

ESD implementation across Carbon Detective Partner countries

Carbon Detectives



ESD implementation across Carbon Detective Partner countries

This report covers the following issues:

1. Overview of numbers of schools in each country
2. Status update for the implementation of ESD
 - a. Educational system and the inclusion of ESD in the curricula of schools
 - b. The inclusion of ESD in the teacher training
 - c. Networks for schools or teachers for ESD
 - d. Available support on ESD for schools
3. Overview of Energy Education
4. Use of ICT in ESD
5. Examples of best practise on ESD and Energy Education

1. Overview of numbers of schools in each country

The number and type of school across each country varies, as does the proportion of these schools that would fall within the remit of the EU Carbon Detectives programme.

The EU Programme provides materials and support to schools that education pupils between the 8 and 14 years of age.

	Austria	Bulgaria	Czech Rep.	Hungary	UK (GB&NI)
Number of schools		2,500		3,664	50,000+
Number of target schools (8-14)			4,133	3,146	42,633
Number of target pupils		500,400	816,015		8,660,000
Number of 'primary' schools				2,888	38,586
Age range in Primary			6-10	6-9	5-10
Number of pupils				Not known	4,860,000
Number of 'secondary' schools				102	4,047
Age range in 'Secondary'			11-15	10-18	11-18
Number of pupils				Not known	3,800,000

Most countries there has been significant reductions in the numbers of schools in recent decades.

2. Status update for the implementation of ESD

Austria

Environmental Education (including ESD) is one of the twelve basic Principles of Education that should run through all school subjects in all type of schools. ESD is also mentioned in the principle of Education on Development Policy (Entwicklungspolitische Bildungsarbeit). At a school level, ESD is integrated in a more indirect way - through the principles of education – rather than in an explicit way through curricula requirements. Some aspects of ESD are contained in Biology and Geography curriculum.

Our Austrian partner - FORUM Umweltbildung is a Government financed nationwide institution providing programmes and materials for teachers and other multipliers of ESD. ÖKOLOG is the Federal Ministry of Education, Arts and Culture programme for ESD and there are transport (Mobility Management for Schools) and food (Nutrition and Sustainability in Schools) programmes. Awards and grants for ESD-projects, including “UN Decade Project” awards operate throughout the country.

ESD is not included in the general curricula and training of teacher education, but there is specialist training and workshops for interested teachers available in the country.

There is an extensive schools network with many different organisations including ÖKOLOG, Environmental-label-schools, UNESCO-schools, Global Action Schools, Climate-Alliance-Schools (Klimabündnis-Schulen) and Pilgrim-schools.

A wide range of Materials and tools for ESD are offered by the FORUM Umweltbildung. Teachers and other multipliers can find information and didactic material on the website (www.umweltbildung.at) or in publications. Moreover different NGOs offer special materials to their own area of expertise, like climate education or Global learning.

Bulgaria

ESD is delivered through interdisciplinary teaching of the national curricular subject of “Areas of Culture and Education”, within this subject ESD features in Natural science and ecology, Social sciences and civel education, Chemistry and environmental protection, Informatics and informational technologies, Home and technologies and the Arts. ESD is used to link these different subjects using practical interactive methods and helps to develop the knowledge, skills and key competences of the students corresponding to the European Framework (EF) for ESD.

Ministry approved SOP (Selectable Subjects for Obligatory Preparation – or core curricular) specific study programmes covering “environment” for grades 1, 2, 3 and 4 are available from www.ekoobrazovanie.com. For grades 5, 6, 7, and 8 there is a Ministry approved “Green Pack” that also includes ESD programmes.

Teacher training at university level covers children aged 3-6 and 7-10 years old on disciplines like: “Ecology and environmental protection” and “Environmental Management”. There is no direct ESD training, until you reach post graduate level and then is limited to separate themes in the teaching of sciences. The teacher training on ESD prior to employment is considered insufficient and non-effective and there are no study materials using modern methods for teaching ESD in schools. There is methodological guidance available - “For a New World” - for teachers and for the training of trainers which covers ESD.

There are some national and regional school networks supporting ESD in schools – but these are fragmented.

Programme for support of ESD in Bulgaria (2007) takes into account all framework and strategic documents related to the environment and the ESD at international and national level. The *Programme* supports the inclusion of ESD in all education and encourages the integrated exploration of the problems related to the environment and the sustainable development.

There is no sustainable funding mechanism for the ESD in Bulgaria which is currently provided through the OP via the Ministry of Environment. National agencies and schools fund activities through the SAP. As a result ESD will cease when funding stops.

A consultative council on ESD consisting of experts from the Ministries of Education and Environment, Universities, NGOs and schools exists but is not very effective. There are about 20 NGOs in the country working in environmental protection and sustainable development. The creation of educational materials for schools is impeded by Ministry Regulation requiring such materials to be submitted to the Commission for approvals.

Czech Republic

National policy (White Paper, 2000; Act on Schools, 2004) ensures curricular updates include ESD. A new system of curriculum documents for children from 3 to 19 years old is currently being introduced at two levels – state and school. Framework Educational Programmes (FEP) are state level curricular requirements which have to be adopted and adapted to the individual school context through a School Education Programmes (SEP).

Climate change is a cross-cutting issue in FEP for elementary, secondary academic and secondary vocational education. The Ministry of Education, Youth and Sports have developed a guidance document (updated in 2008) to support schools Environmental Education co-ordinators in planning and incorporating Environmental Education into school documents.

ESD and/or Environmental Education teaching is covered in some of the 26 teacher training universities, but not all future teachers receive this training.

A number of NGOs and educational facilities offer certified short courses on Environmental Education. Over 250 school Environmental Education coordinators were trained in several rounds of specialized Environmental Education courses and these continue to run.

Several hundred elementary schools are associated in the M.R.K.E.V. network – Methodology and Implementation of Comprehensive Environmental Education. There is also the Environmental Education Club, the Ekoškola project and the School for sustainable life which our Czech partner is involved in.

A wide range of aids, publications and environmental educational programmes provided by environmental education centre lecturers are available for schools. These are either short programmes for several teaching hours or several days long with accommodation in the centres. They are supported by National network of Environmental Education centres, a joint programme of the Ministry of the Environment and Ministry of Education, Youth and Sports, and, as appropriate, by the regions and cities.

Examples of these programmes related to protection of the climate include, e.g., the “Solar energy is most moral” and “There is only one Earth” programmes, intended for grades 6 – 9 of elementary schools and secondary schools, particularly for teaching of geography, the natural sciences, civic education and physics (SEVER Environmental Education Centre), “You too control the Earth” (Ctyrlístek Zlín) and the several-day programme “Week for sustainable life” (SEVER Environmental Education Centre and Rychta Krásensko) and “Seven colours of the rainbow” (Slunákov Environmental Education Centre).

Hungary

There are expectations that schools will cover energy efficiency and ESD but there are no centralised guidelines yet in place to support this.

Some NGO's took the responsibility for introducing ESD in a holistic way into schools as they can react faster than the state educational system. They apply for grants to be able to implement their educational goals and edit their materials. The energy stakeholders, e.g. energy providing, utility companies recently have launched energy educational programs for every age group.

The Eco-Schools programme helps teachers to raise ESD issues, membership is voluntary and there are currently around 450 schools registered as Eco-Schools. There is an annual round of entrants to the programme. However, a well organised, countrywide, comprehensive ESD program for all types of schools is missing

There are some existing energy projects run by NGO's and energy producing companies, some are specific to Hungary but most are adaptations of programmes in other countries.

Examples include:

- **“Kyoto in Homes”**- Internet based but with energy workshops currently being planned - www.kyotoinhome.info

- **Global Climate Change** educational package with an Integrated Science Model projects book
- **Green Pack (a Polish EE programme)** introduced through teachers trainings with access to work packages after the training
- **The Energy Club** – educational packages include board games, workshop materials, lesson plans, publications, audit tools, and themed campaigns
- **www.mtvosz.hu** (also available in English) – Energy efficiency and Carbon Calculators, Climate Watch competition in 2008

United Kingdom of Great Britain and Northern Ireland

Governments in each of the four countries (England, Scotland, Wales and Northern Ireland) have individual responsibility for setting the education curriculum for their own nations. All have agreed to incorporate ESD into their curricular activities; however the way in which the curricular is covered and delivered varies greatly across each country. In addition, schools can decide their level of commitment and what they wish to do with some remodelling their curriculum around ESD and others to teach the bare minimum.

In England, the Department for Children, Schools & Families have a Sustainability Framework and want all schools to be exemplars of sustainability by 2020. There are regional and local initiatives (mainly by government or government sponsored organisations) to support this frameworks implementation. In addition, schools are required to report on how they are embedding sustainability into the curriculum and school operations as part of their annual evaluation process.

Eco Schools is nationally recognised, centrally funded by the Department for the Environment and has over 30% of English schools registered. Local and regional networks exist to support schools in this programme.

The Scottish Government has set Local Education Authorities (as a performance indicator) to report on numbers of schools participating in the Eco Schools programme. Consequently they have a very high percentage of schools registered with the programme. They have also developed a social studies element in the Scottish Curriculum of Excellence which is the main curricular vehicle for ESD in schools. Eco Schools is an active network which shares good practice and provides materials and teaching resources are well utilised in schools.

In Wales, ESD and Global Citizenship (ESDGC) is an overarching theme for education. Schools are required to demonstrate to the school inspectorate where ESD is taught in the curriculum and how the school is sustainable. ESD is included in teacher training and the revised secondary curriculum through the Personal and Social Education Framework (2008). Key local and national networks for schools on sustainable issues in Wales include Green Schools, Eco Schools, Forest Schools and the Welsh Network of Healthy Schools.

The Northern Ireland Executive has formally incorporated strategic objectives and targets for ESD and has promoted the development of good practice guidance to schools, advocated for an increase in teacher training in ESD and revised the curriculum to include the theme 'Learning for Life and Work' which develops young people's knowledge and understanding of citizenship and their personal development. A nationwide Environmental Education Forum provides ESD training for trainee teachers in the province.

There is a large and generally uncoordinated array of support available to schools with regard to implementing ESD. This leads to high levels of competition amongst providers and a real risk that schools participate in many initiatives giving a 'false reading' of activity as a whole and failing to broaden the appeal so as to engage with hard to reach schools. Support is available from many funded initiatives. Funders can be central Government, Regional Development Agencies, Local Authorities, UK wide and local, utility companies and renewable energy manufacturers.

