled "Involvement of Energy Agencies in Energy Education & School Activities" was prepared and distributed by ManagEnergy (Annexe 1). 380 questionnaires were sent by e-mail to all Local & Regional Energy Agencies in Europe. More than 60 replies were received, providing a representative coverage in terms of type of agency and geographic distribution (23 countries). Also, many of them were comprehensive. Thus the set of interviews to selected experts initially envisaged was limited to a smaller number of experts. A literature survey was also performed, namely based on studies financed by DG TREN and on case studies available in the ManagEnergy web site.

At EU level, contacts have been taken between DG TREN and DG EAC, namely through Socrates (Comenius programme), in order to present the existing respective initiatives and exploit possible synergies

2 What has been done? Fields, activities and obstacles

2.1 General results

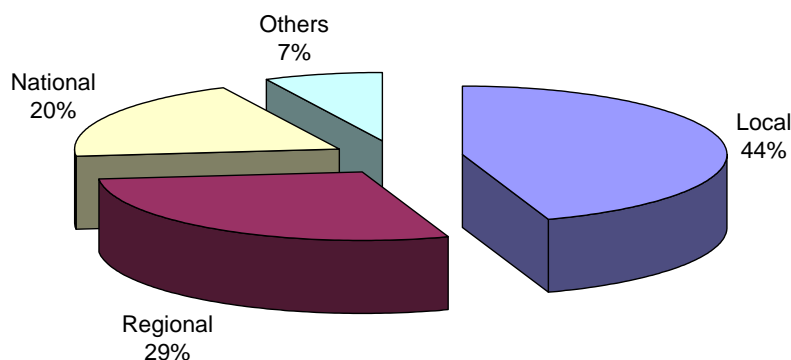
Answers were received from 23 countries, which is an excellent geographic coverage. The countries with more answers are The United Kingdom, Italy and Spain, which reflects the degree of activity of the agencies in those countries. The following illustrates the distribution per country.



Graph 1

Regarding the distribution per type of agency and actor, a fair spread was also attained, which is shown in the following graph. The local and regional energy agencies totalled 73%, with 44% from local agencies.

Type of Agency



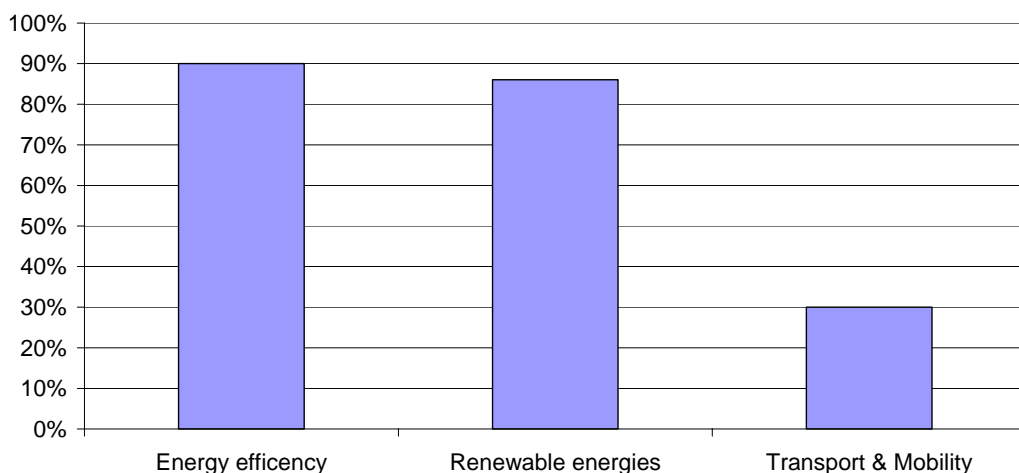
Graph 2

2.2 Which type and fields of activities have been performed by energy agencies ?

This chapter provides a picture of the situation regarding the type of activities, the fields addressed and the type of organisation the agencies cooperated with. Almost 90% of the agencies have engaged in education activities and three quarters of these have demonstrated successful results.

Concerning the distribution by field of activity, energy efficiency is the most important with 90%, followed by renewable energy, as the following graph illustrates. Only one third of the activities relate to transport and mobility but it appears to create an increasing interest from the respondents.

