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Institute for Futures Studies and Technology Assessment

Workshop: Environmental Education

Renewable Energies for children and youth

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Index of contents

Workshop summary.....	6
Simone Probst: Editorial	14
Daniela Mormile: EC policies and tools for intelligent energy education.....	17
Christopher Waldén: ManagEnergy – a tool for local & regional energy actors.....	21
Janus Hendrichsen: The „Green Issue“ in all lessons	23
Susan Crothers: Integrating Renewables into the Classroom	26
Malte Schmidthals: UfU - an independent actor assists schools	32
Ina Angelova: Solar School Forum project and Bulgarian participation	35
Andreas Drack: Environmental Education by using the web	40
Brian Withington: NGOs supporting teachers	45
Stefan Leonards: "A serious global problem - but not for me!" - ways out of the emotional dilemma	47
Reinhard Kaiser: Opening of the Exhibition	52
Dr. Christiane Averbeck: BLK-Programme Transfer 21 – Education for sustainable development - Science goes practice	53
Eddy Deruwe: The research project FEEDU	56
Dr. Michael Scharp: The project “Environmental Education for Children and Youth”	61
Dr. Harald Kohl: Workshop Summary.....	67

Workshop summary

The importance of renewable energy sources is ever growing on an international scale. Yet a sustainable energy policy can only be successfully implemented with the positive attention of children and young grown ups. Still, renewable energies and environmental education face a serious lack of attention - be it in schools, at home or in the media. In order to enhance attention and to provide a platform for international cooperation, the German Federal Ministry for the Environment invited European stakeholders in environmental education ranging from NGOs to school boards and individual teachers to an international workshop in Berlin.

The workshop presented innovative European concepts for environmental education. Berlin school projects, the Polish Energy Bus and participants from all over Europe have presented themselves to demonstrate how environmental education for renewable energies can be improved in practice.

The Workshop "Environmental Education" has been commissioned by the Federal Ministry of Environment, Nature Conservation and Nuclear Safety in Berlin from 18th-20th of May 2005 in Berlin. It was organised by the Independent Institute of Environmental Concerns UfU e.V. (Coordinator), the Institute for Futures Studies and Technology Assessment and Iserundschmidt Consultancy.

Thirteen speakers from Austria, Belgium, Bulgaria, Denmark, Germany, the United Kingdom and Sweden have been invited to present projects, strategies and different approaches of their national situation and to discuss with the nearly 70 participants about their projects, new approaches and new strategies to enhance the environmental education. The conference was live broadcasted via Internet TV with the support of ManagEnergy. On the website of ManagEnergy all presentations are available as videos on demand: www.managenergy.net

The first lecture was held by **Daniela Mormile** (Italy) who works at the European Directorate-General for Energy and transport DG TREN's Unit for promotion and dissemination of programme results in Brussels. DG TREN works on supply and demand policies, the support of combined promotion of demand management and supply from Renewables, the development of instruments and the integration of relevant key actors. One of the major goals of the EU is to save at least 1% of energy per year. That raises the question of how to be more efficient? The answer is well known: minimisation of energy waste, increase of the efficiency of power generation units and appliances using energy efficient technologies, reutilization and recycling, improving the transport sector and last but not least change of the social behaviour in order to rationalise the use of energy. Therefore it is important to learn to be more efficient - and in fact to realise that only modifications of behaviour have a long lasting impact. The possibilities of the EU in this respect are restricted. Responsible energy behaviour can not be imposed with centralized policies and measures. Nevertheless, education will be the right choice as a tool. In this regard an integrated approach is needed. All actors - like pupils, local authorities, schools, teachers, parents and energy agencies - have to be involved. The measures should apply to primary and secondary education, adult education and formation and professional training of teachers. On this goal the EU strategy is to collect existing teaching material, to work more closely with the actors, to establish thematic networks, to develop new tools like EU-wide competitions as well as to promote educational initiatives. On the base of these goals the DG TREN has raised a lot of initiatives: the web platform www.managenergy.net, projects for intelligent energy use in Europe and programmes like Comenius or initiatives for sustainable development. There are some remarkable results within the research projects. For example: Nearly 90% of energy agencies have activities in schools. Their actions concentrate on pupils of primary and secondary classes with projects on energy efficiency. Despite of their engagement there, most of the actors encounter the same obstacles: lack of funding, low interest of school boards and teachers, poor cooperation with educational authorities and integration problems of the projects into regular teaching. Nevertheless, the EU and DG TREN will support environmental education. A lot of good projects have been set up. But there is a strong need

for further dissemination and further projects. These new projects must consider an important fact: cultural, social economic and language differences must be respect in order to achieve good results in practice.

The second lecture was hold by **Christopher Waldén** form the Swedish Energy Agency Energimyndigheten. The Agency has launched for the EU's DG TREN the most important website for communication results on questions of energy in Europe: www.managenergy.net. The website contains information on renewable energies and energy efficiency. A wide range of actors like for example energy agencies all over Europe are listed. Further information pertaining to case studies, best practice, programmes and funds are as well provided. The goal of ManagEnergy is among other things to encourage and support networks in Europe. Therefore every energy agency or research institute is invited to post its profile on the website. The website is an ideal communication portal for research and networking. Another goal is the hosting of workshops and conferences. Nearly ten events are hosted by ManagEnergy every year by broadcasting presentations and talks live on the internet and by providing the broadcasts on demand after the event under www.managenergy.net. The talks and presentations of the International Workshop on Environmental Education are also available at this website. The acceptance of the platform has continuously risen since its launch in 2002. Presently, nearly 75.000 pages are viewed every week. On the basis of these results ManagEnergy goes forward. Next intended project will be a European Energy Education portal with websites for youth and for kids.

The third lecture by **Janus Hendrichsen** covers the Danish environmental education. In 1993 the "Green Issue" has become an obligatory part of all lessons in Denmark. The green issue is a "lesson-less" subject like other subjects in Danish teaching. It has no background in specified methodology or contents. Within teaching the green issue, pupils should have the possibility to connect science-related viewpoints with the methodology of other subjects. It can be reached by environmental projects as well as by extracurricular activities. The introduction of the green issue in 1993 raised some problems. A lot of teachers taught environmental education. But most had not done it before and didn't know how to teach the green issue without a curriculum. A lot of teachers thought the green issue to be only a topic for the natural sciences. The Danish government decided thereupon to support new initiatives to develop materials for teaching and to aid schools in teaching the green issue. After several years the good results proved the initiative to be right. Teachers opened their subjects to the new issue; other actors were involved in teaching and a general debate on the need for constant development of the educational system started.

Nevertheless teaching RES at school is not that simple. It is necessary to create an "ownership" among teachers - teachers have to be themselves convinced of RES. The curricula must contain clear contents, expectations and descriptions of outcome and evaluations on teaching RES. The cooperation of the Ministry of Education with teachers, teachers' resource centres and other actors within environmental education helped to disseminate the experiences. For example: a plenty of materials have been developed for schools and context based subjects of RES have been specified. Different methods have been proved and main obstacles identified. One of the most important obstacles is the "ownership": If everyone is responsible for climate change, no one really is. If everyone is responsible for teaching RES, no one will teach it in the end. Therefore, "ownership" must be passed on to the actors of environmental education, teachers and simply everyone who consumes energy.

The fourth lesson on Wednesday was hold by **Susan Crothers**, UK, who represents the Norfolk Schools Energy Club. The club is part of the community based carbon reduction programme CRed. The aim of CRed is to develop and implement a strategy to reduce carbon emissions by 60% by 2025. The method of achieving this goal is to work with a wide range of community groups (e.g. businesses, local government, industry, villages, towns and individuals) looking at the causes for carbon emissions. Then CRed establishes together with the respective groups methods of reducing energy waste etc. In this context pupils will be the energy manager of the future. Therefore they will be educated in sustainable energy

management. Schools are a good example as they use in fact a lot of energy: Norfolk Schools alone consume 157.000 MWh p.a. The carbon emissions from this are 39.337 tonnes. In order to create an impression beyond the bare fact, CRed transfers these figure into an equivalent of hot air balloons which could be inflated by the emissions – in this case 2.268!

The Schools Energy Club promotes a six stage programme which provides a strategy for schools to put in place an energy management system. The programme is designed to be set up by pupils with the necessary support from the teaching staff. The club provides an energy management handbook with additional materials and resources and works with around 25 schools per year, helping them with classroom-activities etc.

The opportunities for Renewables in the classroom already exist. It is not necessary to invent new ideas. For Renewables to be taken into the classroom, they must fulfil curriculum requirements. Many renewable technology resources can be used to develop learning skills. Renewable technology can be used creatively to make normal lessons interesting and topical. RES are still seen as ‘new’ and exciting although the principles are old knowledge. The Schools Energy Club feels it to be essential that we equip the children with the right knowledge and experience to make sustainable decisions regarding energy resources.

Within the working group **Malte Schmidhals** (Germany) presented the wide range of tasks working in an institute promoting education on RES and energy efficiency. The UfU department of Climate Change and Education is devoted to support both the saving of energy and the use renewable energy at schools. UfU provides help with the undertaking of lessons, pupils’ projects and excursions. Furthermore, UfU concentrates on learning outside schools, for example at youth clubs, nursery schools, kindergartens, youth hostels and recreational facilities. One of the most successful initiatives UfU has developed has been the incentive system fifty/fifty. By this system, energy-saving schools are refunded with 50% of the saved amount.

After the lessons of Wednesday **working groups** have been constituted. The first round on Wednesday considered three questions:

- How is RE integrated in standard lessons?
- What are the possible reasons for the absence/presence of RE in general school lessons.
- How can we do more to integrate RES?

It was common to all countries represented by the participants that RES are seldom integrated in standard lessons. Usually, RES are taught in extra lessons, f. e. in Germany, Denmark, Italy, Bulgaria, the United Kingdom or Slovenia.

The working groups stated a general lack of motivation as a major obstacle. It was assumed that it results from a generation-problem: Most of the teachers now teaching have been trained before RES have been a viable economic option. Moreover, the phenomenon of global climate change was not part of their university-training. As a result, environmental problems or technology progress in RES are only known by them if they are personally interested. All participants of NGO’s agreed that it is extremely difficult to convince teachers to integrate RES into their lessons even when it is obvious that RES lend themselves easily to many subjects, f. e. in history (use of windmills, change of landscapes), social sciences (political decision processes) or in maths lessons. Participants from Denmark and Bulgaria pointed out that a further obstacle to teaching RES could be the controversial political discussion on their expansion. The solution to the dilemma was mostly seen as the top-bottom option by changing the curricula via the educational authorities.

RES are of course not the only topics necessary for a sustainable education: health education, social behaviour and a general “education for living” were as well proposed. It was generally felt that a lack of (unbiased) information lets politicians hesitate to act in this field. Another barrier mentioned is the PISA discussion. As PISA concentrates more on knowledge

than on skills, teachers rely less on project-orientated education – a fact with negative repercussions on RES in schools because they are frequently taught via projects.

The public support was controversial discussed. There is a small base of support all over Europe, but political interests or financial restrictions could rapidly change the climate of promoting RES in schools. Most of the participants from abroad mentioned how difficult it would be to raise money for similar international workshops back home. It was generally noticed that the workshop was a good opportunity to exchange experience and ideas.

Solutions to overcome these obstacles could be workshops with decision makers, the involvement of local communities and teachers and better materials for teachers. Furthermore, interdisciplinary teaching - i.e. a history teacher teams up with a natural science teacher in order to explore problems of climate change during the Roman Empire - would provide helpful new ways in teaching in spite of the overall difficulties in setting up cooperation between teachers. It must be a common goal of all stakeholders to interest teachers and political decision makers for RES. Of course, it proves to be difficult to identify the right channels of communication with politicians who aren't yet convinced of RES. Last but not least the positive image of RES must be used as instrument to convince those who remain today inactive. Therefore, new communications strategies have to be developed. All media should be used to "sell" the message to all kinds of possible recipients.

Success factors, too, have been identified within projects on RES as well as in cooperation's between schools and NGO's. Amongst the most frequently mentioned success factors were training for teachers, a focus on local problems, the liberal interpretation of curricula, and "open" subjects like "natural sciences" (f.e. in German sixth classes). Nevertheless, it is necessary to assist interested teachers by developing material on RES. In regard of the shared experience that teachers fear to interpret curricula all by themselves it proves helpful to provide a vast choice of important subjects on RES like climate change, shortage of fossil fuels, a vision of the future, centralized vs. decentralised supply systems, quality of life, clean energy or energy saving initiatives. Another important success factor is the "do-it-yourself" component of teaching RES. Learning by doing has been considered much more effective than ex-cathedra lessons.

Ina Angelova's talk (ISES Bulgaria) covered an international research project: The Solar School Forum, supported by the European Commission. This initiative is aimed at improving children's and young persons' knowledge of energy efficiency and renewable energy issues, also enabling them to raise awareness among their parents and families. The project focuses on pupils, since today's children will play an important role in addressing energy-related problems as grown-ups. ISES will be carried out in countries in Eastern and Western Europe: Germany, Hungary, Poland, Romania, the United Kingdom, Denmark, Norway, Finland, Italy, France and Bulgaria.

Project activities contain a broad spectrum of measures like questionnaires for teachers, workshops with teachers and administrative staff, a website, a national and international competition, energy days at school with information, actions and exhibitions, the collection of "best practice"-examples and the development of teaching materials.

The Bulgarian project contains all these measures. The results of the teachers-questionnaire resemble the experience from other countries. Nearly 55% of Bulgarian teachers are familiar with renewable energies. But only two schools could be found using renewable energy installations. Teacher complained – as in other countries – about the lack of information on RES. One specific point within the Bulgarian project has been the cooperation with "Mime Studio Alba". The studio developed a mime play on Renewables for primary schools. They presented plays like "The stolen sun", "A ray of light", "Water", "Fire" to interest children in questions of energy.

Andreas Drack, Oberösterreichische Akademie für Umwelt und Natur from Austria, held the seventh lesson. He emphasised that a policy against climate change could only succeed by permanent cooperation of different groups.

For most people the daily work would be impossible without using the web. Yet most users know that the resources of the web are not sufficient for successful work especially in large-scale projects. The web provides lots of information, yet the time available and the skill in using the internet limit the web's usefulness. Finding partners and tools are two tasks easily managed in the web. But it is difficult to find real-life experience and insider-information on projects in the web. The real limit of the web is the fact that very often the face-to-face communication proves to be the essential success-factor in large-scale projects, especially in aspects of finance. Services like energy-advice or installation-aid are often necessary in energy-projects. Therefore regional services have to be co-ordinated via personal contacts.

Brian Whittington, Director of Business & Education London South (BELS, United Kingdom) presented in his talk a successful model of partnership between the Natural History Museum, the Energy Conservation & Solar Centre (ECSC) and the Director of Business & Education London South.

The ECSC is involved in energy efficiency and renewable energy. It carries out the development and implementation of programmes to create socially responsible sustainable energy futures. ECSC's focus is on the development of practical, locally focussed programmes throughout the UK, in households of all tenures and income levels, businesses, public sector establishments and local authorities. BELS is the education business link consortium of six south London boroughs and is responsible for work experiences for students, training of teachers, students and school activities and a sustainability programme for schools. Within this programme the organisation is responsible for standards in schools concerning matters of environmental education. The programme contains training for teachers on energy efficiency and use of renewable energy, water use, recycling and delivering teaching in the subjects.

The ninth talk was held by **Stefan Leonards** (Germany) from iserundschmidt consultancy, who presented a German research project on the improvement of environmental education. He pointed out that the environment is no longer a topic of choice for pupils. Emotional barriers against moral-ridden approaches can be perceived. The perception of 12 to 19-year-olds is on the other hand strongly influenced by modes of identification presented in everyday pop culture. If environmental education is not to be limited solely to the ecologically engaged minority, a complete rethinking would be needed. Environmental education has to adapt with the media-based perception patterns of youth culture and should allow children and youth to adopt their own position - using their own language and their own methods. It should provide potential for modes of identification: Polarising, youth-oriented presentation forms such, as satire, self-irony and humour are useful. The pilot study, in which fashion statements held a central place, shows that adopting youth aesthetics to challenge the traditional school situation can reach the pupils and start of vigorous debates: www.die-erneuerbaren.de.

After that lesson a second round of working groups was constituted as "open groups".

The first working group with **Brian Whittington** as a speaker concentrated on the marketing of RES. NGO's could be the most important promoter of RES, but could it be possible to "brand" RES like a sports shoe? Is it really possible to make RES sexy like Stefan Leonards claimed in his lecture? These questions were controversially discussed in the working work. Probably it could work at the primary level when children could be fascinated for technique. But this raises another question: Children should be educated as self and critic responsible persons, they not should be convinced to something what is not self-evident. Nevertheless the participants noticed, that RES are not to be discussed along the lines of "good" or "bad" energy - only the way of using and implementing RES could be discussed controversially. Adults are more complex to be convinced of RES, f. e. the question of financial grants for PV, windmills or solar heating. The general discussion ignores the fact that conventional energies and nuclear power have been subsidised over decades and they have now a head start. A strategy of marketing needs better public relations activities. RES could be popularised for schools by competitions like the scholar school forums competition or the photo competition in Ireland with the title "Capture the climate change". A lot of advantages - like the creation of

jobs by renewable energy companies - should be used for better promoting RES. For example: With the political change in Denmark which guides to non-observance of windmill technology big companies left Denmark as a Danish participant remarks.

But RES have something different to other products. A sport shoe, a tee shirt or an aftershave could be branded as cool. Everyone could buy it, could wear it. Low costs led to a widespread consumption on these types of products. Renewable energy facilities are expensive, children can't afford them and they are (mostly) fixed to house. Therefore new products are recommended anyone could buy and use in daily life. Furthermore events with Renewables are considered as important. Festivals, parties and school events could help to "brand" RES as new, sexy and high-tech.

The second working group with **Stefan Leonards** as speaker tackled the questions of peer group influence and "how much pop do we have to take". Kids in secondary education are much influenced by their peer groups. Their formation is even more influenced by their friends as by parents or teacher. The working group searched for way to reach these pupils and offered the insight, that teaching by children and youth could be a suitable way of creating energy friendly peer groups. The question of "how much" was discovered to go both ways: "How much ecology do we have to take" would be the reverse question to "how much pop do we have to take?" It was noticed that it is necessary to try to change one's own viewpoint and to face the fact that hesitations on all sides exist against either ecology or consumerism.

Ina Angelova represented the third working group. They concentrated on the question "What could help?" The most favourite mentioned have been actions at school. Successful events like the "Celebration of the Sunday" or "Tag der Erneuerbaren Energien" as well as open days of science could fascinate children and youth. Exhibitions at school should also be successful in fact that they ask for initiatives of the school. Excursions also have been a good promoting factor. Thereby was mentioned, that youth don't know much of possible jobs dealing with RES. A better public dissemination by every kind of media is necessary too as well as training courses with teachers and competitions in energy saving or RES projects.