Other Materials and Tools supported by national and international charities include:

- **WWF – UK** - has launched 'One Planet Schools' which provides assembly ideas, photo-packs and on-line curriculum resources on ESD
http://www.wwf.org.uk/what_we_do/working_with_schools/
- **Action Aid** – has produced a set of primary and secondary school resources that encourage young people to explore the causes and impacts of climate change, investigate energy use and take action to reduce their energy consumption
<http://powerdown.actionaid.org.uk/>
- **Friends of the Earth** - has produced a range of posters, quizzes and lesson plans to help young people learn about ESD <http://www.foe.co.uk/learning/index.html>
- **The Development Education Association** manages a website of resources and activities to teach pupils of all ages about the 8 key concepts of the Global Dimension
<http://www.globaldimension.org.uk>

3. Overview of Energy Education

Austria

There are special tools and materials to support schools in delivering energy related curricular requirements. Including:

- Workshops from the climate alliance for kids and teens on energy education
- Workshops IG-Windkraft
- Compilations of didactic material from different institution and energy companies
- Pupils University on Energy Education and Climate

Bulgaria

Curricular subjects within "Areas of Culture and Education (ACE)" are "Natural sciences and ecology", "Civil sciences and civil education", "Home and technologies". The OP (Obligatory Preparation) for the pupils from 1 to 8 grades includes different themes related to the "energy" education, including:

- food & its origin
- energy sources, technologies, generation and supply
- the Greenhouse effect and chemical rain
- natural resources and their protection in Bulgaria
- the atmosphere and biosphere
- energy use in the home and energy efficiency.

There is no specific programme for "energy" education in the Bulgarian schools. This is generally carried out in the students' OP through themes included in the different study subjects above. Initiatives for energy education tend to be covered by the SAP (Selectable Additional Preparation) and delivered in after class activities funded from the grants scheme "Lets make the schools attractive for the young" under the Operational Programme "Environment" (Ministry of Environment) and the Energy Efficiency Programme of the Ministry of Economy, Regional Development and Tourism.

Projects related to the "energy" education are not considered as priority and schools are not given sufficient opportunities to undertake and finance "energy" education. Presently, the Ministry has developed National programme for retrofitting of schools' buildings and National programme for cycling education.

Czech Republic

Energy is taught in Czech elementary and secondary schools mainly through the subject of Physics (energy transfer, electricity, heat loss, insulation) and Geography (renewable and non-renewable energy sources). From 1990's multiple projects and programmes dealing with energy issues are offered to schools by external bodies (NGOs and private companies) or are created and implemented by schools themselves.

Hungary

Energy education is part of “Man & Nature” and “Way of Living” elements of the National Curriculum (NAT). Schools are required to create their own curriculum based on the NAT. Energy use and its environmental impact is mainly taught at 5 - 7th graders (11 to 13 year olds?). Students must acquire basic competences during their studies including in environmental awareness. So in classes pupils have to work a lot with energy topics.

United Kingdom of Great Britain and Northern Ireland

Energy education no longer teaches just about energy concepts but also about the use of energy in our everyday lives and its global impact. The focus is now on influencing and changing the current energy consuming behaviour, embedding sustainable attitudes and ensuring young people can acquire the skills needed for a low carbon society. This is done through self directed research, investigative and applied learning using pupil's homes, schools and energy data.

There is a broad range of materials available, many of which are accessed by the internet. These include lesson plans and worksheets, carbon calculators, animations, video clips and energy data spreadsheets.

National and regional Governments have invested in programmes such as Sustainable Learning (an energy and water management programme) and Eco Schools (a broader sustainability improvement programme) and their local equivalents. Regional development agencies have developed a resource database to support schools (teachclimatechange.org/), and a school carbon foot-printing calculator (dott07.com).

The most significant investment in energy education programmes has been provided by the UK energy suppliers, through online programmes such as:

- **NPower's Climate Cops** – <http://www.climatecops.com/>
- **The E.ON Energy Experience** - <http://www.eon-uk.com/energyexperience/>
- **British Gas' Generation Green** - <http://www.generationgreen.co.uk/>
- **EDF's "The Pod"** - <http://www.jointhepod.org/default.aspx> in partnership with Eco Schools

Renewable energy companies also support school activities including:

- **Solar4Schools** – <http://www.solar4schools.co.uk/>
- **Our Planet** – <http://www.ourplanet.org.uk/>

4. Use of ICT in ESD**Austria**

There are a number of different Carbon Calculators, mostly for adults or secondary school pupils. There are no calculators for young children. There is no didactic material and the opportunities to link the carbon and data collection activities for Carbon calculators to school lessons or pupil activities

There are two programmes available to support schools with Energy education by providing interactive tools and activities; these are “E-Control” and “Internetportal”

Bulgaria

A National programme for ICT is being implemented with the ambition to allow internet access in every Bulgarian school as well as the creation of a National educational portal that would allow real-time access by 100 000 users (pupils, teachers, directors, parents). In the Portal there would be digital classes, tests, notebooks, and other documents available.

Some digital classes have been developed, but not yet covering ESD, and there are therefore no suitable multimedia materials for ESD.

Except for schools in rural locations, schools are now equipped with computers in a special classroom designated for that purpose, and most such schools are connected to the internet.

There is currently no Ministry documents, materials or schools' networks, specifically supporting ESD. There are around 10-12 NGO websites that cover this sphere.

Czech Republic

Websites providing supporting materials for teachers and games and class activities for pupils, mainly developed by EU funded projects, are readily available and include:

- "Teachers 4 Energy" - <http://www.teachers4energy.eu>
- "Kyoto in the home" - <http://www.kyotoinhome.info/>.
- http://ec.europa.eu/environment/youth/air/air_climate_cs.html - provides information, games (in English), quizzes, environmental postcards
- http://ec.europa.eu/environment/climat/campaign/resources/publication_cs.htm - climate change site with some school material for teachers. Also quizzes, games, information and movies
- http://ec.europa.eu/environment/climat/campaign/resources/videos_cs.htm – aimed at European teenagers

There are several web based carbon calculators / ecological footprints, including:

- Introduction and sign posting - <http://www.hraozemi.cz/uhlikova-stopa.html> - -
- Institutional - <http://www.nadacepartnerstvi.cz/emisni-kalkulacka>
- Individuals – <http://www.myfootprint.org/>. (providing Czech calculators in English)
- Schools - <http://www.ekostopa.cz/ekostopa-skoly>=

Hungary

No information has been supplied on the levels and uses of ICT in ESD within Hungarian schools.

United Kingdom of Great Britain and Northern Ireland

ICT is at the heart of the UK government's commitment to improving learning for all children, and is embedded in the curricula for England, Scotland, Wales and Northern Ireland. The delivery strategies for each region have slight variations and timescales in terms of funding, infrastructure and professional support.

All schools have computers and access to the Internet, but the facilities vary considerably, an increasing trend in the UK is the use of individual laptops by pupils. Many lessons are now run through interactive whiteboards which link a large interactive display to a computer. Users control the computer using a pen, finger or other device.

ICT enriches ESD teaching and teachers are increasingly using these facilities. ESD resources via the internet are available in many different forms. For teachers they include interactive activities for use on whiteboards, downloadable lessons plans with supporting teachers' notes, pupil worksheets, videos and animations. For children there are online activities including games that support their learning of energy, food, transport, etc.

Due to the amount and variety of multimedia material available to support ESD it is impossible to identify and list every resource and website available, and this is one of the biggest problems for teachers.

In England there is a Specialist Schools Programme where secondary schools develop a chosen specialism in partnership with private sector sponsors and additional government funding. Specialist status in maths and computing will result in greater ICT provision. There is also increasingly some element of community access, allowing school buildings to be used outside school hours to support community activities including ICT skills provision to adults in the surrounding area. As a result many secondary schools now have large computer suites and excellent video conferencing amenities.

ICT is not restricted to using computers and accessing the internet for teaching and learning materials. Other ICT tools include data loggers which usually comprise a remote data logger and a variety of sensors including those that measure temperature and light. Children engaged in heating and lighting surveys of their school can use this equipment to measure and record heating and lighting levels to help identify where energy is being wasted. Infrared sensors can also be used to identify heat loss and test the efficiency of insulation.

The use of ICT for communication is also becoming increasingly common. Many schools have flat screen displays in reception areas to communicate information to visitors. Included in the information can be details of schools' latest ESD activities such as a school travel campaign or an energy saving week. Most schools now have their own website and children are sometimes involved in providing material for these sites. They are able to use digital cameras and camcorders to present ideas and promote activities on the website, through class activities, or even where schools have their television studios and editing suites.

5. Examples of best practise on ESD and Energy Education

All partner countries have been able to identify a significant number of programmes, supporting materials and case studies regarding ESD and energy education in schools. There are many initiatives going on and many organisations involved including:

- European Commission – through multiple programmes
- National Government programmes
- National programmes part funded by national, regional or local governments
- Local Authorities and other public sector organisations
- Utility and renewable energy companies
- Private companies (as part of Corporate Social Responsibility or Environmental policy activity)
- International, national and local third parties including charities and not for profit organisations.

Summary of ESD report findings

There are many programmes available to schools, and in many of our partner countries there is some concern over levels of competition to engage with schools. The level and nature of the existing materials available to schools (foot-printing tools, curricular materials, games and quizzes, competitions etc) could make it difficult for this project to stand out or offer sufficiently different approaches and resources to make it appealing to schools. It is hoped that this approach would be engaging enough to encourage those hard to reach (and not yet engaged in ESD)

To overcome this we have endeavoured to provide a 3 stage process to obtaining a footprint – so that schools can be supported through the process. It is hoped that this approach will result in higher levels of activity and more accurate data in this area over time.

Our image boards and the ability of schools to compare themselves to their peers in the same country or, in other partner countries will provide greater educational value and interest. It will also support the aims of creating a linked community of schools across national boundaries.

We are looking to join up with other EU projects to ensure better outcomes for schools across multiple projects. This is particularly relevant for the competition element of the project, which at present has very limited funding and could be unappealing to schools already bombarded with similar (and better funded) initiatives.

ANNEX I - Study – Current status of energy education in Austria

1. Overview of the status of implementation of ESD in Austria

The inclusion of ESD in the curricula of schools

In the Austrian educational system there are existing different forms of curricula: the *General Curricula* for the different forms of schools (which treat for example the general aims of education in school) and special *Curricula for the Subjects* in secondary education (content-based). Besides, there are basic *Principles of Education (Unterrichtsprinzipien)*, formulating cross-curricula-aims, duties and responsibilities of education in Austria.

Environmental Education is one of the twelve basic Principles of Education that should run through all school subjects in all type of schools. ESD is included within this principle of Environmental Education. Furthermore the importance of ESD is mentioned in the principle of Education on Development Policy (*Entwicklungspolitische Bildungsarbeit*).

When it comes to the curricula of the different forms of schools (primary and secondary schools), it can be said that ESD is integrated in a more indirect way - through the principles of education - than in an explicit way - in the curricula - of Austrian schools. Some aspects of sustainable development are contained in the special curricula of biology and geographie.

The Provision of specific programmes on ESD in schools

FORUM Umweltbildung (Environmental Education Forum) is a nationwide institution, financed by the *Austrian Federal Ministry of Education, Arts and Culture (BMUKK)* and the *Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)* that provides programmes and materials for teachers and other multipliers of ESD.

ÖKOLOG (Ecologisation of Schools) is the largest programme of the Federal Ministry of Education, Arts and Culture for ESD and environmental development in Austrian schools. (www.oekolog.at; www.umweltbildung.at/oekolog).

Mobility Management for Schools is an action and advisory program which offers support for the implementation of mobility management measures in schools throughout Austria. (www.schule.klimaaktiv.at).