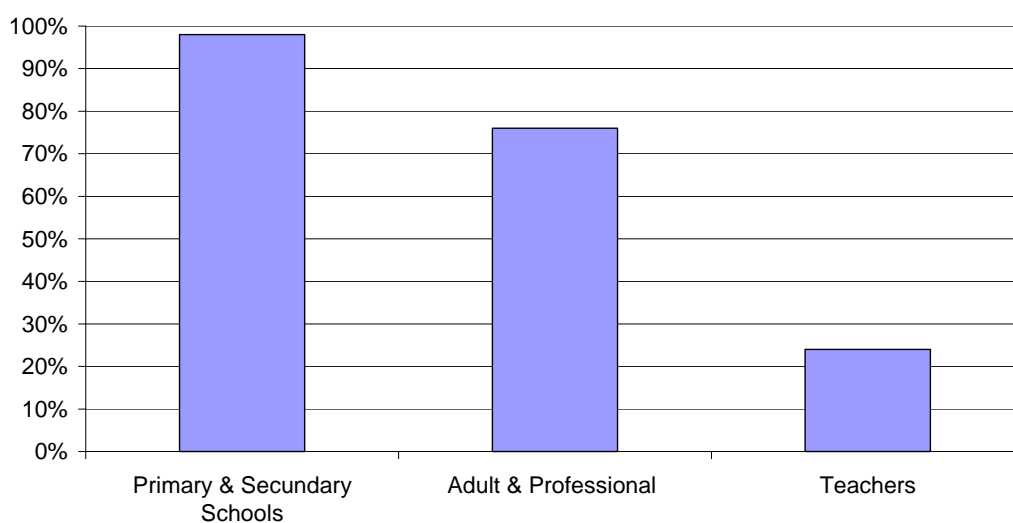
**Breakdown by field activity
(90% of the Agencies have activities in Schools & Education)**



Graph 3

Primary and secondary schools have been a target for almost all the organisations answering the questionnaires. Adult and professional education includes university education, professional education as well as formation. Teachers are mainly an intermediate target to reach the students.

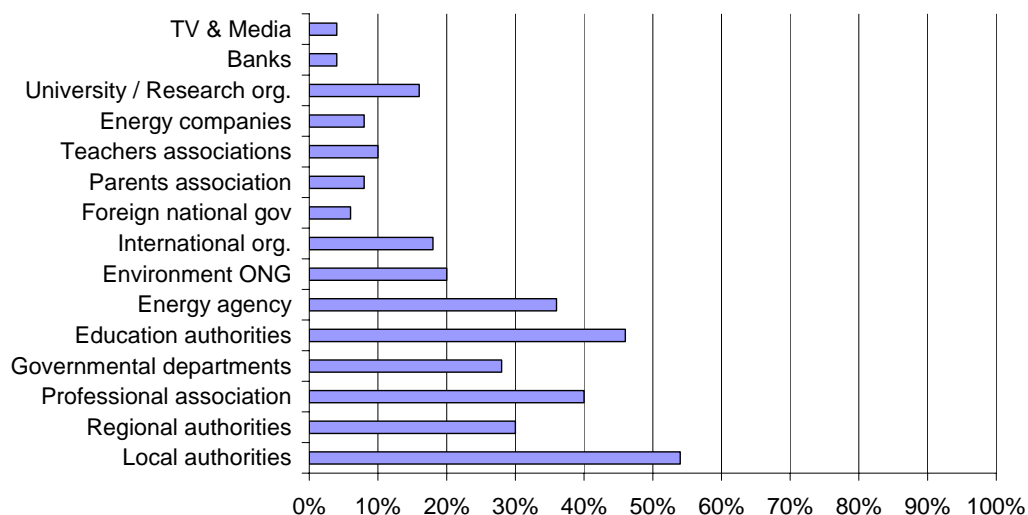
Target for activities



Graph 4

The graph below shows that local and regional authorities are the entities that collaborate the most often with the agencies or other actors in education activities. Surprisingly, there is a clear lack of collaboration with teachers – the principal intermediary -, and with parents associations.

Organisations collaborating in education activities



Graph 5

The following boxes illustrate two successful projects involving energy agencies in education activities. The first one – FEE project - is a cooperation involving agencies from 8 EU countries while the second one is a National project developed in Norway.

The FEE Project

The FEE-project is an educational project conducted by 9 regional energy advice centres, supported by the ALTENER programme in 8 European countries. It aims an educational approach in schools to obtain consciousness and results about Renewable Energy Sources (RES) and Rational Use of Energy (RUE). Children of 10 to 14 years old set up an interactive exhibition about RUE and RES, stimulating their awareness on energy issues. The project has a neighbourhood/regional bounding and an international approach. Making the link between the school project and the local community is specific for this project. By involving kids, you reach a wide public (family, friends...). Working with different countries and organizations, implied common methods with different approaches.