Dr. Cristiane Averbek from BLK-Programme Transfer 21 (Germany) hold the tenth lesson on Friday. Transfer 21 introduced a new subject into Germany's classrooms: sustainable development and renewable energy. From 1999 to 2004, almost 200 schools participated in the programme. Germany's Federal State Commission initiated this programme for the Planning of Education and the Promotion of Research (BLK) to formulate curricula for the teaching of sustainable development in German schools. Based on the results and experiences of it's predecessor, "Transfer-21" started in 2004 and runs until 2008. Transfer-21's preliminary objectives are to put sustainable development on the agenda of at least 10% of the schools in Germany.

Since Germany's low results in Pisa, the development of "Gestaltungskompetenzen" has been a very important topic. To explain "Gestaltungskompetenz" is by no means an easy task, as the concept includes many facets and layers. It is the ability to identify problems of sustainable and non-sustainable development and to apply knowledge about sustainable development. Furthermore, pupils should learn to draw conclusions from current analyses and forecast about ecological, economical, and social developments and their mutual dependence. Last but not least, they should be able to make, to understand and to implement decisions based on the analyses.

Eddy Deruwe, General Manager of the Centre Urbain (ABEA-Brussels Energy Agency) in Belgium, presented in the eleventh lesson the international FEEDU-project. The FEEDU-project is titled "persuasive force of children with regard to the energy consumption through education". It's an interdisciplinary educational project at primary school level with the focus on energy awareness of children and specific emphasis on the training of educators and teachers. It's an international project implemented by 13 energy management agencies throughout Europe (and a few specialised educational organisations), supported by the EIE-program of the European Commission for 2 years.

The FEEDU-project wants to implement an energy related project-learning strategy at primary schools, enhance the knowledge of teachers in energy related issues, stimulate a network of teachers for exchange of experiences and ensure a broad availability and use of energy related educational tools.

FEEDU is based on project-based learning where children are analysing the situation, searching for answers and solutions. In order to implement the project at school level, teacher courses are organised with the aim to introduce the energy and mobility subject, the use of educational tools and project learning methods to teachers. The educational challenge is to make a range of coherent valuable energy related educational tools which are both ready-to-use and fun- to-use available for project based learning strategies. The integration of the educational tools, resources and linked information into the learning plan will be assessed as well.

The project dissemination tasks aim for the transfer of best practise examples from the project via national workshops in each country, as well as by and follow-up workshops on an international level. FEEDU is confident that the results of the evaluation will convince the educational authorities with very sensible arguments to insert energy and mobility related issues as a priority into the curriculum.

Dr. Michael Scharp from the Institute of Future Studies and Technology Assessment (Germany) held the last lesson. He presented the German research and development project "Environmental Education for Children and Youth Concept Study" undertaken on behalf of the Federal Ministry of Environment, Nature Conservation and Nuclear Safety. The project was jointly undertaken by the research institutes UfU (Independent Institute for Environmental Concerns) and IZT (Institute for Futures Studies and Technology Assessment) and the public relations consultancy iserundscheidt. Its aim was to find new methods to communicate the issue of renewable energies and develop new practical ideas and projects to stimulate greater interest and enthusiasm for this topic among children and youth. This concerned not only communication concepts but also to new research project to enhance the interest for RES by children and youth. The project addressed two key questions:

- How can we raise the awareness of children and youth concerning the issue of renewable energies?
- What support can we offer teachers involved in environmental education on the issue of renewable energies?

The first question has been particularly answered by Stefan Leonards in his lecture (see above). The second question has been the main content of Dr. Scharp's lecture on the research of UfU and IZT. The findings of the study are based mainly on the evaluation of teaching materials and interviews with experts. Within regarding the available literature it could be asserted that there are lots of good materials for teaching RES in Germany. Only certain energies forms like hydropower are but rarely featured. The main results of the interviews have been that it is very difficult to find the literature by the teachers. Therefore the research partners launched a website www.izt.de/eejug to present recommendable materials. The second goal concentrates on demands for communication of RES. The research project revealed that action was especially needed in three areas:

- According to the results of research into educational materials and expert interviews, up to now environmental education on renewable energies has occurred mainly at secondary level. But education begins in kindergarten and could be done in a lot of places out of school like youth clubs, in leisure time and in kid's holidays.
- Teaching could be done in new ways. In the past, extracurricular activities have been largely ignored. One possible solution are teaching RES in computer study groups by games on RES. Furthermore school demand for attractive actions to present RES like touring exhibitions, guides for locations of RES, experiments for festivals. By this way the communication on RES should be enhanced.

- Teacher training is also an open topic: at university teachers learn professional skills and education science. Up to now, such courses have barely touched on renewable energies.

Last but not least, what could be present as the workshops results are four thesis:

- **First: There are no ready-made solutions for helping to include Renewable Energies into general school lessons. All teachers and all school classes will have different needs depending on age, knowledge, personal interests, pedagogical situation and other things.**
- **Second: If you offer projects to school make sure that this will be a long term available offer, because often a teacher cannot participate immediately but have to wait for the next term, the next class or just to have some spare time.**
- **Third: Teaching units should be produced in a way that a teacher can use them directly as a whole but he also should be able to select single modules out of them.**
- **Fourth: If you want to support from the outside and have a scientific or technical view, make sure that pupils can cooperate in a practical way. That means often simplified however not falsified truths**
- **And at last: We always should remember, that - at least in our country - schools have no much money to spend. So if they shall include RES generally and not only sometime or other, our ideas and offers should not cost anything or very little. And teaching materials should be easily and cheaply be reproducible.**

Simone Probst: Editorial



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This year Germany celebrates the Year of Albert Einstein. Albert Einstein was a great physicist, a convinced pacifist AND a great teacher. Although he might have been less successful as an academic teacher than in his role as a scientist, he nevertheless knew how to make the best of his opportunities: the myth of being a genius, the world wide public response. And he was capable of filling young people with enthusiasm; he knew how to fire their curiosity and interest. Even with regard to such seemingly ponderous topics as technology and sciences.

This seems to be lacking sometimes in Germany today. We are not doing very well in educating young people in this field. We did not score well in the PISA studies. It is precisely in the field of technology and science education that we now need to put our shoulders to the wheel.

Are there comparable experiences in other countries? What do colleagues in other European countries do differently, what do they do better? And what are their matters of concern?

If there is no knowledge of environmental and energy issues, how to kindle enthusiasm? We will only achieve enthusiasm and affective action, visions and targets for a sustainable future in accordance with human needs if we understand these phenomena. Or vice versa: only those who are enthusiastic and deeply committed can solve the problems of our energy supply in the future.

Environmental communication and in particular information on renewable energies has quite a lot to offer in this field. Wind energy and hydropower, solar energy, geothermal energy and bio-energy are all what we call new energies. They are clean, climate friendly energies. Therefore they present the best starting point for what pedagogical experts call 'positive emotionalisation'.

In Germany renewable energies are undergoing solid and impressive growth. They contribute to an economic upswing and generate new jobs. They are a future oriented topic. The Federal Government has set itself ambitious targets for the further exploitation of renewable energies in the field of heat and power supply. This also holds true for the transport sector. We are well on the way to achieving these targets.

Wind energy is booming in Germany, last year more photovoltaic installations took up operation than ever before. By 2010 we will double the share of renewable energies in our electricity supply as compared to 2000 - to 12.5 per cent. The target for 2020 is 20 per cent.

We do have a vision: by mid century at least half of the energy used will come from environmentally sound, climate friendly and sustainable sources of renewable energies.

It is always better to learn together. This includes talks and discussions as well as an open and unbiased exchange of experiences. In the next two days we invite you to share the knowledge we gained in several projects and research activities about communicating environmental issues in the field of renewable energies. We should like to talk about our understanding of how to improve knowledge about and acceptance of renewable energies at schools. We should also like to discuss out-of-school education and the media. Leisure activities, television and Internet have an ever-increasing influence on the realities children and young people experience in and out of schools.

Can we use these new spheres of communication outside the classroom in order to reach new target groups via new means?

The scientists working on our various projects have carried out surveys. The result: most young people feel that environmental protection, climate protection and renewable energies are important and interesting topics. But with their friends they prefer to talk about clothes and fashion, sports and stars. It is the music and sports industries which decide what is cool, climate protection and renewable energies are not cool at all.

But these things are not mutually exclusive. Pop and practice can go hand in hand, supplement and benefit each other.

In Germany we have learnt that topics like renewable energies very often only attract the 'do-it-yourselfers' and committed technicians among the young. That's not enough. Such future oriented topics should be dealt with by all age groups, all disciplines, in all spheres of life:

Solar energy in the kindergarten: Why are technical topics like this very often neglected among the very youngest?

Learning foreign languages – what about making wind parks the topic of English lessons?

And finally: Why do we only work with textbooks and experiments? What about an Internet game as a means of raising interest in renewable energies?

Fresh ideas and new approaches: This is what we hope for in these next two days.

Teachers, scientists, specialized educationalists and experts from more than 20 countries have come to join this Workshop. They represent a vast wealth of experience from very different spheres and approaches. Colleagues from Romania and Slovenia will probably describe different experiences and problems from their colleagues in Switzerland or the United Kingdom. Also the policies and tools of the European Union, which wants to ensure and support a sound education in energy issues, are being presented.

When talking about children and youth, we should also let them have a voice. Therefore the presentation of students' projects by students is also part of this workshop. And tomorrow they will present their projects to the plenary session, as any effort and commitment to promote a sustainable future for our energy supply gains further momentum when it is communicated actively.

Curiosity is the starting point. It has to be raised, nurtured and further developed. Successful education depends on people being really interested in the matter, on this 'divine curiosity which is inherent to every child but often becomes stunted prematurely' as Albert Einstein put it, with a certain feeling of frustration.

Let us work together to ensure that at least in this point he is not proven right.

Author

- Born 3 December 1967 in Hannover; married, three children;
- studied for the diploma in physics at the University of Paderborn, majoring in applied physics
- 1989-1994 chairwoman of the Grünen parliamentary group of the Paderborn district council

- member of the Bundestag since 1994;
- until 1998, parliamentary secretary of the Bündnis 90/Die Grünen parliamentary group, and spokeswoman on research policy for this group;
- since 1998 Parliamentary State Secretary to the Federal Minister for the Environment, Nature Conservation and Nuclear Safety; re-appointed for the 15th legislative period (2002-2006).

Institution

Until 1986 environmental matters were dealt with by three different ministries within the Federal Government: the Ministry of the Interior, the Ministry of Agriculture and the Ministry of Health. On 6 June 1986 the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety was established. Since then it has been responsible within the Federal Government for (lead-managing) national environmental policy. The Ministry, which under a resolution of the German Bundestag has its principal office in Bonn, has some 830 employees in six departments there and at its second office in Berlin. The Federal Environment Ministry's sphere of responsibility also embraces three federal agencies with a combined total of more than 1,880 employees: the Federal Environmental Agency (Umweltbundesamt), the Federal Agency for Nature Conservation (Bundesamt für Naturschutz) and the Federal Office for Radiation Protection (Bundesamt für Strahlenschutz). The ministry also receives advice in the form of statements and expert opinions from several independent expert bodies. The principal advisory bodies are the Council of Environmental Advisors (Rat von Sachverständigen für Umweltfragen) and the Advisory Council on Global Change (Wissenschaftlicher Beirat Globale Umweltveränderungen).

Daniela Mormile:
EC policies and tools for intelligent energy education



Daniela Mormile

(Italy)

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Abstract


One of the major goals of the EU is to save at least 1% of energy per year. That raises the question of how to be more efficient? The answer is well known: minimisation of energy waste, increase of the efficiency of power generation units and appliances using energy efficient technologies, reutilization and recycling, improving the transport sector and last but not least change of the social behaviour in order to rationalise the use of energy. Therefore it is important to learn to be more efficient - and in fact to realise that only modifications of behaviour have a long lasting impact. The possibilities of the EU in this respect are restricted. Responsible energy behaviour can not be imposed with centralized policies and measures. Nevertheless, education will be the right choice as a tool. In this regard an integrated approach is needed. All actors - like pupils, local authorities, schools, teachers, parents and energy agencies - have to be involved. The measures should apply to primary and secondary education, adult education and formation and professional training of teachers. On this goal the EU strategy is to collect existing teaching material, to work more closely with the actors, to establish thematic networks, to develop new tools like EU-wide competitions as well as to promote educational initiatives. On the base of these goals the DG TREN has raised a lot of initiatives: the web platform www.managenergy.net, projects for intelligent energy use in Europe and programmes like Comenius or initiatives for sustainable development. There are some remarkable results within the research projects. For example: Nearly 90% of energy agencies have activities in schools. Their actions concentrate on pupils of primary and secondary classes with projects on energy efficiency. Despite of their engagement there, most of the actors encounter the same obstacles: lack of funding, low interest of school boards and teachers, poor cooperation with educational authorities and integration problems of the projects into regular teaching. Nevertheless, the EU and DG TREN will support environmental education. A lot of good projects have been set up. But there is a strong need for further dissemination and further projects. These new projects must consider an important fact: cultural, social economic and language differences must be respect in order to achieve good results in practice.

Presentation





EU policies and tools for intelligent energy education

Daniela Mormile
DG TREN of the European Commission




EU Energy Policy Objectives

- Security of supply
- Competitiveness
- Sustainability
 - At the top of the political agenda
 - EU aims at reducing its GHG emissions by 8% by 2008-2012 compared to 1990 level
 - Energy production and use create more than 80% of GHG emissions


Energy supply

- Supply of energy is centralised
- EU scarce resources, increased dependency from outside world
- High Investment costs
- Negative environmental impact
- Dependent on market conditions



Energy demand

- Reduction of demand could lead to savings of 20% of energy consumption
- Energy demand is decentralised and dispersed
- Positive environmental impact
- Low investment costs
- Use of endogenous resources
- Dependent on individuals and life-styles



A new priority.....


Integration

- of supply and demand policies
 - of RUE and RES
 - support combined promotion of demand management and supply from renewables
 - of instruments
 - combining legislation, technology, information, training, etc. and make tailored packages
 - of actors
 - involving all relevant key actors at the appropriate level(s)




.....within a global political mandate

- To save at least 1% of energy per year.
- Comply with EU commitments under the Kyoto Protocol acting at local level on demand side
- To act according to Johannesburg's conclusions: local Administrations responsible for action on climate change, at the same level than National Administrations.



How to be more energy efficient?

- Minimisation of energy waste
- Increase the efficiency of generation units and appliances by using EE technologies
- Reutilization and recycling
- Improve the relation town/suburb, including localization of production and commercial companies as well as the product transport organizations
- Change the social behaviour in order to rationalize the use of energy.



Learn to be more efficient: why?

- Modification of behaviour has a long lasting impact
- Responsible energy behaviour can not be imposed with centralised policies and measures
- Changes in behaviour are the result of individual decisions
- Energy responsible behaviour is profitable
- Efficiency and behaviour influence each other (higher efficiency leads to cheap service prices)



Education

- It is an appropriate tool to induce changes
- It is mainly for children - but not only
- It is based on integrated approach (local authorities, schools, teachers, parents, energy agencies, psychologists,...)
- It works!



EU Target fields for an education strategy

- Primary & secondary education
- Adult education
- Formation and professional training



Primary & secondary education

- **Actors:** teachers
- **Beneficiaries:** kids
- Kids as future decision makers
- Kids as "education brokers" with their parents
- Widely different contents and materials for primary & secondary schools
- Energy as part of the basic educational programmes in schools: educational rather than dissemination approach
- Implementation at local level, cultural consciousness
- Expected short-term effects in energy terms



Adult education

- **Actors:** energy organisations at all levels in cooperation with communication specialists
- **Beneficiaries:** general public
- Energy education as part of the moral basis of each individual: responsibility, respect, social behaviour
- Aiming to change behaviours
- High investments, long-term returns
- Combined approach: local and overall for 'marketing'



Formation & professional training

- **Actors:** energy specialists
- **Beneficiaries:** professionals
- Training of teachers
- Include energy aspects in the curricula of architects, planners, transportation, economists, etc.
- Development of new professions: RES installers, ESCO specialists, energy advisers, etc.
- New skills for professionals



EU strategy

- To collect existing material (handbooks, school-kits, games ...) developed by energy agencies
- To work more closely with teachers, experts on education and educational authorities at local level
- To establish a thematic network of energy agencies specialised in education
- To develop new tools (educational information on RES and RUE, interactive games, EU-wide competitions)
- To promote educational initiatives at national and international level



Tools (1)

- ManagEnergy:
 - Kids-corner
 - Collection of best practices
 - Training of energy agencies on education
 - Streaming of more local and regional conferences, workshops and meetings
 - ManagEnergy Streaming Tool (advise and guidelines)



Tools (2)

- Intelligent Energy - Europe
 - Establishment of a thematic network (HKA2)
 - Organisation of specialized training (HKA2)
 - Dedicated proposals (ex FEEDU)
- Other EU programmes/initiatives
 - Comenius programme (DG EAC)
 - Sustainable development initiatives (DG ENV)
 - Other EU promotion activities (i.e. Public Awareness Campaign DG TREN)



Agency activities in education: main findings

- 90% of agencies have activities in schools and education
- Almost all education activities aim at pupils of primary and secondary schools
- Types of activity:
 - Education in energy efficiency (EE at home) is considered more cost-effective than those on RES
 - Energy in transport and mobility issues
- Hands-on activities are more cost effective (90%) than other (handbooks, energy audits...)

Agency activities in education: main obstacles

- Lack of funding, time and resources (70%)
- Low interest of school board (25%)
- Low interest of teachers (21%)
- Poor cooperation with education authorities (10%)
- Difficulties in integrating into schools' programmes (19%)
 - Question: are the agencies the most appropriate organisation to deliver this type of services? (credibility)

Energy Intelligent-Europe: a framework for support.

Ideas for project proposals

- Thematic network on Schools and Education, e.g. Network on Energy Intelligent Schools
- Development of web-based educational information and interactive games
- Further dissemination of Best Practices – including RES & RUE in national curricula
- National/International Service Centre(s) for RES & RUE – dissemination of educational materials

More project ideas

- Professional training of teachers (also before they become teachers)
- Develop, update and distribution of self-explaining energy tool kits for schools
- Translations and dissemination of other educational information and interactive games
- Move on to television! (Develop RES & RUE television programmes for children)
- But before preparing a proposal: consult Intelbasebase <http://europa.eu.int/comm/energy/iebase> and ManagEnergy www.managenergy.net

Some useful links

- Energy Smart Schools (US):
 - <http://www.rebuild.org/sectors/ess/index.asp>
- Online Energy Education Resources (US)
 - <http://www.eia.doe.gov/kids/onlineresources.html>
- Smart.E (Ireland)
 - http://www.irish-energy.ie/content/content.asp?section_id=571
- Greenpeace (Germany)
 - http://archiv.greenpeace.de/GP_DOK_3P/KIDS/SONSTIGE/IND_EXKID.HTM

Conclusions

- Lots of good projects going on in Europe
- Strong need for networking further dissemination of best practices
- Need for more targeted projects – specific tools for different levels (primary / secondary / adults)
- But also time for gathering threads – both at national level and EU level
- Development of a EC web-portal for virtual RES & RUE education in schools
- **But important to respect cultural, social, economic and language differences!**

Speaker and Institution

Daniela Mormile is working in DG TREN Unit D-3 (Dissemination and promotion of programmes results). She is in charge of the management of local and regional energy agencies in Europe established with the support of the SAVE programme (Intelligent Energy Europe).