Moreover, there are awards and grants for ESD-projects, that honour and support schools' initiatives in the field:

ESD-projects in schools can be labeled "*UN Decade Project*" through the award of the *Austrian UNESCO Commission*. (<http://www.umweltbildung.at/cgi-bin/dekadenbuero/af.pl?ref=projekte>).

The *Fund for Health Education and Education for Sustainable Development (Bildungsförderungsfonds für Gesundheit und Nachhaltige Entwicklung)* supports qualified, innovative education initiatives which target sustainability in the areas of environment and health. Over 1.500 projects have received grants since 1992. (www.umweltbildung.at/bildungsfoerderungsfonds).

The *Austrian Environmental Label (Umweltzeichen)* certifies schools, which prove that they respect and take into action the principles of sustainable development (ecological, social and economic aspects) and ESD. (www.umweltzeichen.at).

The project *Nutrition and Sustainability in Schools* has the purpose of developing and testing a consultation model for optimising the food offered by buffets of middle and secondary school and preparing sustainable school snack. (www.gutessen.at/schule).

The inclusion of ESD in the curricula and training of teacher education

In Austria, the situation can be shortly described as following: There is no fulfilled inclusion of ESD in the general curricula and training of teacher education, but there is an existing offer of special trainings and workshops for interested teachers.

An exception, where sustainable development is indeed included in the curricula of teacher education is the bachelors program of environmental pedagogy. *Environmental Pedagogy (Umweltpädagogik)* is a unique course of studies offered by the *University College for Agrarian and Environmental Pedagogy (Hochschule für Agrar- und Umweltpädagogik)*. It leads to qualification in the areas environment, sustainable development and pedagogy. (www.agrarumweltpaedagogik.at). Graduates are qualified to teach in *Secondary Technical and Vocational Schools* in the special field of Environment (*Berufsbildenden Höheren Schulen mit Fachbereich Umwelt*).

In Austria, the former *Academies of Education (Pädagogische Akademien)*, tasked with the formation of pedagogues for the compulsory Austrian education system, have recently been transformed and upgraded into *Universities of Education (Pädagogische Hochschulen – university colleges)*. In-service teacher trainings for all types of schools, former provided by the pedagogical institutes (*Pädagogische Institute*), are now included in the structure of these colleges.

There are in fact examples of courses on ESD provided within the colleges' offer in teacher training as well as in their curricula of studies of teacher education (for compulsory primary schools and so called *Lower Secondary Schools – "Hauptschulen"*).. Courses on different aspects of ESD, like gender equality or health education are strongly represented in teacher trainings and further education. ESD as a global concept on the other hand is generally spoken not noticeably represented in the curricula of the Universities of Education.

Future teachers in secondary "higher" education, the so called *Secondary Academic Schools (Allgemeinbildende Höhere Schulen - starting at 5th or 9th grade)*, complete their curricula within the general Universities. Their studies and different institutes (e.g. Romanistics for the subject of French, Geography for the subject of Geography, etc.) with a special curriculum in pedagogy (concentrating on didactics, methodology and general pedagogy), are organised diversely by each autonomous university. The question of "if" and "how much" ESD is included in the student's individual studies depends on his or her subjects. (It might be the case in a special course on regional development in Geography, or it might be not.). Within the online catalogues of courses in pedagogy for future teachers there is no course entitled "Education for Sustainable Development" nor "Sustainable Development".

Concerning the in-training formation of teachers, the ÖKOLOG-Summer-Academy is an offer for interested teachers to develop their competencies and knowledge in different topics of ESD, like for example on the topic of sustainable consumerism at the recent Summer Academy. Moreover the FORUM Umweltbildung in cooperation with the University of Klagenfurt offers a university course on Education for Sustainable Development "BINE – Bildung für Nachhaltige Entwicklung" (run twice up to now) for people working in teacher-education - in the sense of "train the trainers" with the aim of fostering the implementation of ESD into the curriculum of the Universities of Education.

It can be said that the subject of ESD as a global concept is not an integrative part of the courses in pedagogy which all teachers have to pass. But there can be found a range of examples of courses that deal with ESD explicitly (rare) or with special aspects of ESD (numerous) in teacher education and training. Most of them are optional or voluntary, so they presumably mainly reach the already interested persons.

Networks for schools or teachers for ESD

There is existing a number of active networks in Austria in the field of implementation of an ESD-agenda in schools. They are mainly addressing schools as a whole, not individual teachers. But the membership of a school indeed depends on engaged actors within the schools. The networks each focus on different aspects of ESD, and within that, their member-schools also have different areas of engagement. One school concentrates on ecological

themes for example whereas another one puts the focus on global thinking and peace-education. The most important and established networks for schools in Austria are the following:

- **ÖKOLOG**: is the basic programme of the Ministry of Education, Arts and Culture (*BMUKK*) on ESD and school development at Austrian schools. Each federal state (*Bundesland*) has formed a regional team to coordinate and accompany participating schools in the **ÖKOLOG**-school-network. The network provides an **ÖKOLOG** network newspaper and materials for teachers as well as a collection of links and methods for the work in schools. The **ÖKOLOG**-network has a current total of 294 member schools. (www.umweltbildung.at/cms/c/oekolog.htm).
- *Environmental-label-schools* is a network of schools awarded with the *Austrian Environmental Label for schools (Umweltzeichen für Schulen)*. These schools have a special dedication to environmentally oriented action as well as education, health promotion and education for sustainable development. (www.umweltbildung.at/umweltzeichen; www.umweltzeichen.at/schulen).
- *UNESCO-schools*: member-schools in this network are actively engaged in advancing human rights, as well as a culture of peace and sustainable development. Another focus lies in practicing democracy and media-education. (www.unesco-schulen.at).
- *Global Action Schools*: members in this network have the aim to contribute to the worldwide reduction of poverty through the building of awareness in teaching and concrete school-projects, like e.g. children rights, fair trade, sustainable land use or climate protection. (www.globalactionschools.org).
- *Climate-Alliance-Schools (Klimabündnis-Schulen)*: Participating schools commit in an interdisciplinary preoccupation on subjects related to climate and climate-friendly comportment. Moreover they elaborate concrete actions most notably in the areas of energy and transportation. *Climate Alliance Schools* deal with the topics of climate as a part of the curriculum, while also developing concrete measures related to the issues and of energy and traffic at schools, thus contributing to overall climate protection.
- *Pilgrim-schools* is a catholic Austrian network of schools dedicated to spirituality and sustainability in the school-environment. The network is a project of the private Catholic University of Education in Vienna (KPH Wien) and the Association of Friends of the Pilgrim-school (Verein der Freunde der PILGRIM-Schule). A pilgrim-school combines ESD with a religious-ethical and philosophical dimension of education in the field of school-teaching.

Special materials and tools on ESD

A wide range of Materials and tools for ESD are offered by the FORUM Umweltbildung. Teachers and other multipliers can find information and didactic material on the website (www.umweltbildung.at) or in publications. Moreover different NGOs offer special materials to their own area of expertise, like climate education or Global learning.

2. Overview of Energy Education

Special materials and tools for Energy Education

- Workshops from the climate alliance for kids and teens on energy education
- Workshops IG-Windkraft
- Compilations of didactic material from different institution and energy companies
- Pupils University on Energy Education and Climate

ICT-materials and tools of Energy Education

- E-Control: e-learning tool for energy education
- Internetportal for Energy Education – information, didactic material

Different Carbon Calculators – most of them for adults or secondary schools; there are no calculators for young children, and there is no didactic material nor opportunities that link the carbon and data collection activities of the tools to the lessons and pupil activities

Other programmes or initiatives of Energy Education

- Austria is partner country of EU-Projects – “SUPPORT” with the web based programme “Co2nnect”
- Climate alliance: material for teacher and children, different campaigns and programmes

3. Available support on ESD for schools

Support by the government on ESD in schools (money, human resources, structures, programmes,...)

FORUM Umweltbildung is the central service-contact for schools to get information and support for the implementation of ESD mandated by the Ministry of... and of... The *Fund for Education on Health and Sustainable Development (Bildungsförderungsfonds für Gesundheit und Nachhaltige Entwicklung)* financially supports school projects in the field of sustainable development. Another possibility for schools to find advisory support and exchange with other schools is their membership in one of the networks mentioned above.

Organisations (governmental or NGOs) supporting or implementing ESD within the formal education system

- *FORUM Umweltbildung* (see above)
- *Zentrum Polis* concentrates on the provision of citizenship education and different aspects of ESD in schools.
- A range of NGOs and other associations engaged in the large spectrum of ESD concentrate mainly on providing information, materials and workshops for interested schools concerning different topics and support schools in their engagement. Some of the different school-networks in the field of ESD are based on NGOs. The network *Global Action Schools* for example is coordinated by the NGO *Südwind* (“*South Wind*” engaged in Global learning tasks and development policy).

Organisations for development and production of ESD tools and materials

FORUM Umweltbildung provides and develops tools and materials for teacher and other multipliers of ESD.

4. Use of ICT in ESD

Do schools have the opportunity to work on ICT with the pupils?

A study on ICT in schools is accomplished at the moment from the Austrian Federal Ministry of Education, Arts and Culture. The results of this study are available in February 2010.

In general all schools in Austria have access to the Internet. There are differences how the several classes are equipped with computers. The configuration on ICT is business of the school upholder – which are in most cases of primary and secondary schools the communities. The schools which are running by the state are equipped in a better way. The so called “notebook-classes” of a number of secondary schools throughout Austria are working and writing with notebooks instead of exercise books and use e-learning platforms and interactive material for their work in school and at home. Generally, pupils learn how to deal with ICT in a practical and theoretical way in the subject of informatics (secondary education). Interactive whiteboards are also used in several classes. There are projects on the use of web 2.0 and edumoodle in schools.

There is the possibility of “sbx-schoolbook-extra” – which is used by many schools in secondary level. In addition to the normal school books are contents provided via internet to use for teachers and pupils.