The aim of the project is to raise energy/environmental awareness in the local community. It should bring an attitude change - behavior change in the way one uses energy. It should improve the Rational Use of Energy and enhance a better understanding of the use of Renewable Supply.

The link between schools and local community is made through:

- Home audits, done by children in their family house;
- Involvement of the community in the development of the school project, follow up by parents committees.
- The exhibition as an event, open for the neighborhood;
- The project wants to give a start to make an energy plan for the area.

The role of the Agencies was to support the schools to obtain the project targets, with helping them concerning the content and giving them some ideas for interesting exercises.

- The methodology is based on project-based learning. Children in project-based learning are analyzing the situating, searching for answers, and solutions. The school is bringing in the reality of society. This active attitude works very well to motivate children, even those who are not the best of the class.
- We also used “commitment pedagogy”: people who commit themselves to saving energy are more likely to save energy.
- Step by step pedagogy was also a notion used: if the child succeeds with a first simple act, he is able to succeed with the next one.
- We based our action also on the notion “valorize what’s been done”. The whole work was also done in function of the so-called « exhibition of energy work» at the end of the year.
- Every country laid the emphasis on a different aspect of the project framework. In France on training teachers, provide tools and methodology for teachers; In Belgium a much closer interaction- games; In Greece and Portugal: single continuous point of contact; In Italy a more laboratory experimental approach and school subject bases; The UK worked within current curriculum base; Sweden worked in the interactive development.

The learning plan of the school project is subdivided in 3 phases: **Activating, introduction in the energy theme, Working out, visits, exercises; Exposing, visualize the work done.**

The community involvement starts with the information on what is going on, through the distribution of a regular publication of a newsletter for the area. The role of the regional press was also important to reinforce the message.

Results

Further we mention the participation of: 5000 children , 100 schools, 6000 parents, a lot of local partners.

One of the results of the project is that the pupils have learned about energy issues. They experienced how energy influences our daily lives. They observed their own energy consumption and searched a way to lower it and look for alternatives. They visualized what they learned, and communicated with their peers, families and neighbors. The pupils take their responsibility (refreshing, lighting) and call teachers to order.

The **school** has gained a lot of experience by working the whole year around one big item, the energy item. They worked project-based from theory to practical examples and visits. They valorized what they did in an energy event. Even the non-motivated pupils learned very well, school could be interesting, indeed.

Those families were also confronted by the fact that their children analyzed the family energy consumption. The children made it clear that there was a lot to enhance and that they know how to do it. Anyhow, a special newsletter and the energy event at the school explained and put emphasis on the situation. Parents confirm that pupils save energy at home and urge their parents to do the same.

The involvement of the community can make a big difference. Because all children and parents were involved. Sometimes it became a topic of talk of the town.

The residents in the chosen area could see it as a first step to a better consciousness of RUE and RES. It could bring more dynamism between schools and population. It could start activities of citizens around Local agenda 21 or sustain the energy saving programs (and info centers).

It's sure that the energy agencies have introduced and helped the schools to realize the project. The energy agencies have gained a lot of experience and tools that can be used for a lot of other educational activities. Those capacities are also the result of the collaboration between the different agencies by the exchange of best ideas. Anyhow, the collaboration between the regional advice centers in the field on education has only started.

We may say that the project was a big success. Many times our energy agencies were asked to continue their educational activities and to broaden to other schools. The project got also attention of a few national educational boards (especially Italy and Greece) or environmental institutions (Green apple award, UK). The experience is renewed in the framework of the « Genova European Capital of Culture ». A large assessment of environmental education in PACA (France) will be organized by university and education researchers through a participative methodology on the basis of the Fee-project experience.