The Directorate-General for Energy and Transport is responsible for developing and implementing European policies in the energy and transport field. Its mission is to ensure that energy and transport policies are designed for the benefit of all sectors of the society, businesses, cities, rural areas and above all of citizens. The energy and transport sectors are pivotal to the European way of life and to the functioning of our economy; as such their operation has to be responsible in economic, environmental, safety and social terms. The Directorate-General for Energy and Transport carries out these tasks using legislative proposals and programme management, including the financing of projects.

Christopher Waldén: ManagEnergy – a tool for local & regional energy actors



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Abstract

ManagEnergy is an initiative of the European Commission Directorate-General for Energy and Transport aiming to support the work of actors working on renewable energies and energy demand management at local and regional levels. ManagEnergy was launched in March 2002. It is based on the requests for further improved communication and information dissemination on locally relevant energy issues raised in the first European Conference for Local and Regional Energy Management Agencies.

ManagEnergy promotes co-operation between local and regional energy actors in Europe through **workshops, study tours** and **online events** on energy efficiency, renewable energy and sustainable transport. If you are working on energy issues at the local level, you can use the ManagEnergy website to find up-to-date information on events, case studies, funding, legislation and energy agencies across Europe. The website also includes a partner search system to help you find participants for new energy projects among energy agencies, municipalities, consultants, industry and other energy experts. ManagEnergy also offers free internet broadcast facilities including some 500 individual video presentations, speeches and interviews.

Most ManagEnergy communication happens through the main ManagEnergy web sites www.managenergy.net and www.managenergy.tv. ManagEnergy supports the work of local actors as follows:

- The ManagEnergy Reflection Group whose members are major stakeholders in renewable energies and energy demand management, including representatives of local energy actors and the Commission;
- information on latest Community energy and transport policies and legislation;
- information on project and programme funding available for local actors to support this legislation;
- organisation of capacity building actions, European events and workshops, including a major European platform on live and recorded Internet broadcasts of energy events, speeches and presentations for improved communication and learning;
- collection and dissemination of good practice in order to learn and share expertise and knowledge from others;
- contact details of energy agencies and other energy actors for easier communication and networking;
- a partner search facility to help you find partners;

- Help Desk for actors, who need further information on ManagEnergy services, including the organisation of events, Internet broadcasts and local media-conferences;
- statistics on the use of ManagEnergy services, contact details for the ManagEnergy team, registration form to register for ManagEnergy information, to send good practice reports and much more.
- a new project is a website for kids, which will be launches in 2006.

Presentation



History

ManagEnergy - a tool for local Energy Actors

Christopher Waldén
Swedish Energy Agency

- Green Paper on Security of Energy Supply & White Paper on European Transport Policy – call for action to support intelligent local energy use and clean urban transport
- 1st Conference on Local Energy Action, Sept 01
- European Commission initiative
- Introduced in November 2001

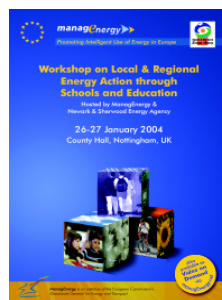


Actions

- Raise competence & increase knowledge
- Build networks and contacts
- “Learn from each other” – share experiences
- Think Global, Act Local
- Prioritised areas:
 - Energy efficiency
 - Renewable energies (sustainable use of energy)
 - Transport and mobility
- Key Themes
 - Buildings
 - Education



Workshops & events



- Supporting, promoting or hosting 10 events per year
- All over Europe
- Most events will be broadcast live over the Internet or recorded.

Sustainable City Development
- from pilot to mainstream
Welcome to Malmö
14-15 June 2005



Kids under 11



Speaker

Christopher Waldén works for the Swedish Energy Agency within the “International Sekretariat Department”. Christopher is at present Project Manager for the ManagEnergy initiative.

Janus Hendrichsen: The „Green Issue“ in all lessons



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Abstract

Whenever there are changes wanted in educational systems, curriculum and legislation is a good place to start. But new topics require old to leave, more lessons financed or lower taxonomical level in wording of curriculum. The initiative “Green ingredients” in all subjects in the Danish school system is an example of how a good intention doesn’t always hit the classroom if nobody is directly responsible for the implementation. The idea was to make it obligatory to include something about environment in all subjects in school.

Schools EnergyForum Denmark was formed around the beginning of this initiative as a reaction to contacts from many teachers wanting help from Organisation for RE, Denmark. The idea was to service Danish schoolteachers with “how to”-materials, hands-on kits and support in education.

“How do we ensure that teachers actually do it – and do it properly?”. I have worked with the practical approach and I am interested in the theory/praxis-theme, competency v.s. knowledge and the taxonomical approach on this, differentiated learning strategies and the local/global-theme. The talk broadly covers the problems there is in deriving appropriate science education and ensuring the contextual approach. Real learning requires a contextual base that provides the student with a suitable “shelf to put the knowledge on”. If this approach isn’t followed it is difficult to keep all the different topics learned, and they are therefore mostly studied to satisfy the demands of a teacher, a society or parents – but not to satisfy the need to learn more about it.

Renewable Energy serves the perfect purpose to both learn some science, some social skills, some language and integrate the whole thing. Cross-curricular learning and project based education still seems to be difficult for many teachers. Teaching the topics with an action-competency approach gives the students the perfect possibility to learn something that relates to their own lives. Being Energy-Smart and using the energy intelligently appeals naturally if it is understood that we are facing a common challenge to overcome our energy demands for the following century.

The Energy subject shouldn’t be owned by the science dept. but by the whole school – but it requires someone to act as ambassador for it.

Presentation



The green issue in all lessons

A danish study in how **not** to integrate RE and environmental issues in curriculum

Janus Hendrichsen, '68

- Educated teacher '97
- Teacher in 10th grade (16-17 years old) Maths & Science for 2 years
- Employed at the National Innovative Centre for General Education DK, Youthtown dept. to start Energyhouse in '99
- Running and developing Schools EnergyForum Denmark since '00
- Stationed in Malaysia for 4 months in 3 short missions 01-02 to facilitate development of national RE materials and hands-on kits
- Authoring and editing of several schoolmaterials – Experiments with energy a.o.
- Development of science-related teaching at the national Innovative Centre for General Education, DK
- Development of Environment and energyhouse-concept for new partner in '02

Hendrichsen/WS Environmental Education/20050427

Agenda

- The "Green Issue" – an example
- Characteristics for successful integration of RE
- General comments to successful science education

Hendrichsen/WS Environmental Education/20050427

"The Green Issue"

- Part of a rather radical change in school legislation in DK 1993
- Idea to integrate "the green issue" in all subjects of danish schools
- Introduced as a "lesson-less" subject together with many other subjects
- No specified methodology or content

Hendrichsen/WS Environmental Education/20050427

Specific description

- "The Green issue should be integrated in all subjects in the school"
- "Students should have possibility to connect science-related viewpoints with the methodology of other subjects and with ..."
- The "Green issue" can be environmental projects as well as extracurricular activities
- Should promote environmentally friendly behaviour – also outside the subjects

Hendrichsen/WS Environmental Education/20050427

Results

- The teachers already doing these things where now officially backed up by legislation – it was now a must
- The teachers not doing it didn't know how
- The sharing of knowledge in our school system didn't really support this
- Many thought of it as something still owned by the science dept.
- Many turned to organisations to ask them for help – e.g. to copy relevant teaching materials for them
- New initiatives where funded by different sources to support these needs – e.g. Schools EnergyForum Denmark

Hendrichsen/WS Environmental Education/20050427

Positive results

- Teachers opened themselves toward external organisations
- The involvement of the surrounding society was strengthened in general
- Many teachers started to participate in projects outside their own subjects – but still mostly the elite
- The general debate on the need for constant development of the educational institutions where strengthened

Hendrichsen/WS Environmental Education/20050427

How should RE be integrated?

- It is necessary to create ownership among teachers
- Clear wording in curriculum regarding the expectations to the teachers – expected outcome and evaluation of results
- In DK: Partnership between MoE, teacher training, teachers resource centres and organisations with specific interest and experience in the area

Hendrichsen/WS Environmental Education/20050427

Necessary resources for teachers

- Teaching materials on RE
- web-site with portal like function
- Videos
- teacher training
- places to visit and resource persons locally
- best practice database
- project-funding to generate more activities, etc.
- Resources should be revised on a running basis

Hendrichsen/WS Environmental Education/20050427

Contextbased subjects in RE

Necessary to include a context e.g:

- Greenhouse-effect and CO₂
- Biodiversity and climate change
- Deforestation and desert spreading
- Sustainable world – how?
- Distribution of wealth
- Pollution of air, ground and sea
- Wastehandling in different parts of the world
- Environmental projects in 3rd-world-countries

Hendrichsen/WS Environmental Education/20050427

The importance of diversity in methodology

- Learning is a proces that takes place in a social context
- Individual students have individual learning strategies
- Students must talk and write about science – they learn differently from talking and writing
- Students must investigate their own most succesfull learning strategies

Hendrichsen/WS Environmental Education/20050427

Ownership

- Lack of feeling of ownership weakens the subject as a common responsibility – if everyone has the responsibility no one has it
- Traditional borders between science and humanistic subjects doesn't fall by themselves
- The introduction of teams around a class created many other problem types to be solved before this issue – the wish to change many things at one time doesn't secure many changes

Hendrichsen/WS Environmental Education/20050427

Speaker and Institution

Janus Hendrichsen

- Educated teacher '97
- Teacher in 10th grade (16-17 years old) Maths & Science for 2 years
- Employed at the National Innovative Centre for General Education DK, Youthtown dept. to start Energyhouse in '99
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Susan Crothers: Integrating Renewables into the Classroom



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Introduction

Good afternoon my name is Susan Crothers and I am representing the Norfolk Schools Energy Club. This afternoon I am going to be speaking on how we have been integrating renewable energy into the classroom in Norfolk. Firstly, I would like to tell you a little bit about the club and why it came into existence. Then I am going to speak about the way we have found most effective in delivering renewable energy into the classroom with some example of how this has been achieved. I will also give you some ideas about how you could develop your own activities.

Background

So firstly, a bit of background about myself and my project. I'm based in the School of Environmental Sciences at the University of East Anglia in Norfolk in the UK. My role there is to develop and deliver the Norfolk Schools Energy Club to local schools.

The club is part of a community based carbon reduction programme otherwise known as CRed. The aim of CRed is to develop and implement a strategy to reduce carbon emissions by 60% by 2025. The UK government's target is 60% reduction by 2050. We believe this is too late to mitigate the worse problems of climate change. Also our government has no plan in place to achieve this. Our method of achieving this goal is to work with a wide range of community groups (eg businesses, local government, industry sectors, villages, towns, individuals) looking at the causes for carbon emissions. Then working together with the various groups we establish methods of reducing waste energy etc. We are currently in the first phase of the project which is much about raising awareness.

Obviously this is a long term project, so the Schools Energy Club was developed to work with young people, who after all, our energy managers of the future. The club works by tackling two main areas. Firstly to help reduce the energy wasted in our schools and secondly to educate children in sustainable energy management and give them experience in practical energy management within an organisation.

The impact of energy use in schools is quite considerable – currently Norfolk Schools alone use 157,000 MWh pa This is the equivalent to 565,000 GJ. The carbon emission from this is 39,337 tonnes or 2,268 hot air balloons. We use hot air balloons as the concept of tonnes of carbon dioxide is very intangible and each year the carbon emissions for each individual in the UK is around five hot air balloons – hence the balloons and the 60% challenge, get rid of three balloons. This energy is also equivalent to 13,000 cars on the road each year.

The Schools Energy Club has a six stage programme which provides a strategy for schools to put in place an energy management system. The programme is designed to be led by

pupils with support from other staff. We provide an energy management handbook with additional materials and resources. Also I go out and work with around 25 schools per year, helping them with activities, some in the classroom and others perhaps helping with meter readings, staff training etc. I have brought some of the materials with me for you to have a look at but they are also freely available to schools via our website. You also find there information on the main CRed project. In case you are not sure where Norfolk is, it is here!

Integrating Renewable Energy

So how do we get renewable energy on the classroom agenda? Well, there are a number of points to consider and I'm sure these are all true where ever you come from.

Firstly, teachers are busy people! They do not need new activities and they do not need another initiative to deal with. Currently there are initiatives for healthy eating, fitness, waste minimisation, literacy, numeracy etc. They may think your work is wonderful, you are fantastic and that what you do is very important and children should know about BUT they do not have time for something else to be added to their work load.

Secondly, you can't do it for them. As teachers are very busy people, it can be very tempting to offer to do everything for them. I've done this before. "Just give me the pupils for a couple of hours, I'll do everything". The activities went well, we had a good time and the children seemed learn something new. Unfortunately, it meant that my activity was seen as an extra and not relevant to the rest of the school. We learn by doing so it needs to be part of school ethos.

Finally, before we look at how to over come these problems, is renewable energy something new?

New Technology?

Here is something for you to consider: We have here a picture of a Norfolk windmill. It was used to drive pumps to help drain land. Not sure how old it is but certainly more than 200 years old. Norfolk is famous for its windmills and they are very much part of our landscape. This is picture is of a water turbine which was installed in a water mill the city of Chelmsford by the author Rudyard Kipling, to generate electricity for a local company in 1903. This picture is another water turbine in Lissan House in Northern Ireland, installed in 1904. It was second hand then and it is still in use today and the only source of electricity for the house. The message here is that technology today may have improved but it is still based on the same science principles. We have found that this is an important key to getting renewable energy into normal lessons.

Delivering Renewables to Schools

To get renewable energy into schools you need to help them to deliver what is important to them. To start this is making sure that activities, resources etc meet key areas of the curriculum e.g.: how is electricity generated, obviously is a science topic. Or perhaps making comparisons of between the energy demand of families in the UK and India, this is a geography topic. It can also mean other aspects of teaching such as learning skills. Some activities may be a way of children learning to work as a group or to improve listening and discussion skills. Obviously, if both principles are used this works best.

Schools Agenda Interpreting Tool (SAInT)

Most schools in the UK are encouraged to assess themselves to identify areas where improvements need to be made. This is known as the Schools Agenda. To work effectively, we have found that discussing with schools their School Agenda for improvement is very useful and helps develop mutually beneficial partnerships. You can use your existing resources but emphasise the key skills areas where schools need to improve

An example of this is one of my schools where they have to improve maths. Many of our Club activities involve maths at all levels so when we work with the school we emphasise the maths element whatever the subject area. If you think about the previous example where the

energy demands of different life styles were being investigated, we would emphasise the maths involved although it is a geography subject. We would focus on getting the pupils to set out their calculations in the right way, than go over them to ensure that everyone had understood the principle. At this stage it is also important that the Maths Department knows what is happening in the Geography Department! This unfortunately is not something that always happens. This is another example from a primary school. The school had identified their key areas being citizenship, numeracy and writing.

The teaching staff had decided that they would work on key elements within those areas being the School's Council within the Citizenship; Calculation and methodology within the numeracy; and speaking and listening skills within the writing area. By sharing these with an outside agency such as ourselves, we were able to identify activities which would support these areas. Also, during government inspection, the school is able to report that they have been working with outside agencies to improve standards – so we all end up as winners!

A Lesson Plan – Example One

I would like to show you how I would develop a lesson plan for a class using a wind turbine model. In this example I am using science as the subject and is based on experience in one of my schools. Firstly, I would consider what learning objectives I would like the pupils to achieve, and in this case I have given three but you may want to have less or break these down more. For clarity, learning objectives are what you want the pupils to learn. The first objective is to understand that the speed at which the turbine turns is proportional to the power output. This is relatively simple - the pupils need to understand the faster the turbine turns, the more power is generated. Secondly, to observe that different parts of the turbine can alter the speed of the dynamo. How will you know if pupils have learnt what you want them to learn? You need to identify learning outcomes. There may be several of these for each learning objectives to reflect individual pupil ability. I have just give three here to demonstrate. Pupils observe that the faster the turbine turns the greater the output – quite straight forward. Changing parts of the turbine can increase or decrease the turning in a constant wind speed – they may observe what the best configuration is. Pupils submit clearly laid out results from their experiments – this can be the most important part of the whole experiment.

With learning outcomes, you may need more than those listed here as there may be a mixed of abilities within the group. So by changing various variables, the speed and therefore output of the turbine can be affected. Finally, I want these pupils to carryout an experiment and accurately record results and draw conclusions. In some cases, I could provide detailed sheets about exactly what I want them to do. However, in some cases you may want the pupils to plan their own experiment and record the results in a suitable way. Using this particular equipment can take considerable planning to provide detailed results. The first step for the pupils is (usually working in groups) to assemble the turbine and to start playing to see what happens! We usually use a fan to carry out this work indoors as the wind can be somewhat unreliable (another experiment!) and to ensure that we have a constant wind speed or there are too many variables. Once the pupils have the turbine together there is usually quite a bit of discussion(!) about how many blades, angles of blades, gearing etc but with a simple goal of producing as much power as possible there is quite a bit of competition and excitement. Record the results in a suitable way.

Finally, getting the pupils to consider the science behind what is happening will give them a everyday context for science. One advantage of wind turbines is that they are highly visible on the landscape and this allows the pupils to make the connection between the classroom and the real world.

Note: throughout this activity, the focus is on understanding electricity generation and mechanical efficiency and NOT about the rights and wrongs of wind turbines. We believe that it is important to keep away from politics in the classroom.


Lesson Plan - Example Two

In this example, I don't want to go over the learning objects and learning outcomes again as hopefully you have got the idea. I would like you consider the idea of using renewables in subjects not usually associated with renewable energy. In this example, we are looking at history. Turbines have a place in our past. While they may not have been used for generating electricity until the 20th Century, windmills for pumping water and grinding corn can be found right across Europe. Mills were important in the past because they provided a source of 'power', both physical and political. Not only were they a useful resource, they provided an income for the mill owner and a tax for the local land owners. For the lesson, the pupils are given the scenario that a new mill is proposed in the other village and the villagers are meeting to discuss whether they want this proposal to go ahead. Some of the class are for the new mill and other are against. They pupils then build up a case for their cause. Again the use of renewable resources can be seen as relevant to today as well as in history.