There is support from the ministry of education on e-teaching and e-learning on several websites (beside that there are a range of workshops and trainings offered for teachers):

<http://www.e-teaching-austria.at/>
<http://virtuelleschule.bmukk.gv.at/>
http://www.e-learning-austria.at/default.aspx?sec_id=123
<http://www.bildung.at/ext/bmbwk/index.php>
http://www.lehrerweb.at/materials/teaching_materials/MS/inf/ikffit/index1200.html
<http://elsa20.schule.at/>

Material to work with ICT in ESD

Available multimedia material in the internet for children

There are several Austrian internet-sites that provide interactive games/tools and information for children on ESD-topics, for instance:

- Interactive tools provided by the FORUM Umweltbildung:
<http://www.umweltbildung.at/cgi-bin/cms/af.pl?navid=912>
- E-learning tool provided by the WWF: <http://www.wwf.at/weltreise/>
- Site on renewable energy provided by the European Centre for Renewable Energy (EEE) Güssing: <http://www.e-energie.at/>

Available multimedia material in the internet for teachers

The internet sites mentioned above also provide some guideline-materials for the use of the interactive tools in class. Further Offers for teachers provided by the Ministry of Education:

- Education highway for teachers: on this website teacher find materials, e-learning materials, workshops or trainings on different topics and for every school subject:
www.eduhi.at
- Site for teachers on the use of edumoodle: www.edumoodle.at

How many websites for ESD do exist (for use by children and/or teacher)

The following website offered for children and/or teachers are concerned with Education for sustainable development:

- Environmental Education and ESD: www.umweltbildung.at
- UN-Decade ESD: www.bildungsdekade.at
- Locations of ESD in Austria: www.bildungslandkarte.at
- Site on wind energy and climate protection for children: www.wilderwind.at
- Interactive site for young people and teachers on global sustainable development:
www.wwf.at/weltreise
- Teaching materials on topics related to solar energy:
<http://www.solarwaerme.at/Lehrer-Center/>
- Information and events on climate and energy for teachers: <http://www.schools-at-university.eu/wien/>
- Small site on climate change for children: <http://www.klimatissimo.at/>

5. Examples of best practise on ESD and Energy Education

5.1. Five Examples for ESD on Energy Education

- Internetportal on Education and Climate
The climate-internetportal of the FORUM Umweltbildung offers information on climate and climate change and a broad range of didactic material for teachers and multipliers. www.umweltbildung.at
- ÖKOLOG Climate Material
ÖKOLOG – the program for ESD and environmental education in Austrian schools – offers a box of didactic materials to different topics, one of them dealing with the topic climate. All materials include information, didactic instructions for teachers and worksheets for pupils. The material is available as box or in the internet as pdf-files.
www.oekolog.at

- Ecological Footprint

This booklet provides information and didactic instructions for teachers concerning the use of the ecological footprint in education. It includes an extensive collection of methods and ideas and a chapter with scenarios how to deal with this topic and the different emotions of children in groups.

- How to live well from 1 hectare

This interactive game deals with the ecological footprint in connection with one's own behaviour and lifestyle – climate and personal consumption are topics of this game. The children together set out one hectare in an outdoor activity and try to come to an agreement how to get along with goods provided by that one hectare (according to the concept of the ecological footprint). They find out that the available area is consumed very quickly and discuss how to change this to gain a more sustainable lifestyle.

- Wild Wind

Wild wind is a workshop for children – they learn about electricity, renewable energy, biomass, solar energy and wind energy. Positive attitudes towards renewable energy are achieved by a playful approach. Beside the workshops there is also a compilation of didactic material and online-tools available. www.ig-windkraft.at

5.2. Five Examples of best practise on ESD-projects of schools

- Mobility Management for Schools

Mobility management for schools is an action and advisory programme which offers advice for the implementation of mobility management measures in school throughout Austria. www.schule.klimaaktiv.at

- Green miles for children

The climate alliance of Austria invites children in one or more special “action weeks” try to make their ways in a climate friendly way – by foot, by bicycle or by public transport – and they collect their “green miles” for the “childrens-mile-album”. www.klimabuendnis.at

- Energy Trail – eco energy in school

This is a project of a school centre in Linz. Pupils learned and searched about new and sustainable form of energy exploitation in physics. The children developed an interactive energy trail to show their results for the whole school, the parents and the public around the school.

- Be creative on sustainable development! (Nachhaltigkeit kreativ)

The aim of the project for young people is to deal with the difficult issue of sustainability in a creative way in order to animate, to irritate and to demonstrate: Sometimes you can even smile about sustainability!

The pupils designed an exhibition of meaningful eye-catchers based on their own notion of sustainability, particularly of sustainable consumption. By means of these pictures adults should get their eyes opened and come to the conclusion that the opinions of teenagers are striking, valuable and important and have to be considered. Further products of the project are T-Shirts, Freecards and even films.

- PediBus

Different schools in Austria organise a pedibus. Children gather at special points like busstops at a particular time and make their way to school together by foot guided by adults (teacher or parents). So parents don't have to bring their children individual by car and the children move in the fresh air and have fun.

5.3. Three Materials which seem to fit best in the carbon detectives project

- Energy efficiency – intelligent use of electricity

This project from e-Control, the Austrian control agency for electricity, deals with the topics energy saving, energy efficiency and the careful handling with our natural resources. The

project is developed for physics. Didactic material for teacher and online e-learning tools for pupils are offered on an internet portal. www.e-control.at/schule

- The environmental checkers

The didactic materials “the environmental checkers” was developed in addition to an interactive exhibition in the ZOOM Kindermuseum. The material deals with many topics belonging to sustainable development in an adequate way for children from 6 to 12 years. The material is also as download available. www.umweltchecker.at

- Sustainable living in Utopia

Sustainable Living in Utopia was a competition, combined with didactic material. The story tells about four children from different parts in the world – they tell about their daily routines. In School workshops the pupils discuss about the sustainability of the different lifestyles and reflect on their own lifestyle. Then they try to create the perfect lifestyle for a sustainable world. One part of the project has been a competition – the pupils were asked for their creative concepts and their ideas. The didactic material is still available. www.lebeninutopia.at

One example from Germany:

- BMU Educational Material: Climate Protection and Climate Change

The material covers the issues: Climate Research, the consequences of climate change, CO₂ emissions and the polluters, Scenarios for climate change. Also a competence check and background information for teachers is available. The material is offered as download in German language and English.

<http://www.bmu.de/publikationen/bildungsservice/bildungsmaterialien/sekundarstufe/lehrer/doc/42085.php>

6. Evaluation of ESD processes

There are different processes for evaluation of ESD progress in Austria:

- The indicator set of the UNECE is used for analysing the ESD implementation process in Austria.
- A pilot study on ESD indicators which investigates the possibility of mapping ESD-related education processes has been published by the FORUM Umweltbildung.
- A research project on ESD indicators (conducted together with project partners from Germany and Switzerland) aims to develop a dedicated ESD indicator set for use at various levels of formal education.

ANNEXII - ESD Study - Bulgaria

1. Overview of implementation on ESD in Bulgaria (as a partner country under Carbon Detectives Europe Project):

In the educational system of the country the following understanding of ESD has been accepted:

- *Methodology* – instrument for sustainable development that increases the ability of people and society to work for a sustainable future
- *Integrated approach* - regarding the three dimensions of the sustainable development – economical, social and environmental development
- *Components* – that include education for environmental protection, ecology, health, citizenship and multiculturalism. That education stresses on the interrelationship between nature and culture.
- *Process* - that covers all the aspects of life and takes place in all levels and forms of the formal and informal education
- *Existing good practices, programmes and existing study materials* - for ESD based on the European strategy for ESD from the Economic Commission of UN, the millennium goals and the national documents related to the problems of the ESD.

The critical analysis shows that there are no traditions in the Educational System (ES) of the country concerning the ESD and such education at the moment is not being implemented to its full potential - content and range wise.

1.1 Is ESD included in the curricula of schools?

The question is discussed based on the following information for the Educational System (ES) in Bulgaria:

Schools and Pupils:

For the school year 2000/2001 the number of schools for general education in the country is 2843. In comparison with the school year 1996/1997 the number is reduced by 407. This is caused by the closure of schools and reorganisation. In 2000/2001 the number of pupils in all kinds of schools for general education was 867 400. For the project target age group (8-14) this number was around 500 400. The numbers in 200/2001 are reduced by 2.2% in comparison with the school year 1999/2000. Similar rate is also applicable to the following years until 2009/2010. The reasons for this reduction are: demographic, economical, migration of the young in the EU countries. Consequently the Ministry of Education, Science and Youth (The Ministry) is currently transforming the school system.

The result is that in the school year 2009/2010 the number of schools is 2 500.

The critical analysis shows that in the last years a relatively high number of pupils drop out of school in comparison to the EU's average and that that results in the closure of schools in the country. According to data from the Regional Inspectorates of the Ministry 19 193 pupils dropped out in the beginning of the school year 2004/2005 from the total of 963 051 (age 7-18) enrolled. The reasons for dropping out of school are: economical – unemployed parents, low income, low living standard; social – parents' lack of interest, lack of parental control; negative influence of the surrounding environment, delinquency; cultural-psychological – linked to the

traditions, customs, moral values of the different ethnical groups; personal – lack of motivation for education, negative attitude towards school, difficulties in the communication with teachers/classmates.

Study plan and Study Programmes:

According to the Bulgarian Law on the educational degrees; the requirements for a minimum general education; and, the Study Plan, the classes under every subject from the Study Plan are carried out following a Study Programme prepared by the Ministry. The Study Plan includes subjects for Obligatory Preparation (OP); Selectable Subjects for Obligatory Preparation (SOP); and, Selectable Additional Preparation (SAP). The OP includes skills and knowledge from the Subjects from the Study Plan that cover the minimum general education from the State Requirements for the educational content. The SOP and SAP add to, extend and develop the skills and the knowledge of the students, acquired from the OP. The education in OP is carried out following the Study programme that is unique for the country and is approved by The Ministry. Every school in the country (state owned, municipal or private) decides on what subjects they will also undertake classes for SOP and SAP. The choice is made while the Law on national public education and the Law on the educational degrees; the requirements for a minimum general education; and, the Study Plan, as well as the specific needs and interests of the students are taken into consideration. Study programme for the SOP and SAP in afterwards created. In the Ministry's Study Plan there is a weekly limit for SOP and SAP for every class.

For the age group that concerns the project II-VIII grade (8-14 years of age) the number of classes for SOP is: 2 study hours for II, III and IV grade and 3 study hours for V, VI, VII and VIII grades. For SAP the number of classes is: 4 study hours for every grade (Annex 1)

Annex 1

Study hours for OP on the subjects of the Areas of Culture and Education (ACE) related to ESD

ACE	Subjects	Grade	study hours/ yearly
<i>Natural science and ecology</i>	Man and nature	2	32
		3	48
		5 and 6	85 each
	Biology and health	7 and 8	68 each
	Physics and astronomy	7 and 8	51 each
	Chemistry and environmental protection	7 and 8	51 each
<i>Mathematics, informatics, informational technologies</i>	Informatics and information technologies	5, 6, 7 and 8	68 each
<i>Social sciences and civil education</i>	Bulgarian nature	1	31
	Man and society	3	48
		4	32
	Geography and economics	5, 6, 7 and 8	51 each
<i>Home and technologies</i>	Home and appliances	1, 2, 3 and 4	32 each
	Appliances and economics	5 and 6	51 each
	Technologies	7 and 8	34 each
<i>Art</i>	Art	1 and 3	64 each
		2 and 4	48 each

		5	68
		6, 7 and 8	51 each

Note: - ***Study Programmes of the schools*** exist only for SOP and SAP. The content of the latter Study Programmes and on which subjects there will be SOP and SAP is determined by the given school and the beginning of every school year in the *School Study Plan*. The latter Study Plan is then submitted (Annex 1) to the Regional Inspectorates of the Ministry for approval.