Energy monitoring-initiative in Stjørdal

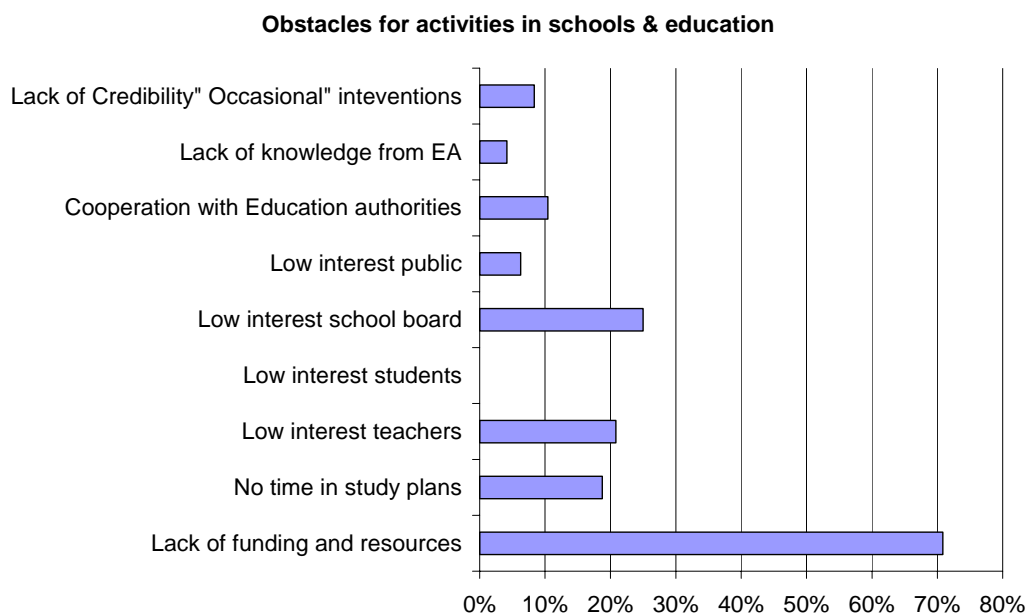
An **energy monitoring-initiative** in Stjørdal (in Norway) was incorporated into nature studies and related classes in the elementary school. The central activity was to record weekly energy consumption in a diary (concrete actions). Both consumption in schools and home was recorded. Analyses were made where the pupils could see that concrete actions lead to actual savings.

A few hundred **households** were affected by the activities, and the power utility in the area was able to locate these households and register the consumption. Data from 1992 to 1995 was used and compared to a comparison group. Local climate was corrected for. There was a significant difference between study group and test group.

The savings at school was high, and a cost/benefit analysis based on the national programme from 1992-1994 carried out by the "Vekst" institution for The Ministry of Education and Research showed significant savings. More than 200 schools participated in the project, with an annual budget of NOK 3 millions (EUR 366.000). 51 schools were investigated annually, and reported collective savings of 1,2 GWh in 1992, 2,9 GWh in 1993 and finally 1,3 GWh in 1994. The schools saved 13 kWh per EUR the first year, 31 kWh per EUR the second year and 36 kWh per EUR the third year. With an Internet-application, the design would probably be even more cost effective. The efforts carried **long-term effects** as well: When these types of activities are carried out, the schools seem to learn by their experience and carry on and improve their activities every year. This learning pattern also suggests a long-term benefit of the proposed actions beyond the year in which the project is executed.

2.3 Obstacles

The main obstacle encountered by energy agencies and other local actors in carrying out educational activities is, as expected, related to lack of funding, time and resources (70%). Conversely low interest from students is never mentioned.



Graph 6

The cooperation with education authorities and school boards is a problem mentioned by some agencies that have tried to perform activities. This lack of interest by the school boards can be explained partially by the fact that the agencies activities are not targeted to teachers, which makes

these activities less attractive. Moreover, the absence of promotion of these activities towards schools at local level can also be considered as a “blocking” element.

Lack of credibility is mainly due to the sporadic character of actions. Educational activities should be regular, as mere “extra-ordinary” activities do not produce effects. Therefore, it is suggested to ensure continuity of the action. However, lack of credibility can also arise if energy agencies are not perhaps considered to be the most appropriate organisations to deliver this type of services. The respondents being from energy agencies naturally do not recognise their lack of knowledge. However there are good reasons to believe that this is really one obstacle for the credibility and thus the acceptance from school boards and education authorities to engage in such education and school activities.

No time in study plan also calls for an intervention in cooperation with education authorities to include energy in the curricula. Teachers and school boards are often not willing to change the curricula.