Summary

The opportunities for renewables in the classroom already exists. We don't need to invent new ideas. For renewables to be taken into the classroom, they must fulfil curriculum requirements. Many renewable technology resources can be used to develop learning skills and this is very important to both teachers and pupils and shouldn't be forgotten. Renewable technology can be used creatively to make normal lessons fun and topical. They are still seen as 'new' and exciting although the principles maybe 'old' science. Our children today are our energy managers of the future. It is essential that we equip them with the right knowledge and experience to make sustainable decisions regarding energy resources.



Presentation



Schools Energy Club
Local Education for a Global Challenge



Integrating Renewables Into The Classroom

- Background - Norfolk Schools Energy Club
- How do you integrate renewables?
- Examples

 The energy each of us use produces enough greenhouse gas emissions to fill **FIVE** hot air balloons a year. To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**  www.cred-uk.org

Introduction



- School of Environmental Sciences University of East Anglia
- Project Manager for the Norfolk Schools Energy Club
- Sub section of the Community Carbon Reduction Programme, also known as **CRed**
 - 60% Challenge to cut carbon emissions by 60% by 2025
- Our aim is to educate young people in sustainable energy management and to reduce the energy used in our schools. Norfolk Schools total for 2003/2004 157,000 MWh (565,000 GJ)
- This is the equivalent of 2,268 hot air balloons!
 - Or 13,000 cars on the road each year

 The energy each of us use produces enough greenhouse gas emissions to fill **FIVE** hot air balloons a year. To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**  www.cred-uk.org

Background contd.....

- The Schools Energy Club programme provides school with a six stage strategy to proactively manage their energy.
- Programme involves pupils, teachers and other staff
- Range of resources are provided to help.
- Programme is free and available on our web site



www.cred-uk.org
www.cred-uk.org/SchoolsEnergyClub

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Integrating renewable energy

Points to consider

- Teachers are busy people
 - They do not need new activities
 - They do not need *another* initiative!
- You can not do it for them
 - We learn by doing
- Is renewable energy something new?

 The energy each of us use produces enough greenhouse gas emissions to fill **FIVE** hot air balloons a year. To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**  www.cred-uk.org

New technology....?

- So what is new?
 - Turbines (either wind or water driven) have been used for a long time to pump water or generate electricity.
- Technology today is improved but it is still the same science!
- This is the key to getting renewable into normal lessons



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To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



Delivering renewables to schools

- The key is to help schools do what is important to them.
- This can be key areas of the curriculum
 - Eg. How is electricity generated? (science)
 - Eg. Compare the energy demands of families in UK and India (geography)
- Or key learning skills
 - Eg. Discussions skills need to be improved.
- Works best if both these principles are used!



The energy each of us use produces enough greenhouse gas emissions to fill FIVE hot air balloons a year.

To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



Schools Agenda Interpreting Tool (SAInT)

- When we work with schools we discuss what areas need improvement (schools improvement plan). British schools carryout self assessment.
- Use existing materials but focus on areas where the school needs to improve
- Example: school may have weakness in the teaching of maths, so ensure that any maths activities are highlighted, *even in other subjects.*



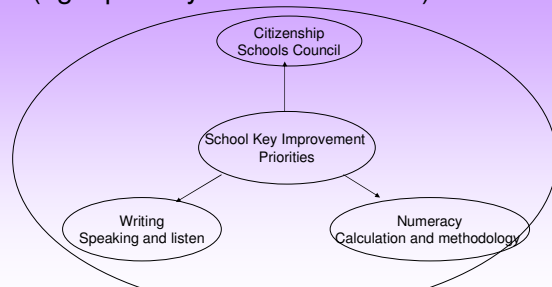
The energy each of us use produces enough greenhouse gas emissions to fill FIVE hot air balloons a year.

To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



SAInT

(eg a primary school in Norfolk)



The energy each of us use produces enough greenhouse gas emissions to fill FIVE hot air balloons a year.

To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



A lesson plan to get renewables into 'normal' lessons

- Example One – Science
- Learning objectives
 - To understand that the speed at which the turbine turbines is proportional to the power output
 - To observe that different parts of the turbine can alter the speed of the dynamo
 - To carryout an experiment and accurately record results and draw conclusions.



The energy each of us use produces enough greenhouse gas emissions to fill FIVE hot air balloons a year.

To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



Example One cont....

- **Learning outcomes**
 - Pupils observe that the faster the turbine turns the greater the output
 - Changing parts of the turbine can increase or decrease the turning in a constant wind speed.
 - Pupils submit clearly laid out results from their experiments.
- **What to do**
 - Pupils will need to assemble the turbine
 - Use a fan to make the turbine work
 - Change parts of the turbine to test what happens
 - Record results
 - Explain what is happening



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To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



Example Two – Renewables in history!

- Is there a place for renewables in history lessons?
- Were 'turbines' used in the past?
- Was a mill important in the community?
- Who would have been affected by the building of a new mill?
- Would it have been popular?



The energy each of us use produces enough greenhouse gas emissions to fill FIVE hot air balloons a year.

To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



Summary

- The opportunities for renewables in 'normal' lessons already exists
- Any inclusion must be relevant to the National Curriculum
- Use renewables to develop learning skills by using a relevant topic
- Have resources that encourage pupils to learn in a fun way that is in context with their lives today as well as tomorrow.



The energy each of us use produces enough greenhouse gas emissions to fill FIVE hot air balloons a year.

To prevent the further climate change we need to reduce our emissions to **TWO** By 2025. **Taking action is essential.**



Speaker

Although I have been working in the School of Environmental Sciences for around six years, my background is in business, particularly in the hospitality industry. Initially, I joined the school to work with the department's business club – the East Anglian Business Environment Club (EABEC) supporting local businesses in meeting new environmental legislation requirements. As the role of EABEC broadened, it was decided to look at the education of young people in relation to environmental management. From this I started an Environmental Education Club. This worked with local schools on a variety of environmentally themed projects and ran for three years.

In May 2003, CRed (Community Carbon Reduction Programme) was launched. This is an innovative outreach project working local community groups to reduce carbon emissions. In response to this project, I developed the Norfolk Schools Energy Club in 2003/4. My main role now is the continuing development of the club and delivery to schools. I am also developing a strategy to deliver the club to other areas in the UK and other countries.

Institution

Based in Norfolk in the south east of the UK, the University of East Anglia's School of Environmental Sciences continues to be regarded as one of the very best research and teaching institutions in the world for interdisciplinary environmental sciences. The School has the highest research assessment 5 ** grade denoting international excellence, and the highest "Excellent" grading for our teaching.

In May 2003 the School launched CRed - a community Carbon Reduction Project based in the East of England and focusing on Norwich and Norfolk. It has put the area on the world map by taking real action to address the biggest environmental challenge confronting everyone on the planet - Climate Change. CRed is building a community of partners, now over 2,000 in number, who are deciding how they want to cut their emissions of carbon dioxide (CO₂) to meet a target of 60% reduction by 2025. Although CRed's focus is fixed firmly on Norwich and Norfolk, new CRed communities have been established in the United States (North Carolina), China (Shanghai) and in Japan. This illustrates the powerful call to action that CRed has been able to deliver.

A central feature of CRed is its work with schools. During 2004 the Norwich Schools Energy Group, kindly supported by the Norwich Town Close Estate Charity, has established itself as a real force for change in both reducing CO₂ emissions and also the heightened awareness and education of school pupils about the causes of climate change and its impacts. Messages delivered in the classroom are being taken home but more work needs to be done to develop and evaluate the impact.

Susan Crothers – my role in CRed (Community Carbon Reduction Programme) is to work with schools to reduce the carbon emissions created through the schools activities and to improve energy education. Currently, our activities are focused on energy use within school although carbon reduction is broader. To enable schools to manage their energy more efficiently, I developed the Schools Energy Club.

The Schools Energy Club works by helping schools develop and implement a proactive strategy for sustainable energy management using a pupil lead programme with support from teaching and other staff. The club programme has six stages which can be worked through on an annual basis and includes a sub programme of class activities which are linked to the National Curriculum.

Currently, I work with 26 schools locally but other schools are accessing the club's materials from other parts of the UK and implementing the programme. In the next few months, I am due to start working on delivering the Energy Club to schools in China and Japan by working in partnership with schools in the Norfolk.

Malte Schmidthals: UfU - an independent actor assists schools



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Abstract

UfU consists out of four departments: Climate Change and Education, Noise Pollution, Landscape Ecology and Environmental Law and Public Participation. In the department Noise Pollution the colleagues deal with preventive measures against leisure noise. Like my department, they work closely together with schools and other institutions for children and youth. The department Landscape Ecology works on sustainable use of waters and researchs on Bio-Indicators. This department is situated in the city of Halle. And our fourth department Environmental Law and Public Participation does research on the practice of the Citizens-Movement and moderates environmental problems.

The department of Climate Change and Education has as a main subject energy saving and the use of renewable energy sources at schools. We are helping them by the realization of lessons, projects and excursions for pupils. We also do climate protection projects in other institutions for children and youth, such as nursery schools, kindergarten, youth hostels and recreational facilities. Using this approaches and practical projects we are doing applied research about energy saving measures by user behaviour and introducing incentive systems. We hereby implemented a system of financial incentives for energy-saving in schools (fifty/fifty). In this system, schools get refunded 50 % of the - by their efforts to reduce energy consumption - saved money. Working with children and youth we always aim to achieve a connection between educational and practical measures if it comes to the intelligent use of energy as well as other parts of the ecological orientated school – and in a broader sense – facility management. For example, we just started a project supporting about 80 schools with 1 KW – Solar Panels, making sure, that they not only getting the ability of maintaining the panel but also using it in their teaching lessons. Furthermore, we produce training aids and information brochures mainly for teachers and offer advanced teacher training on the subjects “Energy – Environment – Climate”.

Presentation

Independent Institute for Environmental Concerns (UfU) e.V.

Climate Change & Education
Environmental Education
Energy saving and renewable energy sources

Noise Pollution
Prevention measures against leisure noise
Consultation of noise-concerned citizens

Landscape Ecology
Sustainable use of Waters
Research on Bio-Indicators

Environmental Law & Public Participation
Research on the practice of the Citizen-Movement
Moderation of Environmental Problems

1

Focuses of the Dep. Climate Change & Education

- Energy saving and use of renewable energy sources at schools
- Climate protection projects with children and youth at kindergartens, youth hostels, leisure homes
- Connection of educational and practical measures of the ecological school management
- Production of training aids and information brochures
- Advanced teacher training
- Energy counselling

2

Environmental Education in different frameworks



- School
- Private/spare time
Clubs, meeting places, neighborhood centers, youth magazines
- Political young people, youth environmental groups and -organizations



3

School



- School subject (obligatory or facultative)
 - Teaching units on climate protection
 - Inclusion of the topic into other units
 - Instruction projects
- Interdisciplinary teaching lessons
- Project days and -weeks
- Working groups for pupils (voluntary)



4

Obligatory School Lessons



Instruction units on

- Climate protection
- Energy saving
- Renewable energy sources
- International Climate Policies

- Duration 2-6 weeks with 2-3 hour/week process card more intensively
- Subject: Physics, Geography, Political Science
- so far rarely, because new topic

Topics relevant to Climate protection in other instruction units

- Different experiences
- Little in school books
- Subjects: Physics, Geography, Computer science, Vocational education
- Examples: Caloric theory, Thermodynamics, Atlases, Pupils experiments



5

What do teachers need?



- No ready-made solutions
- Offers with a long term availability (mostly they cannot participate immediately)
- Offers which can be used as a whole or which open a range of choices
- Offers where pupils can cooperate in a practical manner (which means often simplified but not falsified truths)
- Offers which do not cost at all or very little
- Teaching materials which can easily be reproduced



6

Example for instruction assistance materials: Energy lottery

Pupils draw questions to the topic field „renewable energies“ and have to answer these.

Quelle: www.umweltschulen.de

<p>Question 1 Say five to ten words about „energy“ which occur to you spontaneously.</p>	<p>Question 2 Do you have an idea of how much money our school spends on energy in a year? Please specify your answer!</p>
<p>Question 3 You know the kilowatt hour as the unit for energy, work and warmth. Do you have an idea about the „worth“ of 1 kWh? What does this 1 kWh cost? What can you do with it?</p>	<p>Question 4 Warmth can spread by convection, radiation and diffusion. Where do these three processes play a role regarding the heat supply of your classroom? Name one example at least for each case!</p>



7

Example: The Experimentation System „SUSE“

- SUSE is a photovoltaic Experimentation system, which can be assembled and used in school lessons as well as in voluntary pupils working groups.
- SUSE can be used for lessons on solar energy and as energy supplier for other experiments.



Quelle: ISFH www.isfh.de/service/nils_hp/go.htm



8

Youth (free time) Center

- Working groups are similar as in schools possible
- Study groups, exhibitions, small practice projects, model construction ...
- Work with groups of „regular“ participants, even if short-term admission of new ones should be always possible

Example:
Compilation of a box with experiments, models and media on climate issues



9

Example: Solar cooker

The construction and assembling of solar cookers from various materials can provide impulses for discussion on renewable energies.

Many examples and documented guidance are available.



Source: www.umweltschulen.de



10

Projects with politically interested young people

- Projects in the political area
 - Dissemination of the topic
 - Mobilization of personal commitment to argue out political conflicts
- Local practice projects
 - Solar café
 - Solar discotheque
 - (Solar) bicycle tinkering
- Group travel
 - Tackle the topic content wise
 - Excursions and visits
 - Peer group life
 - Lifestyle discussion



11

Example project of a youth organization: „The bet “



- The Bet of the BUND-Youth with the Federal Minister of the Environment: „We achieve 10% CO₂-savings. We need only 7 months instead of 7 years “
- Publication of Flyer, Energy-saving-cheque, paperbacks with saving tips
- Participation of 153 schools and several thousands individual energy savers
- Saving of more than 10.000 t CO₂
- Bet won!



12

Energy saving measure / Electric Current

Energy-team and caretaker	All pupils and teachers	School administration
Marking of the light switches Information sheets and wall newspapers Lighting regulation in corridors and stairways Switch-off of devices which are not necessary (refrigerators, boilers) Putting redundant lamps out of operation	Switch on the light only if necessary (i.e. using only the lighting of the wall-side or of the blackboard) Switch off the lighting in longer breaks Switch off stand-by functions of electric devices, such as video players and copiers	Purchase of energy saving devices and lamps. New and sensible regulations for lighting (if necessary)



13

Energy saving measures - Heating

Energy-team and caretaker	All pupils and teachers	School administration
Lowering the temperature of the building Starting the night-lowering as early as possible Lowering the temperature during holidays Sealing of the gaps of the windows	Shock airing with all windows Using the thermostat valve in the right manner Do not put anything in front of the radiators Closing windows and doors after the lessons Keeping the doors to the stairs shut, otherwise the warm air streams upwards Cold water-tap for hand-washing	Maintenance of the heating system Arrangement of a modern control of the heating system Purchase of a modern heating system, if the old one has a low efficiency grade



14

Speaker

Malte Schmidthals (Dipl. engineer in environmental technology) leads the department “climate change & education” and - as a member of the board of UfU - is responsible for the commercial management of the institute. His work concentrates on energy-saving through user behaviour and environmental education about climate protection, renewable energy and energy saving. He also works on developing indicators of sustainability.

Institution

UfU e.V. (Independent Institute for Environmental Concerns) was the first independent institute of environmental science established in the former German Democratic Republic. The UfU was initiated in November 1989 by a group of nearly 40 East German scientists. With its roots in the GDR environmental movement, its impetus was to further the progress of environmental awareness at a grass-roots level and analyze the development of environmental policy. Around fifteen people work in the departments of environmental law & public participation, climate change & education, noise pollution and landscape ecology. UfU’s projects are commissioned or supported by the European Union, the German Federal Ministry of Environment, Germany’s Federal States and Communities, environmental organizations, foundations and scientific institutions. Today about 250 members and donors support the work of the Institute through membership dues and donations. The UfU is designated by German tax law as a “special supportable” non-profit organization.

Ina Angelova: Solar School Forum project and Bulgarian participation



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Abstract

The initiative has three focal points, which are the dissemination of good practice on implementation activities, the development and distribution of educational materials on energy issues in different languages, and the promotion of public awareness on energy issues through different schools and their pupils in Europe. The project will be realised in countries in Eastern and Western Europe: Bulgaria, Germany, Hungary, Poland, Romania, the United Kingdom, Denmark, Norway, Finland, Italy and France. Furthermore there will be strong connections with Belgium, Switzerland, Sweden, Spain and the Netherlands.

There are four main goals of the project. The first one is to promote the development of schools as environmental teaching focuses through compiling best practise examples of solar schools throughout the world, and to provide encouragement and guidance for schools interested in implementing renewable energies. The second is to prepare and distribute educational materials on energy issues in order to encourage dedicated teachers to integrate the topic in their lessons and to make these more praxis oriented and interesting. The third one is to raise awareness among the children, their families and the general public for the importance of energetic sustainability and to positively change their behaviour in this respect. The last but not the least is to make the European Sustainable Energy Education Forum (ESEEF) and its web-site www.school4energy.net widely known and popular.

The Bulgarian SSF project Team consists in Anna Dobrinova, Stanko Shtrakov, Alexander Penchev, Ina Angelova, Katya Arsenova, Simeon Nikolov, Vasil Simov, Stefan Lazarov, Svetoslav Koutzarov, Elena Ivanova, Valden Georgiev. Experts like Margarita Dimitrova and Vessela Radeva (coordinators Varna task 1) and Jordanka Eneva (coordinators Varna task 5) have been also involved. Furthermore teachers like Liubov Dombeva, Vera Hristova, Stefka Spasova and Margarita Bogomilova take part in the project. The total number of the schools participating in the project amounts to 39 schools from 12 Bulgarian cities: Sofia (10) schools, Varna (12), Berkovitzha (1), Bourgas (1), Vidin (1), Veliko Turnovo (2), Vratza (1), Gabrovo (1), Montana (1), Pernik (1), Rousse (1) and Shumen (1).

Pre-history of the project in Bulgaria

The “Architecture and Energy Club”, which is part of the Union of Architects in Bulgaria (UAB), was founded in 1997. Since 1998 the members of the club provide voluntary work with schools on taking part in the international Sun Day and providing information and demonstrations on Solar Energy and other RES usages. Other activities were the annual lectures with invited lecturers on the issue. Some of them are Alexandros Tombazis, arch (Gr), Laurentio Fara, Prof (Ro)(1998), André Gillet (Be) (1999), Juhani Pallasmaa, Prof (Fin), Zygmund Knyszewski arch (Fr)(2000), Leslie Jesch, Prof (Uk) (2001). The Annual Exhibitions of the “Architecture and Energy Club” (UAB) presented the leading technologies available in Bulgaria between 1998 and 2001. A competition in which students and pupils

have had the opportunity to present their projects on the Energy Efficiency and usage of Renewable Energy Sources was also held.