Therefore, the inclusion of the ESD in the educational system through opportunities for interdisciplinary relations can be studied in the contents of the Study Programme for the OP that have been approved and published by the Ministry and have relatively long-term status (Annex 2). *The latest design of new Study Programmes for OP happened in 2000 with one Ministry's project "Modernization of the Secondary Education". Update of some Study Programmes took place during 2005-2006.*

Annex 2

Interdisciplinary aspects for including ESD in the State Educational Requirements

N	Areas of Culture and Education	Subjects	Expected results
1.	<i>Bulgarian language and literature</i>	Bulgarian language and literature	The student learns: <ul style="list-style-type: none"> To create own text. To express own opinion and view Participate in a debate – as part of a team or personally
2.	<i>Foreign languages</i>	English German French Spanish Russian	<ul style="list-style-type: none"> Build up communicative competences for managing different situations in the surrounding environment Participate in dialogue with people from different countries Use information from different sources
3.	<i>Mathematics, informatics, informational technologies</i>	Mathematics, informatics, informational technologies	<ul style="list-style-type: none"> Handle information, apply quantitative measurements of objects and natural events in the environment Develop mathematic models for finding solutions Create logical thinking and apply logical arguments for giving right conclusions Apply mathematic models for objects and natural events in the environment Learn about accessible methods and tools for presentation, interpretation and transfer of data. Describing, structuring and analyzing data from different areas.
4.	<i>Social sciences and civil education</i>	History Geography Economics Ethics Law Philosophy	<ul style="list-style-type: none"> Develop skills for active civil participation in social life in the context of intercultural environment, globalization of the economy, the social processes and the ecology Realization of the significance of the interconnections between the social act and

			technological- and bio-spheres.
5.	<i>Natural science and ecology</i>	Surrounding world Man and nature Biology and health Physics and astronomy Chemistry and environmental protection	<ul style="list-style-type: none"> • Form understanding of the variety of objects, processes and events in the nature • Learn about the interconnections between, the changes of, and the evolution of the natural world • Develop skills for working with different informational sources to find out about the living and non-living nature • Develop ecological awareness and eagerness for environmental protection.
6.	<i>Art</i>	Music Art	<ul style="list-style-type: none"> • Develop artistic attitude and creativity through the use of different information sources • Learn to understand the esthetical aspects of the natural world • Expression via visualization of the attitude towards different objects and situations
7.	<i>Home and technologies</i>	Home and appliances Appliances and economics Technologies	<ul style="list-style-type: none"> • Create technological literacy and competences • Reveal the importance of the human impact on the environment • Take part in the outside natural live through designing, constructing, and crafting different objects and technological
8.	<i>Sports</i>	Sport	<ul style="list-style-type: none"> • Develop physical culture and an important component of one's general culture • Learn important rules and preparation for active and healthy lifestyles

The understanding of the ESD in Bulgaria that is included in the Study Programmes is that:

- ESD has interdisciplinary character, it can be carried out through Subjects of different Areas of Culture and Education: *Natural science and ecology, Social sciences and civil education, Chemistry and environmental protection, Informatics and informational technologies, Home and technologies, Arts*;
 - ESD is carried out through linking different Subjects
 - ESD is carried out through practically orientated education using interactive methods;
 - ESD develops knowledge, skills and key competences of the students corresponding to the European Framework (EF) of which: the social and civil competences (for managing conflicts, integration and cooperation, for thinking critically and taking responsibilities); and, the competences for initiative thinking and entrepreneurial approach (risk assessment, planning and analysis), are related to the goals of the ESD for environmental protection and sustainable lifestyles.
- **Has a specific programme for ESD been organized for the schools?**

Because of the interdisciplinary character of the ESD in the Bulgarian educational system there is not (separate) specific programme.

The ESD is carried out through linking different subjects from the themes of the OP. For the SOP specific study programmes have been developed and approved by the

Ministry (in 2005/2006 under projects funded by the Dutch MATRA Programme and the Darwin Initiative). Those apply to the ESD module “Environment” for grades 1, 2, 3 and 4. The ESD substance in these programmes was developed according to the interdisciplinary potential cross-checked with the State Requirements for the educational content. It also took into account the 6 key themes from the European strategy for ESD from the Economic Commission of UN:

- Environmental protection
- Sustainable production and consumption
- Elimination of the poverty
- Health protection
- Human rights
- Peace and cultural differences

The programmes are available from www.ekoobrazovanie.com website and are available to all interested schools in the country. For 5, 6, 7, and 8 grade there is an adapted and approved by the Ministry “Green Pack” that also includes ESD programmes. Every school develops its own study programme for SAP. The data for that cannot be summarized here because of the number of schools and the periodical changes in the individual study programmes.

- **Has ESD been included in the materials for the preparation of teachers?**

For the study year 2008/2009 there are 40 accredited universities. The total number of students is 227 000 which is around 7% less in comparison to 1998/1999. The number of professors in those is reduced from around 23 000 in 1996/1997 to around 21 000 in 2000/2001 or by around 9%.

The tendency for continued reduction of students and professors in the universities can be observed. The highest number of students are following those subjects: technical sciences – 23,5%, health care - 23,4%, industrial management and administration – 16,2%. From the 40 universities for 2009/2010 school year about 30% offer programmes for preparation of teachers in different educational fields. For the needs of the ESD in the universities there are faculties for the preparation of teachers (for children aged 3-6 and 7-10 years old) on disciplines like: “Ecology and environmental protection”, a masters degree on Environmental Management. There is, however, not a discipline called Education for Sustainable Development with the corresponding *scientific code*. In the Study Plans of the faculties there are pedagogical post graduate preparations for students that include themes of the ESD. In the natural sciences faculties – biology, chemistry and technology, physics – the ESD is included through separate themes. **The preparation of teachers for implementation of ESD is insufficient and non-effective.** There are not study materials using modern methods for teaching ESD in schools. In the preparation of teachers the specific approaches of ESD – integrated, multidisciplinary, situation based – are not included sufficiently. The interactive methods and formats of teaching are still not developed enough. The development of materials for the preparation of teachers on the different subject is university policy, nevertheless, study materials on ESD are not easily available and therefore difficulties occur in the search of information. In the website mentioned above there is methodological guidance available - “For a New World” - for teachers and for training of trainers (including university professors) on ESD.

- **Is there a network of schools or teachers related to the ESD?**

There are national and regional networks on ESD that were developed mostly by projects managed by the NGOs. In 2002 a national network for education on environmental protection and sustainable development was created – BeeNet. It counted 200 members (schools and NGOs). In 2003 regional network for ESD was created in Northeast Bulgaria under MATRA project. This network counts just 9 schools. In 2005/2006 another school network was created with around 160 participating schools from 5 regional cities in the country.

The critical analysis shows that after the end of the projects the networks are not effective. The educational cooperation – functioning of the schools network is not active enough.

- **Are there special materials or instruments on ESD?**

In the educational system in Bulgaria there are not separate notebooks on ESD because of the interdisciplinary character of this type of education. **There are specifically developed study materials “The world around us” for 1, 2, 3, and 4 grade and a Teachers’ Book that were approved by the Ministry and distributed in 2 000 schools in the country.** Those initiatives took place in the period 2004/2008 under the MATRA and Darwin Initiative funder projects.

For grades 5 to 8, schools around the country were offered “Green Pack” including a number of different themes and a CD. Seminars were organized around the country for training teachers on the use of the above materials and the introduction of ESD. Around 15 seminars took place and around 1000 teachers were trained. A number of study materials on ESD were approved by the Ministry. Those included the following themes: “For a clean planet” (Rio Declaration on the Environment and the Sustainable Development); “The rights of a child” (UN convention for children rights); “Next to each other” (Framework Convention for the protection of minorities’ rights). Those were developed in the period 1998/2008 and correspond to international documents related to the environment and the sustainable development. The materials were developed with the participation of around 120 pupils that presented their point of view regarding the environmental protection and the sustainable development using drawings and descriptions, expressing opinions, explaining different situations. Those materials were presented to the European Commission in Brussels from where interest was taken for translation in the European languages and distribution in other countries. The schools in the country that carry out ESD use interactive methods and formats of education. Important role here has the interactive methodology for “active learning” (Colb Learning Cycle).

The critical analysis from the study shows that educational materials for teachers and pupils are available. In the majority of those, however, the ESD problems are not regarded as a long term perspective and strategically as to reflect the interconnection between the economic, social and environmental aspects of the surrounding world. What predominates in those materials is the data. The materials do not place the pupils in an active position in the learning process. The training materials for teachers are formal; however, they do not include effective methodologies to support the teachers in the conduct of practically orientated ESD.

The educational materials are evaluated by Commission form the Ministry while the procedures are being changes every year. **The materials are being developed only by “authors’ teams” of private publishing houses.** After that they are submitted to the

Commission for evaluation. When successful the publishing house publishes them and distributes them to the schools.

2. Review of the “energy” education – as a subject of the ESD:

- Are there special materials or instruments for “energy” education

In the study content of the following subjects of the Areas of Culture and Education (ACE): “Natural sciences and ecology”, “Civil sciences and civil education”, “Home and technologies” for the OP for the pupils from 1 to 8 grade different themes related to the “energy” education are included (Annex 3).

Study is based on educational materials form 2009/2010.

Annex 3

Themes in the educational materials related to the “energy” education in the OP related to the intelligent energy education

ACE	Subjects	Grade	Theme on “energy” education
Natural sciences and ecology	Surrounding world	2 grade	Transport. Food depending on its origin - plants and animals. Food processing and consumption.
	Man and nature	3 grade	Air properties. Air qualities preservation.
		4 grade	Motion and energy. Fuels and fossil fuels. Types of energy – water, sun, wind, fossil fuels. Pollution.
		5 grade	Convection. Practical knowledge. How to neat water, how to warm the room, Evaporation and Condensation, Carbon Dioxide, Why the amount of Carbon Dioxide in the natural environment goes up? Greenhouse effect?
		6 grade	Electricity. Conductors and non-conductors. Safety. Substances and chemical reactions. Fuels, greenhouse effect, chemical rain.
	Biology and Health	7 grade	Natural organisms and their importance for the humans.
		8 grade	Hygiene and norm for healthy lifestyle.
	Physics and astronomy	7 grade	Electricity. Electrical tension, resistance, chains. Sources of the tension. Connection of consumers. Electrical energy. Power. Magnetic activities of the electricity. Atoms and nucleus. Nuclear power.
		8 grade	Mechanics and energy. Mechanics, kinetics, and potentials. Conservation of energy in the thermal processes. Internal energy. Volume of heat. Thermal machines. Internal combustion engines. Environmental aspects.
	Chemistry and environmental protection	7 grade	Chemical processes in the nature, the house and the production. Reversible and irreversible processes.
Civil sciences and civil education	Homeland	1 grade	Appliances and safety use.
	Man and	3	Natural resources in Bulgaria. How to protect the

	society	grade	environment?
		4 grade	Bulgaria – part of Europe and the world. Economic development.
	Geography and economy	5 grade	Lithosphere, hydrosphere, atmosphere, and biosphere. Climate. Climate belt and regions. Climatography. Earth's natural resources – wealth that needs protection. Renewable and finite resources. World wealth. Geography and industry.
		8 grade	European economy – major fields. Economic development in the Balkans and Bulgaria.
<i>Home and technologies</i>	Home and technologies	1 grade	Appliances. How to avoid dangers.
		2 grade	Appliances. Switch on/off. Safety and accurate use. Safety mode.
		4 grade	Energy at home. Forms of energy – electricity and heat. Sources – renewable and not. Energy savings.
		5 grade	Control the use of energy. Sources (sun, wind, water, biomass, fuels) and transformation of energy. Transport and storage of thermal energy. Management of control and consumption. Appliances and safety use. Goods and services, resources for production and consumption. Food. Thermal processing and storage.
		6 grade	Energy, Electrical engine, generators, general characteristics of the electrical chain, electrical installations. Measurement of electricity. Transformers and consumers of electricity. Sources of electricity. Energy efficiency. Technology of preparation and storage of food.
	Technologies	7 and 8 grade	Industrial technologies. Energy efficiency.
<i>Mathematics, informatics and information technologies</i>	Informatics and information technologies (for SOP)	3 grade	Computers. Text processing. Graphics and animation. Combination of information (multimedia).communication and internet.
		4 grade	Computers and culture of information. Context menu. Communication and internet – email.
		5 grade	Organize data and data carriers. Creation and work with graphical images. Text processing. Electronic tables. Digital presentation. internet
		6 grade	Operational systems and data carriers. Text processing. Work with graphical images. Work with electronic tables.
		7 grade	Data protection. Creation and operation of electronic tables. Text processing. Computer based project. Resource materials.
		8 grade	Archives. Computer networks. Creation and publishing of websites. Project work.