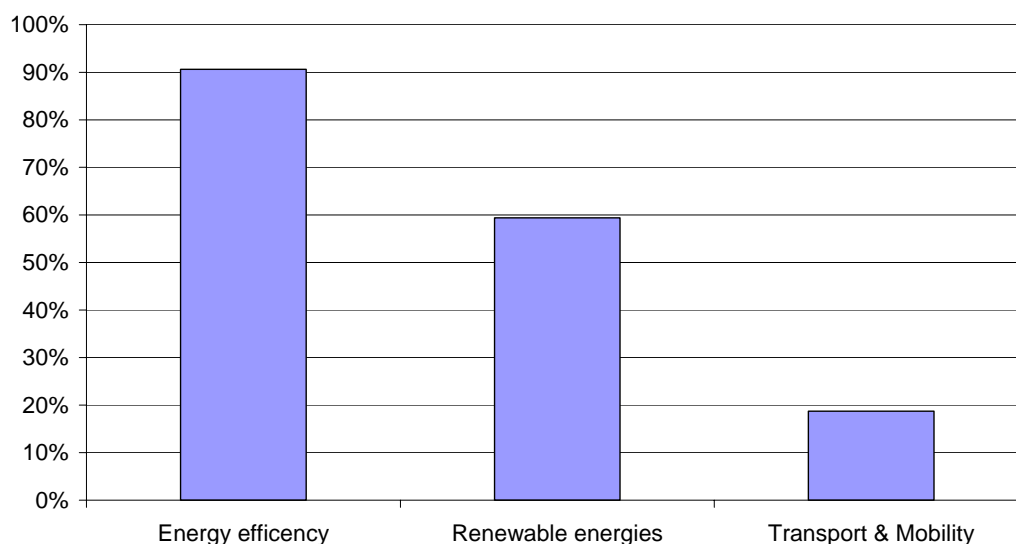
3 What are the most cost effective fields and types of activities in education?

3.1 By field of activity

Energy efficiency activities, especially when addressing young school students, are believed to influence their behaviour in the future, and influence behaviours in their homes. The results of the questionnaire (cf Graph 7) show that educational activities in energy efficiency are considered more cost effective than those in renewable energy sources, while the percentage of activities addressing energy efficiency and renewables are similar (cf. graph 3).

It should be noted that the Intelligent Energy-Europe programme stresses that all these activities should be considered not only at sectorial level but as parts of an integrated approach between energy efficiency, use of renewables and energy transport component.

Most cost effective activities by field



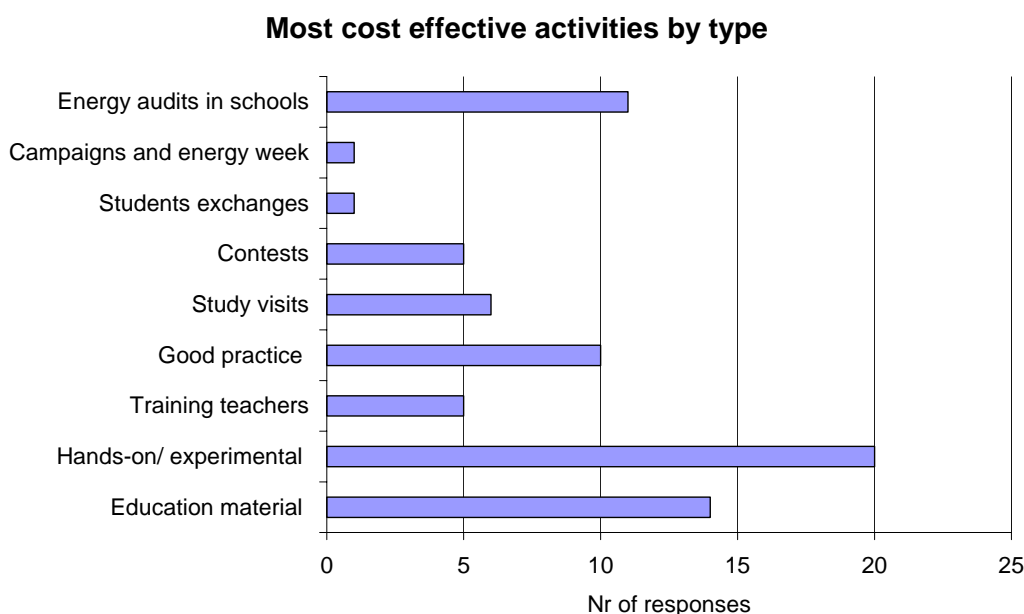
Graph 7

These results allow us to conclude that:

- Priority focus should be given on the field of energy savings, in particular energy efficiency at home, and to transport issues, especially in urban areas. Targets should be those of reduced consumption of energy, knowledge on the best efficient practices (labelling, low consumption lamps... etc) and awareness of the global impact and benefits of rational use of energy.
- Involvement in monitoring energy consumption, transport and mobility, and calculating greenhouse emissions of the schools themselves must be central to the approach in order to get students and teachers involved and committed. The activities and in particular the education material should address specific fields, e.g. efficient lighting with specific practical efficiency measures, including both technical and behavioural aspects.
- Targeting transport and mobility offers significant potential advantages including: reduced traffic congestion; increased safety for children, environmental benefits as well as the socialising and health issues. These can encourage more schools to take part in this worthwhile exercise. Most of the measures are no cost or even allow savings on fuel consumption borne by the parents who no longer need to drive their children to school.