Task 1 Establishment of Contact with Interested Schools/Teachers: SSF project opening ceremony was at SunDay 2004 in Bistriza near Sofia. Schools, teachers, Regional Education Inspectors, Ministries, NGO's, Agencies and Embassies were contacted to support the project. Two Questionnaires were developed by BglSES and brought into a final version in cooperation with ISES and the partners. The final version was translated and adapted to the Bulgarian case. The first workshop has been hold in two towns - in Sofia on June 12th 2004 in the Museum-house of sculptor "Ivan Lazarov". The workshop included "Soltech" solar exhibition and attracted 36 participants. The second took place in Varna on July 12th 2004 in the Planetarium Hall of the Astronomic observatory with a total of 47 participants. More than 100 questionnaires were distributed with a return of about 60 for evaluation which showed, that 55% of teachers are experienced in teaching RE, 28% have little experience and 17% have no experience at all. 21% of the teachers know RE installations in their region as possible sites for excursions. 14 schools have EE measures applied and 2 schools use RE installations. The teachers are willing to participate in SSF-project with the approval of the principals and as well of the Ministry of Education.

Among the demands voiced were information which is directly applicable in lessons, more information on RES installations, opportunities to exchange ideas among schools, experts' consultations and more informative educational materials. Some of the suggestion were to raise the Day of Energy on a national level, to rewarded schools with solar installations, to develop a demonstration RE-centre, to support schools through the SSF project to buy materials to build small RE-installations, to set up a bulletin to inform target groups and to include in the competition works dances, RE-models, crossword puzzles, logos, and to develop a media strategy to supply teachers with a teachers' guide for Energy.

Task 2 Web-application Support: includes the development of an internal website for the SSF members with information on materials, photos, excursion sites and current tasks. Most of the Bulgarian materials are available on the SSF project web-site. Instructions how to use the internal website were disseminated, the public website is planned for May 2005.

Task 3 Good Practice on Implementation Activities: consists of a database of good practices examples and excursion sites - 27 addresses of RES and EE Bulgarian schools were published on the SSF website together with a detailed description of 5 examples. Mime Studio Alba made a genuine contribution to the SSF project with a show consisting of short pieces representing the different sides of the issue. The overview of the excursion sites is forthcoming on the SSF-website.

Task 4 Provision of Educational Materials: Folders for the First Workshops (Sofia and Varna) with materials on the SSF-Project Summary and Project Content, selections from the RES White Paper, introduction by Franz Alt, Earth radiation and Human Productivity by Stefan Lazarov, Examples of Bulgarian RES Schools, Bulgarian Examples of RES Utilization, teaching materials (History, Painting Literature, Music, Zoology, etc) and experiments with RES models translated from www.schools4energy.net.

Additional materials were developed to raise pupils' and teachers' awareness in five subsequent lessons which included five info-lectures on RES-related topics - introduction, solar, wind, geothermal and biomass energy as well as 100 pages of materials connecting RES with the national folklore for history, literature and fine arts lessons. The handbook "Energy saving in schools – How. Suggestions for teachers" has been translated with the permission of the editor UfU e.V.

Task 5 Organization and Realisation of Competition: Designing of leaflet on the competition and distributing leaflets by mail, fax, e-mail and hand-to-hand-100 letters to all target groups were the main activities in the task. Sponsors for the competition are Ministry of Education and Science, Ministry of Environment and Waters, Energy Efficiency Agency, Union of the Physicians in Bulgaria, Union of Architects in Bulgaria, Chamber of Architects in Bulgaria, ERATO Ltd, British Council, French Cultural Centre, Eco-world Magazine, Science

across, Yanadel, Energy Centre Sofia, Anabel LTd., “Solar Energy” NGO, “Architecture” journal (UAB), ESD Bulgaria, ROYA Co., Association for Advanced Studies, Innovation & Entrepreneurship (AASIE), APEX, Nelbo engineering Ltd. UfU e.V., Motophoe, etc.

Lecturers from the BglSES team are visiting schools to provide guidance on the competition, Energy Day Event (see task 5 below) and Sun Fun Day. Bulgarian members of ISES assist teachers in finding opportunities to teach RES in the conventional textbooks and complete the school teacher's energy guide as a serious step to influence school schedules. 50 Schools were interested in the competition, 36 have applied and more than 400 pupils and students are currently participating.

Task 6 Preparation and Realisation of the Energy Day Event: includes the preparation and realization of the Energy Day Event in the schools participating in the project. On 22 of April 2005, 4 Schools in Sofia, 1 Schools in Berkovitzha, 2 in Varna and 1 in Rouse have organized the Energy Day. Members of the SSF project team as well as experts from the Ministries and Agencies were invited.

Media Coverage: News on the project was disseminated of the following TV channels: National TV channel, BTV and Eco TV, TV 2001 and TV Varna local channel. Some of the radios also took part in the dissemination of the information on the project: National Broadcasting Program (NBP) № 1 – “Horizont”, NBP № 2 – “Christo Botev”, rubric “European Projects”, NBP № 2 – “Christo Botev”, rubric “Sustainable development” and RFI – Sofia.


Newspapers which have participate are “VIJ” (Look at) Sofia, “24 chasa” (24 hours) national, “24 chasa” national, “Gradat, Stroitelstvo” (Building – the city) Sofia, “Chernomorie” (Black Sea Region) Varna, “Pozvanete” (Ring on) Varna and “DNEVNIK” (Diary) Varna.

PR activities included participation of the SSF project team in the World's day of Biodiversity, Days of the Open Doors in BAS, where pupils and students were invited to visit different solar installations, Educational RES Seminar (Varna), Anniversary of 95 Years in Architecture, Construction and Geodesy Professional School "Hristo Botev" in Sofia, where BglSES team organized a honourable mentioning, RES exhibition, forest preserve campaign and presentation of new RES technology, also Celebrating Nature Day in some schools, Collaboration and mutual participation in events on World Day of Physics (Sofia Land) and “Fair of Schools” held on 22.04.2005 in the Palace of Culture and Sports PLC, Varna

Conclusions: Considering the situation in Bulgaria, there are major obstacles in the implantation of the project such as the very low public awareness of RES. Therefore, even the collecting of basic facts like data on RES installation in Bulgaria or the contact with target groups proved to be extremely arduous. As well, a high amount of RE&EE installations were found to be out of order, including newly installed ones by European projects. Most of the teachers do not to participate in any project without the outspoken official green light of the Ministries, especially the permission of the Educational Ministry's regional branch. The lack of computers in Bulgarian schools results in severe problems in the communication between and coordination of schools, regional and governmental authorities. Most of the teachers are tired, hard-pressed and low-paid and not particularly interested in new activities. Last but not least, there is a lack of sponsors to stimulate the teachers' and pupils' work and a lack of funds for materials, models and research.

The positive sides and the lessons learnt are that the frequent personal and phone contacts with all target groups are the successful way of communication. The personal assistance provided from the members of BglSES to the teachers is highly efficient. For example, BglSES members were invited to hold talks on RES and EE in the schools. Only in such a positive environment we can observe the rise of awareness of and devotion to the SSF project and its ideals.

Presentation



Solar School Forum

Bulgarian participation activities

Overview of the work programme

Task 1 – Establishment of Contact with Interested Schools/Teachers Task 2 – Web-application Support		
Task 3 – Good Practice on Implementation Activities	Task 4 – Provision of Educational Materials	Task 6 - Organisation and Realisation of Competition
Task 5 – Preparation and Realisation of the Energy Day Event Task 7 – Dissemination of Information Task 8 – Workshops for Teachers and Officials Task 9 – ESEEF Conference		

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Overview of the work programme


- Participating countries
Denmark Germany England Finland France Italy Norway Poland Hungary Romania Bulgaria
- Bulgarian SSF project Team:
Anna Dobrinova, Stanko Shtrakov, Alexander Penchev, Ina Angelova, Katya Arsenova, Simeon Nikolov, Vasil Simov, Stefan Lazarov, Antoaneta Joveva, Milka Stoyanova, Elena Ivanova, Valden Georgiev;
- Location and number of the schools participating in the project (33 schools from 12 cities):

Sofia – 10	Varna – 12	Berkovitz – 1	Bourgas -1
Vidin – 1	Veliko Turnovo -2	Vratsa – 1	Gabrovo -1
Montana – 1	Pernik – 1	Rousse – 1	Shumen - 1

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Open lectures at UAB organized by BG Section of ISES



Prof. Arch. Juhani Pallasmaa

Pre-history of the SSF project in Bulgaria



1999 Sofia
Sponsors, ISES Members and actors before the start


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Task 1 Establishment of Contact with Interested Schools/Teachers

- SSF project opening ceremony at SunDay 2004
- Schools, Teachers, Regional Education Inspectors, Ministries, NGO's, Agencies, Embassies were contacted to support the project
- Two Questionnaires are developed by BgISES:
- First workshop have been hold in two cities:
 - Sofia 12.06.04 in Museum-house of sculptor "Ivan Lazarov" + "Soltech" solar exhibition visit – total 36 participants
 - Varna 12.07.04 in the PLANETARIUM Hall at Astronomic observatory – total 47 participants
- Distribute Questionnaires more than 100 and 60 evaluate Questionnaires

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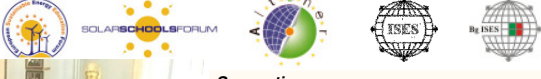
Questionnaire' CONCLUSIONS

- >55% of teachers are experienced in teaching RE;28% - with little experience; 17% - no experience
- >21% know RE devices in their region to be visited; 14 schools have EE measures; 2 schools use RE devices
- >The teachers are willing to participate in SSF-project but with the approval of the principals, and the Ministry of Education as well

Suggestions

- >Teachers expect-information ready to be applied, not they to develop it.
- >Great interest in the RES implementations;
- >Lack of informative educational materials;
- >Exchange of ideas among the schools and more experts' consultations;

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Suggestions

- >The Day of Energy to be announced as National;
- >One school to be rewarded with a solar device
- >Demonstration RE-center to be developed
- >The SSF project to help the schools to elaborate small RE-devices;
- >To create bulletin to inform target groups;
- >In the competition works to be included dances, RE-models, crossword puzzles, logo, etc.
- >To develop Media strategy;
- >To supply teachers with teacher's guide for Energy



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Task 2 – Web-application Support

- Internal Website for the SSF members.
- Most of the Bulgarian materials are available in the SSF project web-site
- Instructions how to use the web site were disseminated
- The Public Website is to be targeted May 2005

Task 3 – Good Practice on Implementation Activities

- 27 addresses of RES and EE Bulgarian schools are tabled and uploaded
- 5 of the good examples with more details uploaded on the SSF web – site
- Mime Studio Alba – a genuine contribution to the SSF project
- List and presentation of places to visit has to be prepared

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Task 4 Provision of Educational Materials

- Folders for the First Workshops – Sofia, Varna
 - SSF – Project Summary and Project Content
 - SSF - Selection from the RES White Paper
 - Introduction by Franz Alt
 - Earth radiation and Human Productivity by Stefan Lazarov
 - Examples of Bulgarian RES Schools (27) and RES Utilization
 - Materials in Favor of Teachers - History, Painting Literature, Music, Zoology
 - Tasks Experiment with RES Models
- Five info Lectures on the topics of RES including: Introduction, Solar, Wind, Geothermal and Biomass Energy
- 100 pages of RE materials connected with the national folklore
- Handbook "Energy saving in schools – How" Suggestions for teachers Ufu e.V. has been translated with the copyright of the authors

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“Mime Studio Alba” Bulgarian contribution to the SSF project

In the beginning was the Sun
 >The stolen Sun
 >A ray of light
 >The flower



>The hunter and the bird
 >Water
 >Fire
 >The Waste Monster
 >The burning of the Monster
 >The wise people – inventions and tradition

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Task 6 Organisation and Realisation of Competition

36 schools have applied and more than 400 pupils and students are participating



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Task 5 Energy Day Event

Sofia “Roerich school”



On 22 of April 2005
 4 Schools in Sofia;
 1 Schools in Berkovitz;
 2 in Varna;
 1 in Rouse.

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Conclusions - Obstacles

- Very low public RES awareness;
- There are no completed titles of RES or EE applied in schools, either in the Ministries, nor in Energy Agencies or in the Firms realized it;
- A lot of the RE&EE devices do not function
- Most of the teachers pretend not to participate in any project without the public clear positive attitude of the Ministries of Education
- Very few schools have computers, hence e-mail addresses or web-sites.
- Severe co-ordinations between schools, authorities; low-paid teachers.
- Schools require Educational Ministry’s regional permission to contact them;
- Lack of sponsors to stimulate the teachers’ and pupils’ work;
- Lack of funds to sponsor some materials and models investigations;

Conclusions – Lessons learned

- Frequent personal and phone contacts with all target groups is the successful way of communication
- BgISES is providing highly efficient assistance to the teachers.
- BgISES members were invited lecturers on RES and EE in the schools.
- Raising awareness and devoting to the SSF project and its ideas

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Speaker

Ina Angelova is born in Sofia on 11.09.1975, in 2000 graduated the Master Program of Architecture in the Department of architecture, University of Architecture, Construction and Geodesy (UACG), Sofia with degree *MA Architecture*. 06.1999 – competition “*Architecture and Energy – ‘99*” (special prize for student’s project on energy effectiveness). Author and lecturer of “Basic knowledge on Visual arts” course at Markov College in 2001. From 09.2004 participation in Project “*Solar schools – Forum*” as technical consultant and manager of task 2 in the Bulgarian project

Institution

Bulgarian Solar Energy Society: BgISES is a non governmental, non profit organization registered under the Bulgarian laws on 09.10.2002. The members are experienced architects, engineers (construction, mechanical, electrical), meteorologists, physicists, chemists and other different specialists. Most of them are trained professionals engaged in: design and computer modelling of different kinds of RES devices; calculation of energy efficiency of such installations; design of passive and active solar heating and cooling systems; geothermal installations; ecological technologies; air pollution problems research (specifically the CO₂ related ones); sustainable energy planning; design of waste usage strategies, etc. Its main goals are to promote development and applications of solar energy, exchanges of information, knowledge, technologies, education, design products and methods, know-how, consultation and other activities related with solar energy.

Contact: Dr. Anna Dobrinova; 37 Graf Ignatiev str., Bg-Sofia 1000; Bulgaria

Andreas Drack: Environmental Education by using the web



Andreas Drack

(Austria)

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Abstract

Climate change policy can only be successful in a permanent co-operation process of a huge variety of (target) groups. If there is a consensus, that the global temperature should not rise higher than 2 degree Celsius till the end of this (century compared with the level of 1990), we have to agree to a switch to new climate friendly technologies and renewable energy sources. Therefore it will not be enough to teach pupils basis knowledge about technologies but an additional vision about the energy future in a system based on renewable energy sources is necessary.

From the point of view of the municipal administration building new energy-efficient schools and retrofitting in schools means nothing special compared with other buildings. Policy maker have a broader view, trying to persuade teachers to contribute to additional climate change projects. We are interested to find the success factors for high participation, knowing that climate change issues compete (for money etc) with other topics. The question arises: Is the web one of the key factors in order to find co-operation?

For a lot of people the daily work would be impossible without using the web. On the other hand, most users know that the performances of the web do not suffice, especially in large scale projects. The web provides a lot of information, but the time available and the skill for searching limits that opportunity. Especially in schools there is in some European countries a lack of technical equipment. Although finding ample opportunities to work in the web some teachers will never be interested in internet-based lessons.

Finding partners and tools are two goals easily to be managed in the web. Because of the shortness of the information provided it is difficult to find first-hand experience and insider-information. So the web will be very helpful as a first aid step giving an overview about activities. Very often a second step will be to prompt communication about projects. Of course e-mailing can be a solution for an in depth process but because of psychological facts the information provided will be limited. The telephone will be the standard to achieve communication at an individual, fruitful level. Services like energy advice or installation aid are often necessary in energy-projects. Therefore regional services have to be co-ordinated in order to facilitate and prompt personal contacts. The real limit of the web is the fact that very often the face to face communication is the success-factor especially in large scale projects and financing aspects. Only knowing a person face to face allows real partnership which will make it possible to get more than standard services. If the results of projects are successful for all partners, there will be a good chance for further common activities.

Solar energy projects are - as "visible" projects - attractive for schools. In some countries the economic incentives for these projects are advanced enough to support complete installations without a lot of co-ordination work (f. e. guaranteed feed in tariffs for PV-installations). Without optimal frame conditions, it might be necessary to organise the financing aspects, too. The number of realised project will be limited therefore. In contrast, renewable energy sources like biomass are in some countries – f. e. Austria – nothing special and are therefore not featured on homepages. Thus, without any activities in schools, there is an ongoing process of using biomass. Therefore, the quantity of RES-projects to be found in the web does not supply the complete picture of the use of renewable energy in school in different countries.

Saving energy can be managed without a lot of co-ordination work and at low costs. The results will be recognised in an abstract way by using an energy accounting tool. Very often the results are limited because a change of behaviour is necessary. So there are advantages for projects in the field of renewable energy sources and energy saving. It doesn't matter which kind of project will be realized – as long as it helps to protect the global climate.

Presentation

Environmental Education by using the web

DI Andreas Drack

- 1990 Upper Austrian Academy for the Environment and Nature
- 1997 co-ordinator of the Austrian provinces
- 2000 commissary for climate protection in Upper Austria
- 2003 member of municipal council

references / school

- SAVE project "Energy Management in Schools" (co-ordinator UfU)
- incentive program for non-investive measures (BONUS) in co-operation with the climate alliance Austria
- programme "climate rescue" (klimarettung.at)



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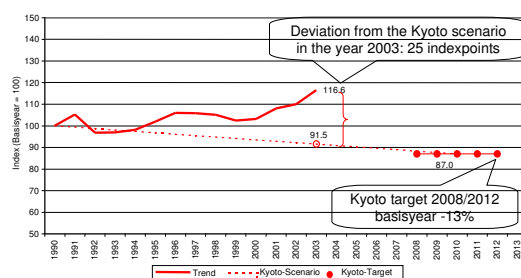
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Content

- Top-down discussion
 - situation in Austria
 - strategies: renewable energies, energy saving
- Bottom-up discussion
 - what schools (teachers) really want
 - the web and other aiding facts
 - good practice for web applications in Austria
 - conclusions

The situation in Austria



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Actions to be done 2005

- Evaluation of National Climate Strategy: 30.6.2005
- Adaptation of National Climate Strategy: Late 2005
- 4. National Climate Report + Report „demonstrable progress“ to the UNFCCC-Secretariat: 1.1.2006

Visions for Austria for this century:

- minus 50% energy demand by using new technologies
- doubling renewable energy sources
- results:
 - at least 80% renewables
 - minus 80-90% CO₂-emissions



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realistic next steps in schools in Austria

enhanced ecological minimum building-standards:

- retrofitting old buildings - better insulation standards; biomass installations (including contracting)
- high energy standards in new buildings
- pilot-projects (passive-house-standard)
- solar energy installations (thermal applications, PV)
- high energy efficiency in electric equipment (light equipment, computer systems)

contributions by the schools (and parents)

- hard fact contributions
 - financing solar systems (PV, thermal solar systems)
 - self installation of a thermal solar system
- soft policies
 - incentive program for non-investive energy saving measures in schools (BONUS, Fifty-Fifty,...) and households (Klimarettung)
 - other project-types (education, public-awareness activities, ...)