Are there materials and instruments related to information and communication technologies (ICT) for “energy” education?

In the educational system in Bulgaria there is a subject called “Informatics and information technologies” (Annex 1). Pupils receive theoretical knowledge for the information technologies and practical skills for working with computers and using genuine programmes and instruments.

Presently, there are not specifically developed materials or instruments related to the ICT for “energy” education.

- **Are there programmes or initiatives related to the “energy” education?**

There are not specifically developed programmes for “energy” education in the Bulgarian schools. The latter teaching is carried out in the students’ OP through themes included in the different study subjects (Annex 3). “Initiatives for energy education” are carried out in the SAP and under the format of educational projects for after class activities funded from the grants scheme “Lets make the schools attractive for the young” under the Operational Programme “Environment” (Ministry of Environment) and the Energy Efficiency Programme of the Ministry of Economy, Regional Development and Tourism, however, projects related to the “energy” education are not considered as priority. Presently, the Ministry has developed National programme for retrofitting of schools’ buildings and National programme for cycling education.

The critical analysis shows that schools are not given sufficient opportunities to undertake and finance “energy” education.

3. What is the level of institutional support for ESD in the schools?

- **Is there governmental support for ESD in schools? (money, human resources, structures, programmes, etc.)**

National programme for development of education in schools education and pre school preparation (2006-2015) was adopted by the Ministry. It includes general guidance and concrete activities for support and implementation of the national policies in this field.

Programme for support of ESD in Bulgaria was developed and adopted in 2006/2007. It takes into account all framework and strategic documents related to the environment and the ESD at international and national level. It was created to facilitate the implementation of the key messages and directions from the European strategy for ESD from the Economic Commission of UN and is based on the shared experience from a number of international papers from UN, UNESCO, and the Council of Europe. The main objective of the *Programme* is to support the inclusion of ESD in all form of education from the position of the concept for lifelong learning by encouraging the integrated exploration of the problems related to the environment and the sustainable development.

Other documents and opportunities for the development of ESD in Bulgaria:

- Memorandum for cooperation between the Ministry of Education and the Ministry of Environment signed 2004;
- National strategy and Action Plan from the Ministry of Environment 2005-2014;
- State Requirements for the educational content and the study programmes by the Ministry (Annex 2);
- Joint project form the Ministry of Education, Environment and the Civil Society.

The opportunities for development of ESD in a decentralized management of the educational system depend strongly on the educational policies and the priorities as well as from the motivation of the responsible institutions at local and regional level.

There is not a sustainable funding mechanism for the ESD in Bulgaria. At the moment ESD is being funded by Operational Programme “Human resources development” and other programmes of the Ministry of Environment, national agencies, as well as from the schools state budget line (SAP).

The critical analysis shows that ESD is brought to a halt after the funding under the given project expires. There is not a system for qualification of teachers regarding the ESD. Presently, about 1000 teachers were trained on 3 days seminars.

Consultative Council on ESD was created as a structure in 2006. It consists of experts from the Ministry of Education, the Ministry of Environment, The Universities, The NGOs and The Schools in order to facilitate the implementation of the Programme for support of ESD. Until now the Council has not been very effective.

- **Are there organizations that support and implement ESD in the national educational system?**

Until now mostly NGOs support the organization and implementation of ESD in Bulgarian schools. The Consultative Council to the Ministry in not fulfilling its functions, the National educational network on ESD is not effective.

- **Are there organizations for creation and development of instruments and materials on ESD?**

The creation and development of instruments on ESD is a question of mission, strategy and objectives for the (civil societies) organizations. Presently, there are about 20 NGOs in the country that work in the field of the environmental protection and the sustainable development. **The creation of educational materials that are to be used in the schools is impeded by a Regulation Number 5 of the Ministry that regulates the evaluation of the latter materials. According to the regulation only materials prepared by “authors’ teams” or publishing houses can be submitted to the Commission.**

4. Use of the ICT in ESD:

- **Are schools able to work with pupils using the ICT?**

In the educational system in the country a National programme for ICT is being implemented. Apart from the schools in small agglomerations (villages) the schools are quipped with computers in a special classroom designated for the purpose. Most of the equipped schools are also connected to the internet.

- **Are there materials for working with ICT in ESD? On what subjects?**

The creation of digital notebooks for the pupils is a policy in development by Ministry and the publishing houses. Presently, digital materials are available only for a little number of subjects. The process started in 2006 and is part of a public procurement procedure where the Ministry announces biddings for the publishing houses. There is a general practice that the notebooks (when prepared) are also available in a digital form (Compact Disk - CD). Considering the ESD there are not concrete materials to be used with ICT. The ICT can be used when there are suitable for ESD themes from the study content (Annex 2) that have digitalized version. According to the National programme for development of school education (2006-2015) there would be internet access in every Bulgarian school as well as the creation of a National educational portal that would allow real-time access by 100 000 users (pupils, teachers, directors, parents). In the Portal there would be digital classes, tests, notebooks, and other documents available. Digital classes were developed in the country in the school year 2006/2007 for some subjects from the OP for the 11-14 years old.

This is an ongoing process and is expected to cover other age groups and subjects.

- **Are the multimedia materials also available in the internet for teachers?**

It was projected that by the end of 2006 every school would have at least one multimedia system. This would expand the possibilities for teaching by using the modern methods. Presently there not suitable multimedia materials for ESD.

- **How many websites are there for ESD (to be used by the pupils and / or the teachers)?**

Every significant project has all results and materials published on the internet based website. The critical analysis shows that there is a mechanism that unites all the above materials and information neither there is a structure that assures the sustainability of the ESD publications. In the Ministry's website www.minedugovernment.bg there is information on the ongoing projects, current documents, materials, schools' networks, however, there is not specific materials for the ESD. Presently, there are around 10-12 websites of NGOs that cover this sphere.

5. Examples of best practise on ESD and Energy Education

- 5 Materials for ESD on Energy Education (all kind of material, not only ICT) – short summary of each of maybe 5 lines.
- 5 examples of best practise on ESD-projects of schools (all kind of projects and all topics of ESD) – short summary of each of 5 lines.
- The 3 materials which seem to fit best in the carbon detective project (to select in agreement with the developer of didactic material) – should be fully translated (later on)

1. Materials for ESD on Energy Education

The presented good practices on 'energy' education represent activities undertaken in 2008 – 2009 with pupils from the primary education (1-4 grade) aged 7-10 years

old from different districts within Bulgaria – three of the five principal agglomerations in the republic, plus two more. The education was carried out using the educational materials: “The world around us”, developed for *Compulsory after Class Activities* “Man and the Environment”, Module “Environment” for 2nd, 3rd and 4th grade, developed according the General Subject 2 “Natural Resources, Production and Consumption” and according to the national educational requirements for the content and the key subjects of the educational materials corresponding to the European strategy for the environmental education for sustainable development of the United Nations Economic Commission for Europe.

The educational materials: “The world around us” (1-4 grade) were developed in the period 2004-2007 under the projects: “Support for the development of education for environmental protection in Bulgaria”, funded by the Darwin Initiative of the Foreign Office, UK and “Environmental Education for Sustainable Development in Bulgaria”, funded by MATRA Programme of the Dutch Embassy in Bulgaria. The educational materials: “The world around us” were approved by the Ministry of Education in Bulgaria.

1.1 Theme “The nature – source of energy” – 3rd grade, 9 years old

During the educational process the pupils develop the understanding and knowledge for the sources of energy and its production; they understand the meaning and necessity of efficient and economical consumption of energy.

Illustrated examples, interactive study materials (CDs) assist the pupils in the introduction to the finite natural resources (coal, oil, natural gas, uranium) and the renewable sources (sun, wind, water). The pupils learn that the use of finite resources is economically inefficient – the resources are depleting, the environment is being polluted. Individually and through working in small groups the pupils investigate the alternatives sources of energy and the new technologies for production and consumption of energy including new scientific discoveries like ‘green energy’: ‘solar batteries from ... spinach’, etc.

1.2 Theme “The natural resources – a look into the future” – 4th grade, 10 years old

The objectives is for the pupils to realise that unsustainable ‘mode de vie’ (modern but also lavish) results in the depletion of natural resources. Through discussion and interactive games the pupils compare data on the quantities of the finite natural resources on regional and worldwide scale; data on the pace and volume of consumption. The carry put and ‘energy’ audit of the consumption of energy at home – how much electricity is used for the heating of water, heating, cooling of the living space, lights. As a result the pupils are convinced of the lavish and insensible energy consumption in the households. The pupils carry out studies and discuss the disadvantages of the conventional approaches and the advantages of the new technologies (green energy) and the alternatives.

1.3 Theme “The route of the electricity to our homes” – 4th grade, 10 years old

Here the pupils acquire direct knowledge for the electricity generation infrastructure, the transport and distribution, the appliances that use it at the end of the line. A study tour is organised in a thermo power plant; in a distribution substation; in an energy system control unit. The pupils develop a project where through drawings, photos, pictures, objects, etc they represent the ‘route’ of the electricity from the source to the home. The pupils undertake an art and exploration task where they investigate animals, fish, insects that produce ‘own electricity’. The pupils are guided to creative activities for discovering non-traditional sources and technologies for production and consumption of energy.

1.4 Theme “How do we live now in comparison to the past” – 2nd grade, 8 years old

The object of this part of the education is for the pupils to gain knowledge and to conclude that the smaller amount of energy consumed in the past came: from the direct use of resources (without transformation from primary to secondary); from the “closed loop” – consumption without waste (the food that remained after supper was given to the domestic livestock); from the patriarchal ‘mode de vie’ (where the different generations of one family were living together, where the food was prepared for more in one go and consumed fully, where the family was gathered together around the fireplace thus saving energy for heating and light); from the economical (in smaller quantities) use of resources and energy. The idea is not for the pupils to think we should live like in the past but to learn from that experience and look for efficiency and effectiveness in the consumption; for alternative sources and technologies.