3.2 By type of activities

As illustrated by graph 8, the activities considered most cost-effective are the hands-on/experimental type of activities, which can include energy audits although these are more targeted to older students. The production or adaptation of education material (kit, manuals, games, etc) is also considered cost effective.



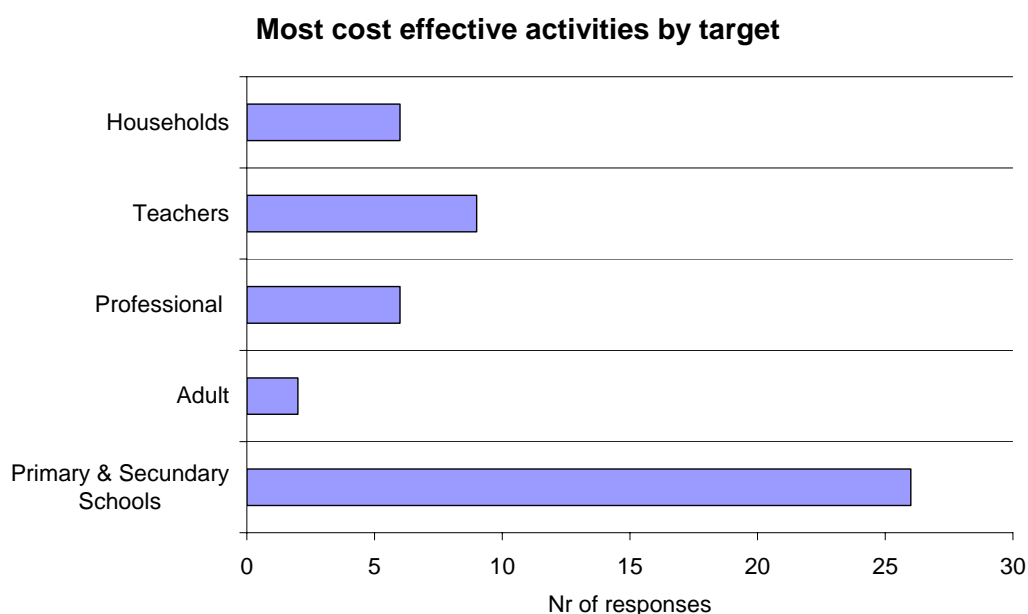
Graph 8

The survey shows that the following elements are needed for developing cost-effective activities:

- **Active involvement of students through experimental or hands-on approach.** Examples of activities that can stimulate the experimental aspects are:
 - a. Laboratory classes;
 - b. energy efficiency measures in the school;
 - c. simple installations using renewables in the school;
 - d. energy audits and monitoring of energy consumption of the school;
 - e. monitoring the results of the measures mentioned in b or c;
 - f. contests.
- **Integration of energy in curricula to create room (time) for energy issues.** This requires a cooperation with the education authorities, or at least with the school board and teachers.
- **Combine theoretical and experimental aspects.**
- Produce or adapt educational material in national languages. This aspect is particularly important for “smaller” countries (and not sharing languages).
- **Training of teachers.** Although this activity is not in in the list of priority under this question, answers to other questions and experience show it can be a n effective means to reach the students.