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what schools (teachers) really want

- "Living the Egoism"
 - successful competition as school type and school-location
 - successful education
 - based on standard-lessons
 - based on new items and instruments
 - high ratio outcome / time input



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success factors for projects

- "visible" projects
- projects which can be easily integrated into the lessons
- projects with a low demand of lessons
- projects without coordination work (internal, external)
- projects with instruction aid and tools

the web and other aiding facts

- performances of the web
 - homepage / newsletter / mailing list
- goals
 - finding (short) information
 - finding aiding tools
 - finding partners and platforms
- limits
 - technical equipment
 - age of users
 - interest
 - time



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the web and other aiding facts

- additional performances needed
 - lobbying
 - face to face partnership
 - services in the school (energy-advise, speeches, installation aid)
 - handouts (brochures, folders)

good practice for web applications in Austria

- not information about lots of projects (biomass-heating systems)
- Networking: www.klimarettung.at
- Tools: <http://bonus.lebensministerium.at>
- RES in schools:
 - **Elementary school Holzhausen**
 - **BORG Schoren/ Dornbirn**
- RES school-projects
 - **Secondary school Gaspoltshofen**

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target groups

Province of Upper Austria

Klimaretter, Klimapioniere			
enterprises	schools	house building society	house-holds
41	22	23	3.000

"Klimarettungspartner": communities, organisations, cooperation partners

• architects	1	communities	55
• banks	4		
• master builder	11		
• waste managing companies	10		
• contractors	5		
• energy comp.	2		
• electric. supply shops	2		
	8	cooperation partners	
• stove-fitters	5	• Climate Alliance	
• farmers	2	• Ökoberatung	
• grocers	3	• ESV	
• organisations	2		
• passive-house builders	35		
• chimney-sweeps	32		
• educational instit.	1		

Stand: Apr. 08

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goals "Klimarettung" for schools

- climate change activities (Klimaretter)
- BONUS (Klimapionier)
- networking in climate change projects under the leadership of municipalities (minus 10% electricity at no costs): worksheet for reducing stand-by

projects

<http://bonus.lebensministerium.at>

- online-tool for energy accounting
- energy-check for schools
- online energy-advice tool

Gymnasium Schoren/ Dornbirn

- www.brg-schoren.ac.at/de/solaranlage.htm
- 200 m² grid-connected PV-installation in Vorarlberg
- financed by higher feed-in tariff

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projects

Elementary school Holzhausen

- www.sonnenschule.at
- first grid-connected PV-installation in Upper Austrian school (100 m², 2002)
- 60.000 Euro; 30.000 Euro government of Upper Austria; 30.000 Euro sponsoring

Secondary modern school Gaspoltshofen

- http://schulen.eduhi.at/gaspoltshofen/startseite_e.htm
- energy island: solar panel, four solar cookers, wind-model

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summary

- the web can provide a lot of services especially for starting projects (search for ideas and partners)
- the web can be the main aiding tool in small projects
- large scale projects need additional face-to-face communication and cooperation
- handout are still necessary
- the web provides a lot of information about what to do but less about the processes needed to be successful

Drack/WS Environmental Education/20050519

Speaker

Andreas Drack, Physicist, Dipl.-Ing., University of Linz

- Since 1990: Upper Austrian Academy for the Environment and Nature (organisation of the provincial government)
- 1991: membership of Upper Austria in the programme "Climate Alliance"
- 1996: first provincial climate action plan; ongoing process
- 1997: representative of the nine provinces; member of the national climate change co-operation committee (Inter-ministerial Committee to Coordinate Measures to Protect Global Climate (IMC Climate), Kyoto-Forum, JI/ CDM-commission, Task groups for special climate change issues)
- 2000: commissary for climate change issues in Upper Austria
- 2000: project leader "climate rescue"
- 2004: project leader "mobility management in the public administration of the Upper Austrian government"

Institution

The Upper Austrian Academy for the Environment and Nature is organised as a regional public authority (32 employees). The Academy deals with interdisciplinary topics, f. e. climate change issues, agenda 21 and sustainability-region in co-operation with internal and external target groups. Each year, the academy organises up to 100 conferences, seminars and workshops.

Brian Withington: NGOs supporting teachers



Brian Withington
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Business and education in London South;
Independent Institute of Environmental Concerns

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Abstract

The main focus of our work on this issue is ensuring that teachers in South London have a wider understanding of renewable energy, energy efficiency and sustainability in general. We offer free training for teachers to come out of the classroom into a wonderful resource which is the Natural History Museum in London. The training focuses on the needs of the national curriculum in the UK and we produce materials which the teachers can then use in their lessons when they go on to teach the subject.

Our main partner in this is the Energy Conservation & Solar Centre (**ecsc**), based in London, but which works across the UK. They provide the necessary information and deliver the training. BELS provides the funds for teachers to come out of the classroom and attend the training, an important point as it costs approximately 300 euros to pay for a supply teacher to cover lessons when the teacher is out. The reason why we do this is because the national Inspectors of education in the UK (OFSTED) have seen that where a teacher has a good understanding of the subject, the lessons are taught well and children learn a great deal, where the teachers do not understand the issues teachers are taught badly.

I also want to show the political situation in the UK. The House of Commons Environmental Audit Committee have investigated this issue and found there is not enough well taught lessons on this issue. They have published a report which attacks the UK government for not doing enough. We believe that a lot is being done, but in a patchy fashion across the UK.

Presentation

**Business & Education London South
NGO's supporting teachers**

A partnership approach –

Natural History Museum – venue & materials

Energy Conservation & Solar Centre – training the teachers

Business & Education London South – recruiting teachers

Schools across South London – providing day release for teachers to attend training



**Business & Education London South
NGO's supporting teachers**

Natural History Museum –

Internationally renowned museum with a dedicated centre that highlights the following:

Explore how earth scientists find our mineral and energy resources, and manage our increasing demands on the environment. How do they help manage our needs for water, food and clean air?

The NHM provides a perfect venue for our training workshops



**Business & Education London South
NGO's supporting teachers**

Energy Conservation & Solar Centre –

Today, ECSC is involved in both energy efficiency and renewable energy, where it carries out the development and implementation of programmes to create socially responsible sustainable energy futures.

ECSC's focus is on the development of practical, locally focussed programmes throughout the UK, in households of all tenures and income levels, businesses, public sector establishments and local authorities.

ECSC delivers high quality training for community activists, teachers, local authority staff and business



**Business & Education London South
NGO's supporting teachers**

Business & Education London South (BELS) –

BELS is the education business link consortium of 6 south London boroughs and is responsible for:

14,600 work experience placements for students

372 professional development days for teachers

Over 10,000 business link activities for students and schools

Employer involvement in schools

Sustainability programme with ecsc and schools in south London



**Business & Education London South
NGO's supporting teachers**

Why the programme -

OFSTED – the organisation responsible for standards in schools identified that where teachers understood sustainability they taught it well, where they did not understand they taught it badly.

Teacher training universities do not have this on the teaching degree curriculum

Teachers are unsure of what they are supposed to deliver



**Business & Education London South
NGO's supporting teachers**

What the programme is: One day training for teachers at Natural History Museum

Training covers: Energy Efficiency, use of Renewable Energy

Water use, Recycling, delivering teaching in the subjects

Back up includes: Telephone Helpline Support (from ecsc), Teaching materials

What are the outcomes: seachers clear about subject matters; support through helpline; students have greater access to materials; teachers are excited about renewable energy and able to pass on this excitement to their students; standards in teaching and learning on sustainability are raised; students learn in a supported environment



**Business & Education London South
NGO's supporting teachers**

What are the lessons –

Teachers only come out of school in the UK if money can be found for supply teachers to cover their lessons

It helps to have a high profile partner like the Natural History Museum as it helps overcome scepticism

When teachers are excited about a subject it shows, and the pupils are almost always more interested

Teachers need further support so the help line is useful.



**Business & Education London South
NGO's supporting teachers**

Other UK initiatives –

Energy Efficiency Partnership for Homes, Education, Environment & Community Group www.est.org.uk/partnership

Community Action for Energy Programme www.est.org.uk/cafe

Clear Skies (DTI) programme www.dti.gov.uk

CREATE education programme www.create.org.uk



Speaker and Institution

Brian Whittington is Director of Business & Education London South, a charity which promotes links with business and the community and schools. Brian previously was head of community projects for an environmental charity, where he set up energy efficiency and renewable energy projects across the UK. He is a qualified teacher of adult education. Brian holds a masters degree in Government, and has worked as a House of Commons Research Assistant to a Labour Member of Parliament.

Partners and References

Environmental Education: Follow-up to Learning the Sustainability Lesson, House of Commons, London, April 2005

<http://www.publications.parliament.uk/pa/cm200405/cmselect/cmenvaud/84/8402.htm>

Energy Conservation & Solar Centre (www.ecsc.org.uk)

Natural History Museum (<http://www.nhm.ac.uk/>)

Stefan Leonards:
"A serious global problem - but not for me!" -
ways out of the emotional dilemma



Stefan Leonards

(Germany)

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Internet www.die-erneuerbaren.de

Abstract

In summer 2003 the Federal Environment Ministry commissioned a concept study on "Environmental Education for Children and Youth" in the framework of the environmental research plan. The project was jointly undertaken by the research institutes UfU (Independent Institute for Environmental Concerns) and IZT (Institute for Futures Studies and Technology Assessment) and the public relations consultancy iserundschmidt. Its aim was to find new methods to communicate the issue of renewable energies and develop new practical ideas and projects to stimulate greater interest and enthusiasm for this topic among children and youth. This concerned not only pedagogical concepts but also media presence and a public and youth-focused presentation.

The project addressed two key questions:

- How can we raise the awareness of children and youth concerning the issue of renewable energies?
- What support can we offer teachers involved in environmental education on the issue of renewable energies?

Raising Awareness

We can only bring about a fundamental change in thinking if we take the wishes, opinions and problems of young people seriously. But how do children and youth actually relate to the topic of renewable energies? How do they really see the issue? Is there any basic awareness? What means lend them to increasing this awareness?

A pilot campaign tackled these complex issues, approaching pupils in a variety of ways:

- 32 school forums throughout Germany formed the organisational framework, reaching around 800 schoolchildren in all. Each forum consisted of a short presentation in the classroom followed by a discussion among the pupils. Respected energy experts from politics, trade and industry and the scientific community were invited.
- A Collection of viewpoint t-shirts enabled pupils to express their opinion in their own words and in their own way: as a fashion statement. The shirts, printed with thought-provoking, humorous or challenging statements ("eco-hero", "oil is addictive" etc.) were handed out at the start of the school forums. In this way they also acted as a springboard for the presentations and debate.

- A questionnaire was distributed, focusing more on the young people's intellectual and emotional points of reference rather than on normal school knowledge with regards to the question: In which context are renewable energies known, experienced and felt?

“A serious global problem - but not for me!” - three types of emotional defence

Young people are keen to express their opinions and take a stand. The school forums show that environment and renewable energies could certainly become a youth issue. It just has to be approached from the right angle.

From the notes of participating observers and the evaluation of the questionnaires, the following picture emerges:

- As expected, factual knowledge varies greatly.
- Renewable energies have practically no part in the everyday life of the youth.
- Employment prospects in the field of renewables are completely unknown.
- Renewable energies are abstractly considered to be “somehow important”.
- Most schoolchildren do not discuss the environment in their leisure time.
- Factual knowledge plays only a subordinate role in the pupils' emotional commitment.

However, the majority of young people have erected emotional barriers against the moral discourse of teachers and parents. Answers to the question “what do you think of climate change?” are examples of the 3 typical emotional defensive responses:

1. Powerless and panicked: The “global problem” is recognised and even felt to be a personal threat - but without any options for action: “I'm scared.” - “It's our fault, us humans and our technology.”

2. Bored and cynical: Pupils often express their attitude with typical youth cynicism, implying on the one hand that they have a certain understanding of the problem, while on the other making it clear that they are not too bothered about it: “Not so good” - “Our own fault.” - “Just one more change, not really significant.” - “Something should be done soon, or it'll be too late.” - “Climate change from emissions - I don't think much of that.”

3. Detached and rational: A large group of pupils present factual knowledge alone. Regardless of the actual level of knowledge, little or no emotional connection can be perceived: “Constant climate change could lead to mass destruction, especially in the animal world.” - “It is dangerous for some of the population.” - “Climate change can have serious consequences for the environment and later on for people too.”

Pop and Practice – ways out of the dilemma

If environmental education is not to be limited solely to the ecologically engaged minority a complete rethinking is urgently needed. Environmental education must take the emotional defensive responses of youth seriously. Only this will enable the majority of them to be reached at all on environmental issues.

Environmental education must not wear itself out on the mere communication of knowledge. The research project reaffirms that it is vital to deal with materials on renewable energy in practice in order to learn ecological awareness. The importance of doing and testing for the learning processes, especially in the field of environmental education, is undisputed. However, if we want to draw the attention of a broad majority of pupils to environmental education, we must connect with the media-based perception patterns of youth culture.

The perception of 12 to 19-year-olds is strongly influenced by modes of identification presented in pop culture. This is demonstrated, for example, by their television viewing habits. Public television stations do not reach even 10% of youth. In Germany, commercial television broadcasters like Pro Sieben, RTL, MTV and RTL2 maintain an unrivalled

influence on boys and girls (Focus 6/05). In a representative study by the media pedagogical research association Südwest (JIM 2004), three quarters of all young people named one of these four private stations as their favourite station. Thus, if environmental education is not to be perceived as simply part of the compulsory school syllabus, and if we want to make “energy” an emotionally charged issue for our youth, we must address young people on their own aesthetic level. Environmental education should allow children and youth to adopt their own position on the topic of renewable energies using their own language and their own methods. Environmental education should provide modes of identification. Polarising, youth-oriented presentation forms such as satire, self-irony and humour can be extremely useful here. The pilot study in which the fashion statements held central place shows that enabling youth aesthetics to challenge the traditional lesson situation can generate vigorous debate.

The forms and methods of environmental education must change - they must become more fun. Instead of inflicting a guilty conscience on pupils we should give them pop and practice. Gaining a new aesthetics of environmental education is the first step towards a new form of environmental education. www.die-erneuerbaren.de

Presentation

<p>„Environmental Education“ Stefan Leonards (iserundscheidt)</p>  <p><small>Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit</small></p> <p><small>ufu IZT iserundscheidt Kooperationspartner für Publikations-Dienst</small></p>	<p>The viewpoint campaign</p> <p>Question >> How to raise awareness for Renewable Energies?</p> <p>Analysis:</p> <ol style="list-style-type: none"> 1. What do pupil know about Renewable Energies? 2. Is there a basic awareness? 3. Is there any emotional relation to the topic? <p>T-Shirt-Slogans and experts as catalysers to stimulate discussions and raise awareness</p> <ul style="list-style-type: none"> • 32 school forums at regular and job-orientated schools • with more than 800 pupils <p><small>Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit</small></p> <p><small>ufu IZT iserundscheidt Kooperationspartner für Publikations-Dienst</small></p>
<p>data-basis</p> <ul style="list-style-type: none"> – Questionnaire – Interviews with teachers – Interviews with experts – Choice of T-Shirts by the pupils – Memos on the forums – Interviews with pupils and teachers after the forum <p><small>Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit</small></p> <p><small>ufu IZT iserundscheidt Kooperationspartner für Publikations-Dienst</small></p>	<p>Results</p> <p>Do you think climate protection is</p> <ul style="list-style-type: none"> – important: 702 – interesting: 333 – innovative: 185 – sexy: 49 <p>Do you think climate protection is</p> <ul style="list-style-type: none"> – uninteresting: 46 – boring: 35 – unimportant: 10 – old-fashioned: 8 <p><small>Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit</small></p> <p><small>ufu IZT iserundscheidt Kooperationspartner für Publikations-Dienst</small></p>

Results

What do you most talk about with friends?

- nature and environment: 136
- pop stars: 150
- other topics: 232
- clothes and style: 316
- sport: 361
- school: 470



Results

Climate Change is a global problem, ...



... but not for me.



Barriers

Pupils raise emotional barriers against the moral approach of teachers and parents

The answers to questions "what do you think of climate change?" shows three typical defensive responses:

The three types of emotional defensive posture

1. powerless and panicked

The global problem is recognised and even felt to be a personal threat – but without any options for action.

- „I'm scared.“
- „It is our fault, us humans and our technology.“



The three types of emotional defensive posture

2. Bored and cynical

Typical youth cynicism, implying one is above the situation

- „Not so pretty“
- „Own fault“
- „Yet another change“
- „Something should be done“
- „Climate Change from Emission – I do not think much of that.“

The three types of emotional defensive posture

3. Detached and rational

Factual school-knowledge without emotional concern

- „Constant climate change could lead to mass destruction, especially in the animal world.“
- „Dangerous for some parts of earth's population.“
- „Climate Change can have serious consequences for the environment and later on for humanity too.“



Pop und Practise – Ways out of the Dilemma

- A complete rethinking is need if environmental education is not to be limited to an ecologically engaged minority.
- Environmental Education must take the defensive posture seriously.

Pop und Practise – Ways out of the Dilemma

- The campaign shows, that youth-culture oriented approaches may result in discussions: BUT
- only when we allow the pupils to adopt their own position in their own language do we reach modes of identification,
 - f. e. by polarising, using youth oriented forms of presentation with a blend of satire, self-irony and humour.



Pop und Practise – Ways out of the Dilemma

- The importance of doing and testing for learning is undisputed.
- However, if we want to draw the attention of a broad majority, we must allow for the media-based perception patterns of youth culture.

Pop und Practise – Ways out of the Dilemma

- the perception of 12-19 years-old is strongly influenced by modes of identification present in pop-culture.
- TV: public television stations do not reach more than 10% of the pupils. 75% watch exclusively commercial TV

Pop und Practise – Ways out of the Dilemma

- If environmental education should not be perceived as yet another part of the compulsory school syllabus,
 - and if it should provide impulses for action,
- >> we have to address the pupils adapted to their patterns of perception
- >> **Environmental Education rivals with MTV and Nike!**

Pop und Practise – Ways out of the Dilemma

1. Forms and methods of environmental education have to change and adapt to pop-aesthetics.
2. Avoid moral appeals and opt for pop and practise.
3. Two goals: climate protection is life-style important, ecology is applied hightech
4. The approach needs a new aesthetics of environmental education.