1.5 Theme “Energy sector and technologies” – 10th grade, 16 years old

The educational materials for that theme were developed by a secondary school in the town of Varna (top five in the country, arguably 2nd) as part of the study programme for the *Compulsory after Class Activities* “Technologies and environmental protection”, “Geography and Economics”. As a result of the education the students acquire integrated understanding of the interdependencies of the pillars of the sustainable development – economy, society, and environment. They acquire skills for evaluating the natural resources potential in Bulgaria in the context of the sustainable production and consumption. The students analyse problems related to the consumption of energy and the benefits from the energy efficiency, they learn the process of understanding, assessing and predicting the tendencies related to the use of natural resources. They are motivated for adequate actions for preserving the environment from pollution. The education under this module integrates and further develops what students learn in Physics, Chemistry, Environmental Protection, Biology and Health education.

Subthemes: Metallurgy and Nuclear power

2. Best practise on ESD-projects of schools

2.1 Project “National Parks and Natural Reserves in Bulgaria” – 4th, 5th grade, 10, 11 years old. Global ESD theme: Environmental protection

The project took place in 2007 in schools situated around the three national parks and two natural reserves in Bulgaria. The objective of the project was to introduce the pupils to the functioning of the system for natural protection in the country and to motivate them for protecting our biodiversity for the future generations. The activities under the project included: 1 – identifying the protected areas near our home; 2 – create a map using pictures, photos, drawings; 3 – create signs; 4 – organize information-awareness campaign for the local population; 5 – summary of the study, creation of student’s album book and organization of mobile exhibition “Bulgarian Nature”. Results under the project: creation of student’s album book and organization of mobile exhibition “Bulgarian Nature”.

2.2 Project “Improvement of school’s environment (school yard)” – 2nd, 3rd, 4th grade (8, 9, 10 years old). Global ESD theme: Environmental protection

The project took place in 2000 in the schools in the town of Silistra (3rd town on the river Danube). Project was funded by the British Know-How fund. The objectives of the project were to develop understanding and need for maintaining the school

environment (school yard) as part of the natural environment; to raise the public awareness and to build environmental relationship within the different ‘stakeholders’ – pupils, teachers, parents, neighbours. The activities under the project included: 1 – the British experience; 2 – needs analysis and amelioration potential; 3 – development and public discussions of a vision; 4 – implementing change: gardening, sport activities areas, recreational activities; 5 – monitoring and assessment of the change (i/w with the different target groups, registering behavioral change, interactive education – open air classroom in the yard, evaluation of the safety in the renovated areas, esthetics). 6 – photos exhibition. Results under the project: leaflet with the achievements.

2.3 Project “Eco-Eye (observation of the environment)” – 5th, 6th grade, 10, 11 years old. Global ESD theme: Environmental protection

The objective is to learn via observation and develop skills for environmental protection.

The activities under the project included: 1 – develop a questionnaire (10 questions) on environmental observation; 2 – scouting in the nature including interactive games such as: “Seekers”, “The environmental chain”, “Who lives where and eats what?”, “The nature – a colourful palette of forms and shapes”; 3 – registering impressions from the outing (photos, pictures, essays); 4 – i/w with students, teachers, parents related to the questionnaires and presentation of the results. Results under the project: questionnaire on environmental observation; leaflet with interactive games including natural objects (plants, animals, areas).

2.4 Project “Who am I?” – 2nd, 3rd grade, 8, 9 years old. Global ESD theme: Human rights

Project was implemented by two schools in the town of Assenovgrad (near Plovdiv-2nd town in the country) in 2008.

The objective is to develop social skills for self realisation, accommodation of diversity and self involvement; knowledge of the rights of a child. The activities under the project included: 1 – creation of a school theatre “Next to each other” and theatre plays aimed at self realisation confidence and friendship, presentation of personal achievements and desires, tolerance, shared understanding and communication; 2 – creation of a school art studio – “Who am I?” – interactive environment for personal successes and visual communication; 3 – educational forum – “Child rights”; 4 – organization of a traveling exhibition – “My World”. Results under the project: multimedia presentation of the school theatre “Next to each other”, art studio “Who am I?”, and, travelling exhibition “My World”, educational programme and handbook “For Child’s Rights”.

2.5 Project “Celebration of ethnic minorities in Bulgaria” – 5th, 6th, 7th grade, 11, 12, 13 years old. Global ESD theme: Multicultural integration

Project was implemented by two schools in the town of Rakovski (near Plovdiv-2nd town in the country) in 2008-2009

The objective is to preserve and develop the cultural identity of the pupils from the ethnic minorities in the target region following the basic principals of the European Union for the prevention of discrimination on ethnical differences, sex, age and religion. The activities under the project included: 1 – understanding the meaning of ‘ethnic minorities’, ‘multiethnic tolerance’; 2 – presentation of the celebrations and the cuisine of the Turkish minorities (Eid ul-Fitr, Eid al-Adha, Hudurlez); 3 – presentation of celebrations and traditional cuisine of the Roma minorities (Vassilitsa – Bango Vassil, Hudurlez, etc); 4 – presentation and participation on the Bulgarian national

celebrations (from Christmas to St. Ignatius of Antioch day); 5 – organization of children exhibition including folklore objects, costumes and pictures. Results under the project: multimedia presentation of students taking part in ethnic celebrations and traditional rituals in the entire region, Photos album.

3. The three materials which seem to fit best in the carbon detective project
 - 3.1 Educational module “Energy and Power” – practical interactive activities and games for children of 7 to 10 years of age

The objective of the education under this module is to ‘wake up’ an interest among the children on the ‘energy’ subject. The idea is through practical means (interactive didactic games, tests and experiments) for the children to understand “What is energy?” and why we need it. Activities under the module: during the educational process the following activities are undertaken with the pupils: they are introduced to the different forms of energy (electricity, chemical, biological, mechanical); they are asked to think of and create objects (using cardboard, paper, waste, packages) that can move and to experiment with the movement. For instance - a ‘paper spiral’ – a snake that turns thanks to the air flow, a kite – that stays in the air for a long time, toys from waste materials that move thanks to various energy sources: water, air, mechanical force. In addition to that the pupils are given a multimedia presentation on the unique “Zaburdovsko ferries wheel” created in 1876 in the village of Zaburdo as a prototype of the Ferries Wheel. The latter was reconstructed thanks to European funding.

Results: demonstrative practical modules (construction and toys that move); multimedia presentation on a CD telling the story of the “Zaburdovsko ferries wheel”.

- 3.2 Practical work “Energy audit” – for pupils aged 8 to 14

The objective: through practical activities the children acquire an understanding of values (quantitative and financial) of the electricity consumption in the houses and the effect of the energy savings.

Activities: study of the monthly consumption of energy (using the energy bills); undertaking an observation (audit) while following a plan for energy savings at home; disconnect the appliances from the grid (avoiding the stand-by mode); switching off the lights from space that is not being used; insulation of the house; substitute the energy hungry appliances – light bulbs for instance; using the sun instead of a dryer; washing with low temperature active powders.

Results: summary of the results of the audit, a handbook on energy efficiency created by the pupils.

- 3.3 Module “In the mystery world of the bioenergy” – for children aged 11 to 14

Objective: using scientific research and practical know-how the pupils are introduced to alternative energy sources and new technologies for energy efficiency.

Activities: presentation of avant-garde technologies in the bioenergy (from spinach, biomass, etc); stimulating creative thinking with the children for the invention and testing of bioenergy technologies; tests and experiments; presentation of individual and school projects assisted by professional consultants.

Results: children exhibition ‘green energy’, multimedia presentation of pupils’ projects for energy efficiency.

Sources of information:

- The Ministry of Education www.minedugovernment.bg
- NGO site on ESD www.ekoobrazovanie.com

- European strategy for ESD from the Economic Commission of UN, 2004
- National programme for the development of the school education (2006-2015)
- National institute of statistics (education)

ANNEX III - Current status of ESD and energy education in CZECH REPUBLIC**Content:**

- 1. Overview of the status of implementation of ESD in Czech Republic**
 - 1.1. Educational system and the inclusion of ESD in the curricula of schools**
 - 1.2. ESD in non-formal and informal education**
 - 1.3. The inclusion of ESD in the teacher training**
 - 1.4. Networks for schools or teachers for ESD**
- 2. Overview of Energy Education**
- 3. Available support on ESD for schools**
- 4. Use of ICT in ESD**
- 5. Examples of best practise on ESD and Energy Education**

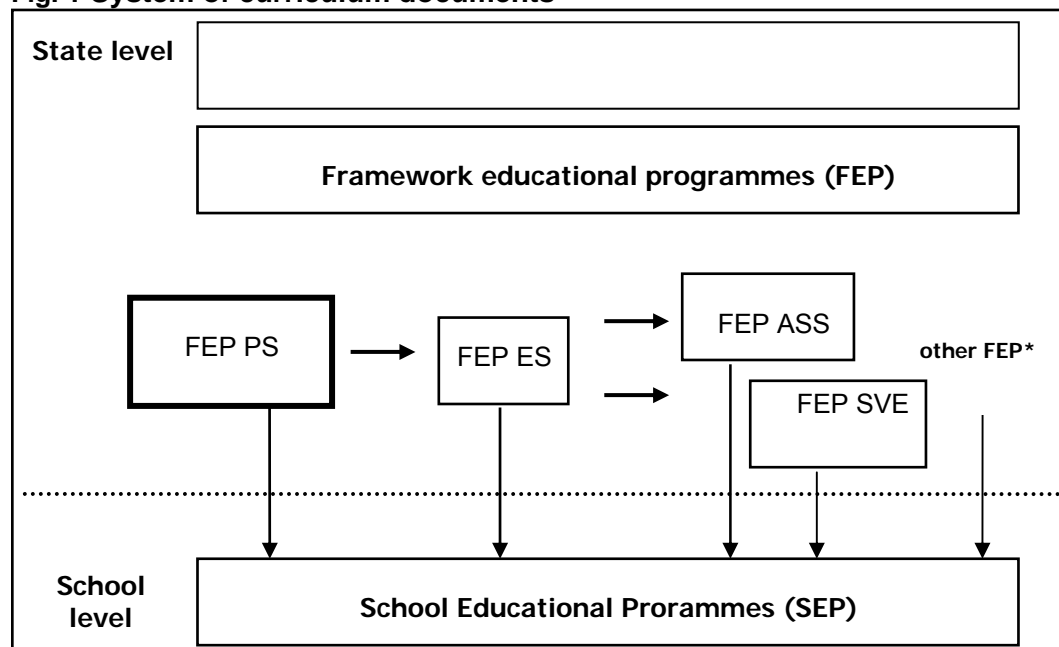
1. *Overview of the status of implementation of ESD in Czech Republic***1.1. Educational system and the inclusion of ESD in the curricula of schools**

ESD is rather new term in Czech educational system. It is supposed to be closely linked with Environmental Education which has a long history in Czech republic (since 1960's). Environmental Education is part of the National Programme of Development of Education in the Czech Republic – the White Paper (2000). One of the targets of the programme consists in „environmental education in the sense of providing for sustainable development in society“. The Act on Schools of 2004 stipulates „acquiring knowledge of the environment and its protection based on the principles of sustainable development“ as one of the components of a general education. The Strategy of Lifelong Learning, adopted in 2007 by Government Resolution No. 761, mentions, in the main strategic directions, „social partnership, intended to promote harmonization of the supply of educational opportunities with the needs of economic, environmental and social development“ and also contains proposals for measures that emphasizes sustainable development. The long-term plan for education and development of the educational system in the Czech Republic was also adopted in 2007 in Government Resolution No. 535. It also contains proposals for measures emphasizing sustainable development and describes the reasons for reform steps in education, based, amongst other things, on the role of education as a guarantee of sustainable development. Most recently – in 2008 the National Strategy of ESD was adopted by government and Action Plan of National Strategy of ESD is under preparation (planned to be adopted in 2010).