3.3 Target groups

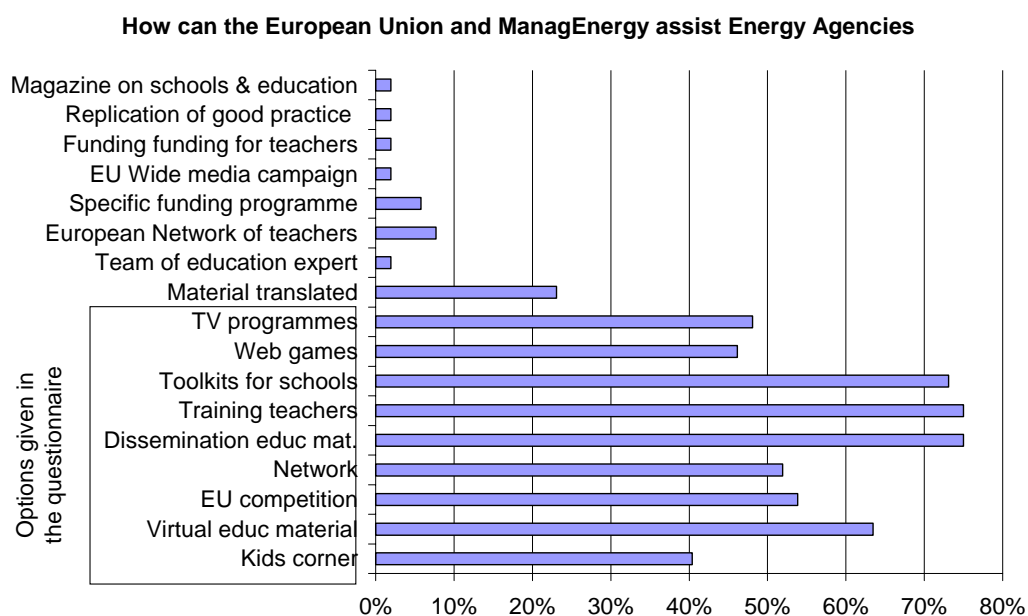
The target group providing the most cost effective activities are students from primary and secondary schools. Teachers are considered a privileged multiplier to reach students. Professional training (i.e. formation) is particularly important for energy managers (or influencing the use of energy) especially in schools and other public buildings since they serve as “leader by example” or shining examples). Naturally the formation of energy managers for buildings in general is also important and was often mentioned. This included also professional training related to university/professional education to integrate energy efficiency contents in courses like engineering courses and property management.



Graph 9

4 How could ManagEnergy assist Local Actors in energy education activities?

One of the questions addressed was on the type of support that they would like ManagEnergy to provide regarding sustainable energy education. The quantitative results are illustrated in graph 10. Some suggestions were proposed in the questionnaire (in the rectangle in the graph). Specific comments on every option are provided below.



Graph 10

Professional training of teachers. The early paradigm was to visit classes by professionals directly. The disadvantage was, as described above, that the knowledge did not live long in the school, and the teachers did not feel committed to follow-up. The children considered the visit “time off”. Training of teachers has many advantages, and given the positive effect of the teachers taking ownership of the energy-concepts, the efforts of training teachers is considered more cost/efficient in most cases. Teachers are the most effective multiplier to reach the students and a way of making the actions live in the school. Thus training teachers - or/and providing them with very good education toolkit - is very effective. The involvement of the energy agency - for example a visit of someone from the energy agency or a study visit organised by the energy agency – would provide a practical dimension to the activity.

Dissemination of information. Energy education should be delivered in a comprehensible way and in the children’s National language since most of the students can not speak other languages at that age. The preparation of educational material should take into account the cultural, social and teaching diversity of the countries concerned. Thus, it is recommended that **it is of no use to develop a common set of tools to be used by all schools all over Europe**. On the other side, a lot of tools on energy education in schools (kits, manuals, web sites) have been developed at local/national level. Schools are usually not aware of this material. Therefore, a first step could be to **collect all existing educational material** and make it available. This is particularly needed in countries where there is little material available.

“Kids Corner” on www.managenergy.net . The establishment of a “Kids corner” would serve in the first place to create a common facilitator and a reference for agencies, schools, teachers, pupils, and citizens. The task of the agencies will be to support ManagEnergy in identifying and adapting material available and to promote it at local level. If there are no energy portals for children in the country,

ManagEnergy could be a useful resource. However, if good resources already exist, it is probably more cost effective to develop these further because in order to avoid duplication of efforts.

EU-wide competitions with symbolic prizes. There are several successful experiences from contests and competitions mostly run at regional or national level. A competition for schools at EU level would pose some difficulties related to fairness, climate and culture differences, among others. However, a competition at EU level organised by ManagEnergy is possible if the energy agencies are the contact point for the schools.

Schools partnerships. Within the Comenius programme, DG EAC, Socrates, the action "School partnerships" provide financial assistance for the development of trans-national partnerships which seek to implement a trans-national project between schools. Representatives of schools authorities meet together in Comenius contact seminars to discuss on possible projects to be implemented at trans-national level. These seminars are organised by Socrates national Agencies in the Member States. ManagEnergy could contribute to a co-operation on energy education in European schools coordinating the involvement of energy agencies. The questionnaire sent to the agencies already opened the possibility of participating in a brainstorming on energy education. This initiative would enhance the possibilities for collaboration between agencies and school authorities which is lacking at the moment.