Speaker and Institution

Stefan Leonards: *1967, studied history at the University of Cologne; Relief-worker for the International Committee of the Red Cross (1991, 1994 & 1995), Curator at the German Museum for Contemporary History (1995-2000), PR-Consultant for iserundschmidt since 2001, f. e. award-winning campaign “planet earth 2002”, “Environmental Education Renewable Energies for Children and Youths” for the German Federal Ministry of the Environment, “Clean Energy Partnership” for DaimlerChrysler, BMW, Ford, GM, Aral/BP and TOTAL and Conferences for the German Energy Agency dena.

iserundschmidt consultancy is specialised on public communications for science-related and technical topics. Customers range from DaimlerChrysler, Tenesol Photovoltaic and the German Physical Society to the German Federal Ministry of Education and Research and the German Federal Ministry of the Environment and Wissenschaft-im-Dialog, the German Society for the Public Understanding of Sciences.

Reinhard Kaiser: Opening of the Exhibition



Reinhard Kaiser

(Germany)

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Conservation and Nuclear Safety

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mailto: Reinhard.Kaiser@bmu.bund.de

Ladies and gentlemen,

I would like to thank you to have joined us at this Workshop. You - being teachers, scientists, specialized educationalists and experts from more than 20 countries - represent a vast wealth of experience from very different spheres and approaches. Yesterday we learned about policies and tools of the European Union, which want to ensure and support a sound education in energy issues. We listened to different presentations on “How the Green Issue” is to be presented in normal school lessons. Today we’ve come across possibilities to transfer the knowledge and the contacts of NGO’s into a teacher supporting programme concerning Renewable Energies. We’ve found out, that colleagues from Bulgaria, Romania and Slovenia described different experiences and problems from those of their colleagues in Denmark or the United Kingdom. One idea we certainly all share is that curiosity is the starting point. It has to be raised, nurtured and further developed. Successful education depends on people being really interested in the matter. The collection of projects being presented in the exhibition I want to open now shows the enormous effort and commitment of all of you here. Unfortunately, we cannot welcome the students who were engaged in these projects – they are all enjoying their Whitsun break at the moment. Nevertheless I hope you will enjoy visiting the different projects now. After this brain food you are all invited to join our reception and have dinner.

Speaker

Reinhard Kaiser, joined the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in 1999 and is responsible for the department „Climate Protection and Renewable Energies“

Dr. Christiane Averbeck: BLK-Programme Transfer 21 – Education for sustainable development (ESD) - Science goes practice



Dr. Christiane Averbeck
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Abstract

The new subject in Germany's classrooms is sustainable development - renewable energy being part of it. From 1999 to 2004 almost 200 schools participated in Programme "21". This programme was initiated by Germany's Federal State Commission for the Planning of Education and the Promotion of Research (BLK) to formulate curriculum for the teaching of sustainable development in Germany's schools. Based on the results and experiences made the programme's successor, named "Transfer-21" started in 2004 until 2008. Transfer-21's preliminary objective: to introduce sustainable development in to the curriculum of at least 10% of the schools in Germany.

Presentation



Education for sustainable development -
Science goes practise.

Dr. Christiane Averbeck



- is a programme of Bund-Länder Commission for Educational Planning and Research Promotion

- is financed by the Federal Ministry of Education and Research and the Länder

- is coordinated at the Free University Berlin



Content

- Education for sustainable development – What is it?
- BLK- Programm „21“: aims, performance and results
- BLK-Programm Transfer-21: aims, focus of activities



Sustainable – what does it mean?

- to consider environmental, social and economical aspects equally
- future oriented management means: we have to leave our children and grandchildren an intact ecological, social and economic system
- One cannot be achieved without the other.



Objective of ESD: Gestaltungskompetenz

- Gestaltungskompetenz is the ability
- to identify problems of sustainable and non-sustainable development
 - to apply knowledge about sustainable development to draw conclusions from current analyses and future studies about ecological, economical, and social developments and their mutual dependence
 - and to make, understand, and implement decisions based on them



What do we want to convey to children?

- to think in a anticipatory way
- the ability to plan and conduct operations
- to think and act in a interdisciplinary manner
- to be able to participate



What do we want to convey to children?

- to show empathy, engagement and solidarity
- to motivate themselves and others
- to communicate and co-operate cross-culturally
- to reflect on individual and cultural guiding principles



How do we integrate ESD in everyday practice?

- Interdisciplinary learning
- Participation in local environment
- Innovative structures in school



Interdisciplinary learning

- Example
The syndrome concept
- interdisciplinary co-operation in project lessons on the exploitation of non-renewable resources (Kathanga syndrome, brown coal mining in Lausitz) (concept German Advisory Council on Global Change)



Promote Participation

- Example
Collaborative work in the community
- Shaping and maintaining community biotopes
 - Participating in municipal district conferences and local agenda projects
 - Concepts for a sustainable community



Innovative structures

Example
Sustainable business

- Pupil companies (bicycle workshop, soft tourism; fair trade; leasing)
- Sustainability audit



BLK-Programm „21“: facts and figures

- Duration: 5 years (1999 -2004)
- Budget: 13 Million Euro
- In 15 Federal States
- In 200 schools
- With 1.000 teachers
- With 65.000 pupils



Pupils are enthusiastic about BLK „21“

75 % know

- what is sustainability
- now better assess whether products and services are „sustainable“
- and are confident that they can convince others of the necessity of sustainable development
- can now better identify and describe utilisation conflicts



Education for sustainable development is particularly successful when..

- ...pupils can participate in shaping lessons
- ...certain topics are worked on. E.g. „the syndrome of global change“
- ...teachers take advantage of further education courses offered by the programme
- ...schools establish a control group that includes the school administration and as many other players as possible.



Education for sustainable development – important for the future!

- forms of situated learning / participation
- acquisition of area-specific competencies
- opening of schools
- self-evaluation
- in-house co-operation of schools
- fostering of children and young adults of disadvantaged backgrounds



BLK-Programm Transfer-21 – What do we want to achieve?

- Expansion by integrating 10 % of the schools in Germany incl. primary schools and all-day schools
- Develop lasting consulting and support structures
- Extensive training of multipliers
- Expand to primary schools and full-time day schools
- Integration into teacher education

Speaker

Christiane Averbek is a biologist. She worked for several years in a research project of the Federal Environmental Agency in Germany, as a development worker of a German NGO in Africa and wrote her Ph.D. on sustainable resource utilisation in Uganda followed by two years as scientific consultant of the German Council for Sustainable Development.

Presented films to be found (in English and German) at:

http://www.nachhaltigkeitsrat.de/service/bild_und_ton/nachhaltiger_filmblick.html

Netzwerk Zukunft e.V.; Nachhaltiger Filmblick: Bumerang (An example to answer the question: What is education for sustainable development?)

Netzwerk Zukunft e.V.; Nachhaltiger Filmblick: Schulkind (Example to answer the question: And what do you want to give the next generation for the future?)

Eddy Deruwe: The research project FEEDU



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Abstract

The FEEDU-project is entitled "persuasive force of children with regard to the energy consumption through education". It's an interdisciplinary educational project at primary school level with the focus on energy awareness of children and specific emphasis on training of educators-teachers. It's an international project implemented by energy management agencies (and a few specialised educational organisations) in 9 European countries and is supported by the EIE-program of the European Commission for 2 years. It started in January 2005 and will be implemented during a two year period in 13 European regions. In each region 10 schools will take part, which adds up to 130 schools respectively teachers. The programme will reach approximately 7500 children.

Energy related challenges are mostly the start of the motivation to set up energy education in schools. Long term awareness is mentioned mostly as an investment in energy friendly citizens. In order to achieve this, there is a need for appropriate educational tools and didactic know-how to start with energy related educational programmes. Nevertheless, throughout Europe energy and transport issues are inserted into "environmental studies", but not marked as priority for the school curriculum.

The general aims of the project are to raise awareness and change the attitude of children and their families to energy use, to implement energy related issues into the school curriculum and to achieve energy friendly schools and Kyoto targets through the education of future energy friendly citizens. The FEEDU-project wants to insert an energy related project-learning strategy into primary schools, enhance the knowledge of teachers in energy related issues that can be replicated, stimulate a network of teachers for experience exchange and ensure a broad availability and use of energy related educational tools.

The project development of the FEEDU-project will consist of 5 different phases – activation, implementation, monitoring and evaluation and dissemination. It is based on project-based learning where children analyse the situation, search for answers and solutions. The learning strategies are composed of the implementation of a learning plan and use of educational tools. Thereby FEEDU also stimulates teachers to apply "commitment pedagogy": people who commit themselves to saving energy are more likely to save energy. There is a step-by-step- approach, which implies that if children succeed with a first simple act, they are able to succeed with the next one. The Project Approach refers to a set of teaching strategies, which enable teachers to guide children through the learning modules. When teachers implement

the Project Approach successfully, children can be highly motivated, feel actively involved in their own learning, and produce work of a high quality


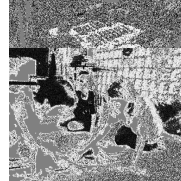
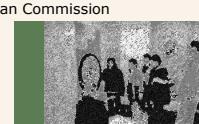


In order to implement the project at school level, teacher courses will be organised with the aim to introduce teachers into the energy and mobility subject, the use of educational tools and project learning methods. There will be participation of a total of 130 schools and 380 teachers in the program, and the courses.

The educational challenge is to make a range of coherent valuable energy related educational tools to be used into the project based learning strategy, ready-to-use and fun to use. The selection of tools is based on good practices by exchanging ideas of experience of partners and by gathering other relevant educational materials and tools, (on the previous experiences by the FEE-project), in relationship with the themes RUE, RES and Mobility. A number of best educational tools, resources and linked information will be integrated into the learning plan. Those “good practice” educational tools will be adapted, classified, tested in several school situations with kids, and will become best practices.

The monitoring of the teachers and children consists mainly in helping them and their schools to achieve their goals while assisting them on specific contents, solutions and ways to implement the FEEDU-project at school level. Monitoring are also activities carried out to keep a close watch over implementation, to check that the project aims is consistently being complied with, but most important the educational tools, resources and linked information that is been integrated into the learning plan will be assessed.

The project dissemination tasks are meant for the transfer of Best practises from the project through workshops in each country, as on the international level. In having results of the implementation of the projects and disseminating them, we are convinced that the educational authorities should be very sensible to reasons to insert the energy and mobility related issues into the curriculum as a priority.

Presentation

 	<h3>The FEEDU-project</h3> <p>"persuasive force of children with regard to energy consumption through education"</p> <p><small>Project supported by the European Commission in the framework of the EIE2003-program</small></p> <p>Presentation by Eddy Deruwe Environmental education Friday 20th of May 2005 Berlin</p>	<h3>The FEEDU-project</h3> <p>"persuasive force of children with regard to energy consumption through education"</p> <ul style="list-style-type: none"> educational project, in primary schools regarding RES, URE and transport awareness of children, with training of teachers implemented by 13 energy management agencies supported by the EIE-program – European Commission started on 1st of January 2005 
	<h3>Involved partners</h3> <ul style="list-style-type: none"> Le Centre Urbain (Abea) - (BE) GDE-net (SE) ARE-Liguria, (IT) ELEEAC (UK) Rhônealénergie-Environnement (FR) Sewern Wye Energy Agency (UK) Planète Science Méditerranée (FR) Energieberatung Prenzlauer Berg e.V. (GE) Slovenski e-forum (SL) REAC (GR) EALP (IT) AGENEAL (PT) APERe (BE) 	<h3>Operational objectives</h3> <p>Long term objectives</p> <ul style="list-style-type: none"> raise energy awareness and change attitude of children and families energy friendly schools integration of energy related issues into school curriculum (where possible) achieve Kyoto targets by educating energy friendly future citizens <p>Medium term objectives</p> <ul style="list-style-type: none"> energy related project-learning strategy enhance knowledge of teachers in energy related issues a network of teachers for experience exchange; energy related educational tools

Operational objectives: short term

- implemented in **13 European regions** (9 countries)
- experienced by **7500 children**
- agreements with of **130 schools**, 10 per region
- implemented during one **school year**
- training** courses set up for all participating teachers
- availability of energy related educational **tools**
- involvement of **parents** (and communities)
- learned from** and valorises similar experiences (like former Fee-project)

Challenge - saving potential

- potential average **saving behaviour**:
 - Heating, thermostat → 5% of heating costs;
 - Heating ventilation → 1 to 50 % of consuming
 - Lighting → 8 to 20 % of lightning energy
 - Home equipment → 1% to 10 % of building energy use;
- potential **medium term additional benefit**
 - Heating, thermostat → 10% - 30% of heating costs;
 - Lighting → 50 % of lighting energy
- potential long-term** are investment measures (loft insulation, and new heating system. We may mention that measures for renewable energy are possible)
- investment in **energy friendly citizens**.

(Figures coming from IBGE – www.ibgebim.be)

Challenge - energy education related


- need** for educational tools and didactic know-how
- access to and knowledge of didactical **value** of tools
- teachers need **low- or no-costs** educational tools
- a **simple** project learning plan, with technical issues integrated
- valorising** already gained experiences (former FEE-project)

--> collecting experiences, systematize and testing them, adopting them and making them available

Challenge - curriculum related

Curriculum « environmental studies », energy and transport are well present, but not a priority

- most **teachers determine which topics** should be covered in lessons and teaching methods
- sustainable development** has been introduced on an experimental level with the aim to develop this theme at school, with energy and climate change
- Specific for the curricula**:
 - Germany
 - Belgium
 - Italy
 - UK
 - Greece
 - France
 - ...



(Information coming from www.eurydice.com)

Project strategy

- general project management and school based planning, consisting in different phases
- Step 1- the activation phase** before the school year starts:
 - project strategy involving school, families, energy agencies, and other stakeholders.
 - learning plan for primary school, with the integration of educational tools
 - training plan for teachers into the content and the way to use the tools

Project strategy

Step 2- implementation of learning strategy during school year: - *implementing and testing the effectiveness of the tools:*

- Learning Phase 1: Acquisition of knowledge on energy (1st semester)
- Learning Phase 2: observation and reflection (1st part of 2nd semester)
- Learning Phase 3: communication and showing the value of the action

- Step 3- monitoring and evaluating** the learning plan and use of tools for school, personal and family commitment
- Step 4 - a disseminating** strategy after the implementation period: - exchanging experiences and communicating the results through workshops and the internet


Learning strategy

- based on **project-based learning** where children analyse the situation and search for answers and solutions
- learning strategies are composed by the implementation of the learning plan, with use of the educational tools
- assist the teacher to use "**commitment pedagogy**": people who commit themselves to save energy are more likely to save energy
- a « **step-by-step** »- approach: if the child succeeds with a first simple act, it will be able to succeed with the next step, too
- teacher training** is supporting implementation

The learning plan: Phase 1

a project approach: from the start during the teacher training courses, the teacher selects the topic of study **Acquisition of knowledge on energy (1st semester)**


- teacher discusses the energy topics with the children to **find out the experiences they have had and what they already know about it**
- children present their experiences and enhance their understanding of the concepts involved in **teaching them about « energy »** and with the use of appropriate educational tools
- teacher helps the children to **develop questions** which their investigation should answer
- teacher **encourages the parents to talk with their children** about the topic and to share any relevant special expertise. A letter about the study is sent home to parents



The learning plan: Phase 2

observation and reflection (1st semester and 1st part of 2nd semester)

- Opportunities for the children to do **field work** and speak to experts
- Teachers **provide resources** to help the children with their investigations; real objects, books, and other research materials are gathered
- Teachers suggest ways for children to carry out a variety of **investigations**
- Each child is involved in **representing** what he or she is learning, and each child can work at its own level in terms of basic skills like construction, drawing, music, and dramatic play
- The teacher enables the children to **be aware** of all the different work being done in class or group discussion and displays




The learning plan: Phase 3

communication and showing the value of the action (2nd semester)

- children can be helped to **convey the energy lessons learned** by featuring highlights for other classes, the principal, parents etc.
- teacher helps the children to **select material to share** and, in so doing, involves them purposefully in reviewing and evaluating the whole project
- teacher also offers the children imaginative ways of personalizing their new knowledge through **art, stories, and drama**
- teacher arranges an **energy event** through which the children share with others what they have learned energy-exhibition)
- summary outline has explained some of the common features of projects, but **each project is also unique**. The teacher, the children, the topic, and the location of the school all contribute to the distinctiveness of each project



Cfr. Sylvia Chard www.projectapproach.com and FEE-project



Educational tools

integration of educational tools into learning plan


- energy related educational tools to be used in the project-based learning strategy, seen as **learning modules**
- selection based on **good practice** related with topics RUE, RES and Mobility
- best educational tools, resources and linked information will be integrated into learning plan. The series of tools concern books, info-posters, cards, video, and also CD-Rom and internet, is classified in:
 - Information cards and books
 - Games and activity books
 - Science Fair Projects for Kids
 - Tools (and exercises) linked between the educational content and physical strategy to improve the school infrastructure
- tools will be adapted, classified, **tested** in several school situations with kids, and will become best practices. The FEEDU-project has now gathered 80 existing educational tools

training teachers


training into energy issues and ways to use related tools

- introduce teachers to the **energy and mobility** subjects, the use of **educational tools** and interactive **project methods**
- formal participation** of a total of 130 schools and 380 teachers in the programme and the courses
- use of **learning modules**, composed of educational tools
- topics:** project learning approach; introduction to energy issues; energy at school and at home; use of RUE, RES and mobility at school; use of educational tools, games and exercises in the lessons; insertion into the curriculum and the practical lessons of the topics; self-audits and how to use them into the lessons; ways to implement energy consumption, at school and at home; visits and their relations content in the area for the school; involve the local community, and especially the parents
- set up by the energy agencies, with **educational expertise**
- networking** possibilities for teachers
- a **web-site** for supplementary material and exchange ideas



Implementation and monitoring


- monitoring consists in **helping to achieve goals** while assisting on contents, solutions and ways to implement at school
- teachers shall make a **project-based learning plan** for his class, with help of the "Energy Agency". The plan need to have firm aims, outcomes and a good idea of the results to be delivered
- Assessment at beginning, middle and end, work out learning targets** in energy and mobility.
- whole work shall be done in function of « **exhibition of energy work**» that can be web-based for the end of the year; surely here teachers need some assistance
- applicability at home** of the learned strategy and contents confirmed by the parents' committee
- technical **energy audits at school** will be integrated into school lessons. Real data and targets are listed at school boards, and linked to behaviour
- being **present in schools** and have an interaction with the teachers



Project dissemination

*In order to **transfer of Best practises**, and to try to introduce energy education **into the curriculum**.*

- National workshops** are organised for presenting resources, training packages, experiences and project management directed to teachers and specialised organisations (one in each country);
- An **event-exhibition** of the schoolwork shall be organised with the involvement of the local community and parents through newsletters, leaflets, invitation, press releases and website shall be realised.
- a **European workshop** organised for educators and agencies. This workshop should be organised in close contact with the DG-Tren and based on the services of or in co-organisation with ManagEnergy (website and streaming).
- educational material, work books, teacher guides, games, energy experiments and other experiences will be adapted in order to put them at **disposal trough the internet** to a broad range of users (children, teachers and parents).
- tools and methods of the FEEDU-project will be **accessible and usable** by every European school without any constraint (In relation with the policy of the DG-Tren of disseminating educational work around energy).