Thematic network on Schools and Education. Within the Intelligent Energy - Europe programme, horizontal Key Action 2 "Think globally act locally" foresees the establishment of thematic networks of local actors around a specific issue. DG TREN proposes to introduce in the specifications for the next IEE call for proposals (to be launched by the end of 2004) a specific mention of energy education and suitable types of activities/projects to be submitted. The idea would be to start creating a network between relevant actors at national and local level and to exchange best practices.

Others.

TV is naturally a powerful means to reach the young population and this option was appreciated by the respondents. However, it is our opinion that TV is a suitable means to create awareness for sustainable energy use but not for education purposes.

Since active participation /involvement of students are considered essential, all kinds of tools calling for interactivity seem to be appreciated. These include web based educational material, computer based games but also typical experiments "ready to use" (e.g. metering devices).

Energy agencies have a potential to implement energy awareness projects by developing partnerships with local players. The technical knowledge of the agencies is important for the development of the right content, the right educational tools and the right guidance of the educational process. But we should not underestimate the knowledge of specialized educators to translate the content of the educational tools. A specific training for energy-animators (non-technical) could be useful.

5 Conclusions and recommendations

The aim of this document is to provide preliminary recommendations on how ManagEnergy, as a tool to animate local and regional actors at EU level, could support activities on education as a means to promote end-use energy efficiency including in transport, and renewable energy sources.

For the purpose a questionnaire was launched and more than 60 answers from 23 countries were received. About 90% of the respondents have performed activities in the field of sustainable energy education, and two thirds of these have demonstrated success. Primary and secondary schools are the principal target for these activities. Teachers are mainly an intermediate target to better reach the students.

The main obstacle encountered by energy agencies and other local actors in carrying out educational activities is lack of funding and resources. Other obstacles mentioned are the lack of time in study plans and the lack of interest from school boards and teachers to adapt the curricula. Lack of credibility, often due to lack of continuity, is also pointed out. Interesting to note is that low interest from students is never mentioned!

Concerning the perceived most cost effective activities, the following recommendations are made:

- Priority focus should be given to **energy savings**, in particular end-use **energy efficiency at home**. Targets should be those of reduced consumption of energy, knowledge of energy efficiency measures (labelling, efficient lighting, etc) and awareness of the global impact and benefits of end-use energy efficiency;
- Targeting **transport and mobility** offers also significant potential advantages including: reduced traffic congestion; increased safety for children, environmental benefits as well as the socialising and health issues.
- The activities and in particular the education material should address specific fields, e.g. efficient lighting with specific practical efficiency measures, mentioning both technical and behavioural aspects.
- **Active involvement of students through experimental or hands-on approach**. Examples of activities that can stimulate the experimental aspects are: a) laboratory classes; energy efficiency measures in the school; simple installations using renewables in the school; energy audits and monitoring of energy consumption of the school; monitoring the results of the measures mentioned in b or c; and contests.
- **Combine theoretical and experimental aspects**. For example the “hands-on” approach mentioned above should be completed with quantification of effects like avoided greenhouse gas emissions. Involvement in **monitoring energy consumption**, and calculating greenhouse emissions of the schools themselves is important to get students and teachers involved and committed.
- **Integration of energy in curricula to create room –or time - for energy issues**. This requires co-operation with the education authorities, or at least with the school boards and teachers;
- Produce or adapt educational material in national languages. This aspect is particularly important for “smaller” countries (and not sharing languages).
- **Training of teachers**. Although this activity is not in the list of priority under this question, answers to other questions and experience show it can be an effective means to reach the students.

Some suggestions on how can ManagEnergy support local action are:

Professional training of teachers. The early paradigm was to visit classes by professionals directly. Teachers are the most effective multiplier to reach the students and a way of making the actions live in the school. Thus training teachers - or/and providing them with very good education toolkit - is very effective. The involvement of the energy agency - for example a visit of someone from the energy agency or a study visit organised by the energy agency – would provide a practical dimension to the activity.

Dissemination of information. Energy education should be delivered in a comprehensible way and in the children's National language since most of the students can not speak other languages. The preparation of educational material should take into account the cultural, social and teaching diversity of the countries concerned. Thus, it is recommended that **it is of no use to develop a common set of tools to be used by all schools all over Europe**. A first step could be to **collect all existing educational material** and make it available.

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EU-wide competitions with symbolic prizes is possible if the energy agencies are the contact point for the schools. The Comenius programme, DG EAC, Socrates, provide financial assistance for the development of trans-national partnerships which seek to implement a trans-national project between schools. ManagEnergy could contribute to a co-operation on energy education in European schools coordinating the involvement of energy agencies.