Conclusions

*The FEEDU-project should have **the ambition** of showing that:*

- the implementation of energy projects with a project based learning plan are treated during the whole school year on a **systematic didactical way**
- teachers can **choose out of a series of non expensive educational tools** based on a range of educational modules
- energy saving** can be checked at least on short term basis
- training is important, also for teachers in order to **implement similar project in future**. And once convinced, they can find and use easily all resources
- technical energy saving projects** in schools can be combined with real learning assets
- children who implement measures about RES, URE and mobility can **convince also their school and their parents**
- In doing so, we are convinced that the educational authorities should be very sensible to insert the **energy and mobility related issues into the curriculum** as a priority



The FEEDU-project

Eddy Deruwe

Le Centre Urbain/Stadswinkel asbl-vzw
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Speaker

Eddy Deruwe is expert in urban regeneration, with emphasis on sustainable urban development. From 1996 he is General Manager of the Centre Urbain (ABEA-Brussels Energy Agency), a non-profit organization working primary for the Brussels Regional authorities to inform the citizens and to set up awareness projects around housing renewal, energy and heritage. From 1992 to 1996 he worked in urban regeneration programmes and neighbourhood development for the Brussels Regional authority (neighbourhood contracts and URBAN - European Regional Fund). Worked between 1986 and 1992 in different projects in the Brussels region for the development of housing, industrial building conversion and poor neighbourhoods. He has a university degree in social and cultural adult education (1985).

Institution

The Centre Urbain, a non-profit organisation, mainly supported by the Brussels regional Capital, is an information centre for urban sustainable development active in renovation, urbanism, energy consumption and heritage issues and was founded in 1988. The Brussels Energy Agency (ABEA), the energy department of the Centre Urbain, has been setup from 1996 on. The Centre Urbain aims directly at the Brussels citizens as end-user and the basis targets are supported by educational and awareness projects. The staff is composed of architects, engineers, urban planners, social and cultural workers. Each of the collaborators has developed his technical competences within a social approach, linked to the Brussels urban context and this integrated approach is specific. The information-desk is located in a historical Market hall that includes an exhibition space of about 800 m².

The Centre Urbain is setting up supportive general informative missions at the scale of the whole Region and local initiatives, in particular in old and impoverished neighbourhoods. It has developed an expertise about housing issues, characterised by:

- activities of counselling and accompaniment of the citizens,
- actions of awareness and incentives,
- realisation of information supports,
- development of tools of service to the citizens among others: energy audits, repertoire of the professionals and craftsmen active in the heritage sector,
- Pre-financing of house renewal grants within the "contrats de quartiers" (neighbourhood contracts).
- Educational projects, specifically for the primary school level.

Le Centre Urbain (ABEA) use an integrated approach with house improvement, heritage and energy awareness as main themes with emphasis on Rational Use of Energy and Renewable Energy. Also it initiates and organizes regional events such as the "Energy Week" and publishes for a large public. The Centre Urbain is coordinator of the former FEE-project (Altener 2001) and the ongoing FEEDU-project (EIE2003), both energy awareness projects for primary school in Europe.

The services of the Centre Urbain are well known in the Brussels Region because it is the official regional information-desk where house-owners can obtain all information about financial grants for house improvement. The technical and administrative expertise of its multidisciplinary team is recognized by the Brussels Regional Government and a large number of Brussels based organizations.

Dr. Michael Scharp: The project “Environmental Education for Children and Youth”



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Abstract

Ladies and gentlemen,

between 2003 and 2005, we have worked on a project called “Environmental Education for Children and Youth” ordered by the Federal Ministry of Environment, Nature Conservation and Nuclear Safety (slide 1). The project had four goals (slide 2):

- testing a campaign about RES at schools (c.f. lecture iserundschmidt);
- identifying requirements for support to enhance environmental education;
- supporting teachers by analysing and distributing information on education of RE and
- identifying deficits in research and development

Within the R&D-project we have made a survey of requirements of teachers (slide 3). The applied methods were qualitative, explorative interviews with teachers and institutions. Within this survey we have analysed the practice of teaching, the requirements needed and the restrictions of environmental education. Furthermore we have made a survey of the available literature. Based on the campaign, the analysed literature and the survey of requirements and deficits we have developed new R&D-projects to enhance the communication on education for RES.

We used an interview guideline for our survey of requirements, the ways of teaching environmental education, identifying deficits and used materials for teaching. Nearly thirty interviews were carried out. The survey was not kind of a statistical analysis but a survey to structure our research. We wanted to know, how teaching RES is put into practice, how teaching RES fits into regular teaching and how we can improve the communication of RES into education.

There is a broad variety of ways to teach RE (slide 4). The most regular forms in practice are presentations of pupils, interdisciplinary teaching, field trips or using installations of the school for teaching and exercises. Further materials usually used for teaching were class books, but also booklets of energy supplier and national institutions.

The list of requirements of teachers is a very long list of demands (slide 5). That doesn't mean that teachers in Germany are complaining about this and that. The reason why the list of requirements is so long is that teaching RES is not a foundation subject. Further more it is due to the fact that we interviewed mostly very interested teachers. Therefore teachers told

us, what they would like to have to enhance their interests. They mentioned following requirements:

- More scientific education;
- more further training on RES;
- experts for school lessons;
- more internal cooperation in school;
- more money;
- better and up to date materials (class books, different media);
- better descriptions of experiments and projects;
- a network “exchange of experiences”;
- installations for schools (solar heating, photovoltaic systems, biomass combustion) and
- a field trip guide.

Good teaching of RES at school has many restrictions (slide 6). The complaints most mentioned were:

- environmental education is extra work in German instruction;
- there is insufficient cooperation between different school subjects;
- the school books are not up to date;
- there is not enough time because RES is seldom part of regular teaching;
- there is not enough money to buy materials or to make field trips;
- there are too many pupils in class
- it is hard to find good and up to date materials and
- there should be more actions at school to interest pupils for RES.

The third goal was supporting teachers with a survey of available material on teaching RES (slide 7). Within this survey we first identified more than 250 materials of different types: books, booklets, videos, DVD's and CD's, construction kits, kits for experimenting, websites or games. Secondly we developed criteria to structure and to evaluate these materials. Criteria have been for example:

- Criteria (practicability): up to date, easy to get, suitable for regular teaching etc. and
- Criteria (teaching standards): orientated to practice and for teamwork, procurement of basic knowledge, reference to everyday life etc.

Afterwards we analysed and described the identified materials (slide 8). Nearly 70 have been selected as recommendable and were recommended on our website. In spite of the broad variety of the materials there are some remarkable similarities:

- Most of the materials are for pupils around 12 years;
- most of the materials should be used in physics, technical education and geography;
- in physics and social sciences ex-cathedra teaching is supported by the materials;
- cognitive education is required in higher classes and
- in social sciences / social studies for primary school the material fits to learning on projects.

Based on the campaign, the survey of requirements and deficits and of analysing the literature we have developed ideas for further research and development (slide 9). According

to the fact that RES will be the basis of our energy supply in a few years or in a few decades we know that

- Pupils must be prepared to a new energy supply,
- teachers must be trained on RES,
- different audiences needs different materials and different ways of teaching (Kindergarten, youth club, primary school, high school etc.) and
- “learning” and “teaching” is also possible outside of school.

The first deficit we found was that pupils don't have an emotional bound with RES (slide 10). There could be many reasons, but one of the most mentioned in our campaign survey was that RES as a subject is seen as a project of the teachers rather than one coming from the pupils. RES is therefore connected with “boring teaching”. RES is something, which interests the teacher. Therefore it is not a matter of pupils.

Our first proposal is, to educate RES with computer games (slide 10). The prospects may be:

- Education is possible by using computer;
- computer games are attractive for children;
- (emotional) relationships could be formed through games;
- knowledge transfer is also possible and last but not least
- Games aren't a “matter of teachers”.

Therefore we suppose that it is possible to interest pupils between 6 and 12 for a game about RES.

Another important deficit is the lack of diversification in materials for different target groups e.g. for Kindergartens, primary schools and youth clubs (slide 12). Therefore we propose the development of material cases. These cases for different audiences could contain games, booklets, models or experiments. Every case must fit to the different target group. There are some prospects of success why we have decided to develop cases. First, cases for RES are not available yet, second that they will be a new offer for teachers and last but not least that they could be used out of regular teaching. We propose an audience between 4 (Kindergarten) and 10 (primary school) in fact that there is the biggest gap of materials.

Another deficit is the lack of available attractive actions for schools (slide 13). That means that teachers are looking for new ways to present RES to their pupils. They would like to have more attractive ways to interest pupils. Therefore we propose the development of attractive “experiments”. One possibility is a balloon experiment: the balloon has the capacity of one pupil's daily life “emission”. By blowing up the balloon pupils could experience “emissions”. The balloon could be used at school festivals, where it can be an attractive eye catcher.

Another possibility to make RES more attractive is the use of a touring exhibition on good examples of RES (slide 14). We propose to create an exhibition with posters of good practice. On the one hand, schools could present what they have done with RES. On the other hand, schools could lend the exhibition. The exhibition could be integrated into the education and actions of the school as a starting point for own projects on RES at school.

One more – but not the last – deficit is that teachers need more support teaching RES (slide 15). A lot of teachers are complaining how difficult it is to find good materials. Therefore we propose to create a new website for German teachers. Contents could be information on available material, good practice examples, tasks, texts and charts.

Within our project, we have identified a lot of deficits in German teaching of RES (slide 16). Some important ones are:

- Teaching RES in Germany concentrates on higher education;

- possible teaching locations are disregarded,
- there is a lack of material e.g. for Kindergartens and primary school and
- information about teaching RES is difficult to find.

Nevertheless solutions are possible. Our campaign and the website www.die-erneuerbaren.de have shown that teachers can be supported in different ways. However, new solutions are needed to solve the identified deficits to enhance the environmental education on RES.

Presentation

<p>The R&D Project „Environmental Education Renewable Energy for Children and Youth “</p> <p>Dr. Michael Scharp Institut for Futures Studies and Technology Assessment</p> <p>Malte Schmidthals Independent Institute for Environmental Concerns</p> <p>Stefan Leonards iserundschmidt consultancy</p> <p>R&D Project: BMU FKZ 903 41 113</p>	<p>Project Goals</p> <ul style="list-style-type: none"> • Goal 1: Campaign to interest pupils for RE (c.f. lecture ius) • Goal 2: Requirements for support • Goal 3: Support for teachers by analysing and distributing information on RE education • Goal 4: Identifying deficits in research and development
<p>What have we done?</p> <ol style="list-style-type: none"> 1. Survey of requirements <ul style="list-style-type: none"> • Method: explorative qualitative interviews • Teacher and institutional survey • Analysing teaching practice, requirements and restrictions 2. Survey and analysis of literature 	<p>Results: practice of teaching</p> <p>How do they teach?</p> <ul style="list-style-type: none"> • presentations of pupils • interdisciplinary teaching • field trips • using school installations • materials: class books, booklets of suppliers and national institutions 
<p>Results: Requirements</p> <ul style="list-style-type: none"> • more scientific education • more further training on RE • experts for school lessons • more internal cooperation in school • more money • better and up to date materials (class books, different media) • better description of experiments and projects • network "exchange of experiences" • installations for school (solar heating, photovoltaic systems, biomass combustion) • field trip guide 	<p>Results: Restrictions</p> <ul style="list-style-type: none"> • extra work and insufficient cooperation in school • out-dated school books • not enough time (RE are seldom part of regular teaching) and not enough money (to buy material, to make field trips etc.) • too many pupils in classes • there is an information deficit that means it is hard to find good materials and • they would like to have more actions to interest pupils for RE

Analysing literature

- identification of 250 materials
- analysis and description of good materials
- criteria (practicability): up to date, easy to get, suitable for regular teaching etc.
- criteria (teaching standards): orientated to practice and for teamwork, procurement of basic knowledge, reference to everyday life etc.



Analysing literature: results

- most of the materials are made for pupils of about 12 years of age
- most of the materials should be used in physics, technical education and geography
- in physics and social sciences ex-cathedra teaching is supported by the materials
- cognitive education is required in higher classes
- in social sciences / social studies for primary school the material is adapted to learning by projects



Identifying deficits in research and development

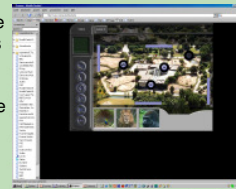
- It is a fact that RE will be in a few years or in a few decades the basis of our energy supply. This means that
- pupils must be prepared to a new energy supply
 - teachers must be trained on RE
 - different audiences needs different materials and different ways of teaching (Kindergarten, youth club, studies etc.)
 - "learning" is also possible outside of school



future projects

Deficit: There is no (emotional) relationship

- Proposal: Education with computer games
- Prospects: Education is possible with computer; computer games are attractive for children, (emotional) relationships could be formed by games, knowledge transfer is also possible, games aren't a "teacher theme"
- Audience: pupils at the age between 6 and 12



Deficit: Lack of materials for Kindergärten, primary school and youth clubs

- future projects
- Proposal: Development of material cases
 - Contents: Games, booklets, models, experiments etc.
 - Prospects: cases are not available yet, new offer for teachers, usable also out of regular teaching
 - Audience: children at the age between 4 and 10



future projects

Deficit: Schools need new actions for RE (1)

- future projects
- Proposal: development of attractive "experiments" with RE
 - Contents: balloons, which have the capacity of the "emissions" of the daily life of a pupil; the balloons have to be inflated by the pupils
 - Prospects: "emissions" will be experienced by inflating the balloon
 - Application: school festivals



Deficit: Schools need new actions for RE (2)

- future projects
- Proposal: Touring exhibition with posters of good practices
 - Prospects: Teacher and schools are looking for events for introducing in RE
 - Application: exhibition in schools

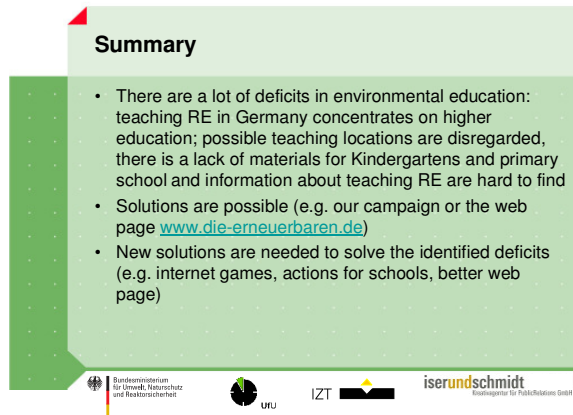


future projects

Teacher need more support

- future projects
- Proposal: new website "Umweltbildung Erneuerbare Energien"
 - Contents: Information on available material, good practice examples, tasks, texts and charts etc.
 - Prospects: easy-to-get information are needed and helpful, quick and broad distribution of material is possible
 - Audience: Teacher





Summary

- There are a lot of deficits in environmental education: teaching RE in Germany concentrates on higher education; possible teaching locations are disregarded, there is a lack of materials for Kindergartens and primary school and information about teaching RE are hard to find
- Solutions are possible (e.g. our campaign or the web page www.die-erneuerbaren.de)
- New solutions are needed to solve the identified deficits (e.g. internet games, actions for schools, better web page)

Logos at the bottom: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit; UfU; IZT; iserundschmidt Kooperationspartner für Publikationen GmbH

Speaker

Dr. Michael Scharp, Master of Chemistry, Master of Philosophy, PhD of Chemistry, Scientist and project manager at the IZT since 1996.

Main research areas: sustainability of the real estate sector, sustainable use of materials, Service development and research, innovation research (methods and instruments), education for renewable energy.

Institution

The IZT - Institute for Futures Studies and Technology Assessment is an independent and non-profit research institute, was founded in 1981. The mission of the IZT is to conduct interdisciplinary futures studies with a long term impact on society. Future developments do not concentrate on single disciplines or issues, but are marked by various interdependences and overlaps that have to be considered in research and action. The scientific work at the IZT has always been characterised by the combination of basic research and practicable results. Our research projects thus provide orientation, for example for the use of telemetric systems, the development of environmentally friendly products and services, and the use of rational and regenerative energy or for shaping new labour structures. Many projects concentrate on methodological issues such as the use of the scenario method as a creative and consensus-oriented communication instrument.

Dr. Harald Kohl: Workshop Summary



Dr. Harald Kohl

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Dear ladies and gentlemen,

I was asked by the organizers to give a short summary on the main results and the most relevant topics we have discussed during the last two days. This is not an easy task. You attended to a lot of talks and a lot of discussions took place here in Berlin. However, I think, there are several points and results which were discussed repeatedly.

The most remarkable observation we made is that there is only little difference between the experiences in the different countries represented here. We share the same experiences and very similar problems when it comes to teaching Renewable Energies. The presentations revealed positive and negative experiences, showed good tools and methods which seem to be still improvable.

What are the points which most of you mentioned as being important for getting Renewable Energies communicated in the best possible way?

The actors – be it teachers, consultants, researchers or the colleagues from the European Commission – they all must be authentic, and they all must be experts themselves. Only those who can rely on a vast amount of and thorough knowledge are able to teach Renewable Energies successfully.

Teachers and other communicators have to be enthusiastic about Renewable Energies. This is crucial. In other words, and to put it in one of the favored workshop words: They have to be engaged.

Having labels for Renewable Energies, or inventing hip campaigns and slogans might be very helpful to transfer knowledge about Renewables a better way.

The fourth point is the question of networking. Authorities, experts, institutes dealing with Renewables must be linked to each other, and – most important – they all must be linked with the schoolteachers and the communicators in order to broaden their network of expertise, and to know whom to consult when planning and conducting new projects.

Tools of teaching and methods of learning should be diverse and – as far as possible – go hand-in-hand. Neither the internet on its own nor the building of a single solar boat will have an impact in the long-run. Applying one tool after the other, and using them in accordance with the needs and interests of children, is obviously the more successful strategy.

And last but not least: The “Green Issue”. The green issue can be discussed in many school subjects. We have learned about successful projects in Denmark and in the UK, transferring Renewable Energies in history lessons and many more.

Nevertheless there are the traditional boundaries. It remains difficult to overcome the difference between science and humanistic subjects. We have to try again and again – but they don't fall by themselves.

Let me come back in the end to the questions how successful teaching and communicating for sustainable energies is possible. Claudia Löffler, one of our organizers, told me that a saying I knew in German, is also well-known in English:

- Tell me – and I will forget.
- Show me – and I will remember.
- Let me do it myself – and I will probably have learned lessons for the lifetime!

To put it another way: Successful environmental communication starts when children and young people get really involved in the subject. This means of course a big effort for the teachers as well as the Renewables' experts.

I hope that this workshop helped to support these efforts and that you have strengthened your networks and that you will keep in touch all over Europe. I wish you a pleasant time here in Berlin and a good journey home. Good bye, and Thank you very much.

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