In accordance with the new principles of curriculum policy formulated in the White Paper and new Act on Schools, a new system of curriculum documents for education of children from the age of 3 and pupils aged 6 to 19 years is being introduced into the educational system. Curriculum documents are created at two levels – state and school. Framework educational programmes (hereinafter FEPs) constitute the central level of the curriculum system. FEPs delimit a binding framework of education for the individual stages and types of education (for preschool, elementary, secondary academic and secondary vocational education). The school level corresponds to

school education programmes, according to which education is provided at the individual schools. Each school creates its own school environmental programme according to the principles laid down in the FEP. Framework and school education programmes are public documents available for the pedagogical and general public.

Fig. 1 System of curriculum documents



Legend:

FEP PS – Framework education programme for preschool education; FEP ES - Framework education programme for elementary education; FEP ASS – Framework education programme for academic secondary schools; FEP SVE -- Framework education programme(s) for secondary vocational education.

** Other FEP – framework education programmes that, in addition to the above, are defined by the Act on Schools - Framework education programme for basic artistic education, Framework education programme for language education, and others, as appropriate.*

Source: The Ministry of Education, Youth and Sports

Framework education programmes include cross-cutting issues that are concerned with education and training of students in selected socially important and topical areas. These aspects are a compulsory part of FEP.

Cross-cutting issues in FEP for elementary, secondary academic and secondary vocational education also encompass subjects that are important for education on climate changes – especially Man and the Environment (in FEP secondary vocational education) and Environmental education (in FEP elementary education and FEP secondary academic education), and also, e.g., Education in thinking in a European and global context.

A methodical web site <http://www.rvp.cz/> has been established to support schools and pedagogues in creating and planning school education programmes, including sections concerned with cross-cutting subjects, including Environmental Education for the individual FEPs.

The Methodical Instruction of the Ministry of Education, Youth and Sports on Environmental Education in schools and educational facilities was adopted in 2001

and updated in 2008. This document describes in detail the system of environmental education in schools and educational facilities; it also introduces and describes the function of the school coordinator of Environmental Education and recommends how to plan and incorporate Environmental Education into school documents, etc.

Elementary education

Elementary education in Czech republic includes 5 grades of 1st level (for students ca 6 to 10 years old) and 4 grades of 2nd level (for students ca 11 to 15 years old)

Number of elementary schools:

- 2008/2009 **4133 schools**

Number of students:

- 2008/2009 **816015 students**

The number of primary schools (as well as number of students) is going down during last years – by 8% from 2005 to 2008.

Types of basic schools:

	Schools
Totally	4 133
Founders: Ministry of Education	49
Municipality	3 674
Province	302
Private	68
Church	40

The Ministry of Education, Youth and Sports issued Framework education programme (FEP) for elementary education in 2004, with validity from 2005. Environmental education appears in the FEP for elementary schools at the level of key competences, targeted educational areas (educational goals), educational outputs and teaching in some fields of education and is simultaneously a crosscutting issue that must be included at levels 1 and 2. According to the conditions for school integration, cross-cutting subjects can be included in various subjects in the form of projects or courses and also in the form of an independent subject concerned with the environment.

Secondary education (students ca 16 to 19 years old)

FEP are also gradually being introduced for higher academic schools and the individual fields of secondary vocational education. They all include the cross-cutting subjects “Environmental education” (academic secondary schools) and “Man and the environment” (secondary vocational education). At present, there are 8 fields of study at 26 secondary schools, with emphasis on protection of the environment, protection of the landscape and industrial ecology. Similar to elementary schools, some of the secondary schools are also associated in the M.R.K.E.V. network, in the Environmental Education Club and in school environmental projects, based on one-day and several-day environmental education programmes.

University education

Over 100 fields of study at universities are concerned with ecology and protection of the environment. The study programmes also include post-graduate studies in these university subjects. The potential for an interdisciplinary approach and cooperation amongst universities is amongst the basic Environmental Education subjects at the university level. Consequently, the “Forum of University Teachers: Education for a sustainable future” has been established following the initiative of the Environment Centre of Charles University in Prague. The Forum is intended to permanently contribute to clarification and creation of the content, extent and methods of education for sustainable development and provision for mutual awareness of the activities of the individual members, and to strengthen cooperation in preparation of courses, lectures, textbooks, research work and projects.

The Ministry of the Environment promotes a competition for the best thesis in the area of protection of the environment. The Czech Republic also employs some of the EU educational programmes for university students, such as SOKRATES, LEONARDO etc.

The inclusion of ESD in the teacher training

The university training of future teachers is implemented at 26 universities in the Czech Republic. ESD and/or Environmental Education forms a part of the study programmes of some of these universities (e.g. Masaryk University in Brno, Palacký University in Olomouc, partly Charles University in Prague). However, it has so far not been possible to ensure that all future teachers undergo training in the area of ESD and/or Environmental Education.

Further education of pedagogical workers is also an important area. The Ministry of Education, Youth and Sports is responsible for integration of the elements of environmental education and awareness into the post-graduate education of pedagogues. A number of NGOs and educational facilities offer certified Environmental Education seminars and courses for pedagogues lasting from several hours to several dozen hours. In 2006 – 2008, over 250 school Environmental Education coordinators were trained in several rounds of specialized Environmental Education courses (organized, e.g. by SSEV Pavucina, the Lipka Brno Educational Facility for Environmental Education, the SEVER Environmental Education Centre and the Club of Environmental Education). New terms of these courses are being open and the number of organizers is gradually growing.) The funds from the Operational Programme for Development of Human Resources from the European Social Fund was a significant source of support for education of pedagogues in Environmental Education.

Networks for schools or teachers for ESD

Several hundred elementary schools interested in Environmental Education are associated in the M.R.K.E.V. network – Methodology and Implementation of Comprehensive Environmental Education (coordinated by the Pavucina association of environmental centres), in the Environmental Education Club and a number of school environmental projects – national and regional. The best known are the Ekoškola project (Tereza Association) and the School for sustainable life (SEVER Partnership Foundation and Environmental Education Centre).

1.2. ESD in non-formal and informal education

The education system (and thus also ESD and/or Environmental Education) encompasses both activities taking place at schools and educational facilities (formal education) and also in employers’ facilities of, private educational institutions, NGOs, school facilities and other organizations (non-formal education), as well as

unorganized, every-day experience and activities at work, in the family, during free time, interactions with society and nature and through the influence of the media (informal learning).

The State Environmental Education programme and the regional Environmental Education conceptions also pay great attention to education of various target groups. Here, emphasis is placed especially on education in the public administration and the business sector. The Ministry of the Environment has prepared an e-learning programme for education of government employees on the subject of environmental education and awareness. The subject of the environment forms a part of some courses of the Institute for Local Administration in Benešov (national training center, where examinations of the professional qualifications of government employees are also held) and of the Office of the Government. NGOs, such as the National Network of Healthy Cities and the Czech Environmental Management Centre (CEMC) also provide some training. The training is related to legislation, EMAS, ISO standards, cleaner production, voluntary agreements, waste management, packaging technology, chemical and hazardous substances, monitoring, modern technologies, foreign and domestic experience, work with the public, codes and charters in this sphere, etc. CENIA, the Czech Environmental Information Agency is also authorized to act as the National Cleaner Production Centre.

A wide range of extracurricular education for children and young people is available, with participation of numerous of school facilities and NGOs. At present, great emphasis is placed on public participation in decision-making on environmental matters and community cooperation. Some NGO's are concerned with support of civic participation in environmental issues. The public is invited to participate in the creation of some important documents, which are, in the preparatory stages, placed on the web site of the Ministry for public discussion and comments (e.g. the State Programme of Environmental Education and Awareness in the CR, etc.). The Green Circle, as an umbrella and service organization associating over 20 member organizations, is the contact point for comments on draft documents submitted by the Ministry of the Environment. NGO's also play an important role. Greenpeace, the DUHA Movement, the CZ Biom Association, etc. are systematically concerned with the subject of climate change.

Support for Environmental Education related to climate change is also provided by some important foundations, such as the Partnership Foundation, the Foundation for the Development of a Civic Society, the Via Foundation and the Open Society Fund, and also regional foundations – for example, the Foundation for the Jizera Mountains and the Community Foundation of *Ústí nad Labem*. Governmental institutes in the area of the environment participate in environmental education of the general public – in addition to the Ministry of the Environment (see below), also the Regional Authorities, Administrations of Protected Landscape Areas and National Parks, CENIA, the Czech Environmental Information Agency, the Nature Protection Agency and some other institutions, such as universities and institutes of technology, professional scientific institutes, medical or enlightenment and cultural educational facilities, some tourist centres, etc.

An important role is played by public-service media which, in addition to specialized programmes and news, also have regular programmes concerned with the environment (e.g. the *Zeměžluč (Earth bile)* programme on Czech radio and *Nedej se (Don't give in)* on Czech Television).

In addition to periodicals published by the Ministry of the Environment, a number of other titles related to the environment are published by the NGOs – e.g. *Ekolist*, *Sedmá generace*, *Bedrník*. Regional periodicals are also concerned with Environmental Education – e.g. *Ekoton* in the Hradec Králové region and the Southern Moravian *Ekolisty*. Specialized eco-websites are also available in the area of environmental awareness.

6. Overview of Energy Education

Energy is taught in Czech elementary and secondary schools mainly through the subject of Physics (energy transfer, electricity, heat loss, insulation) and Geography (renewable and non-renewable energy sources). From 1990's multiple projects and programmes dealing with energy issues are offered to schools by external bodies (NGOs, companies...) or are created and implemented by schools themselves. The most interesting ones are listed and described in part 5.

7. Available support on ESD for schools

A wide range of aids, publications and also environmental educational programmes provided by lecturers from environmental education centres are available for schools. These are either short programmes for several teaching hours or several days long with accommodation in the centres. They are supported by National network of Environmental Education centres, a joint programme of the Ministry of the Environment and Ministry of Education, Youth and Sports, and, as appropriate, by the regions and cities. Examples of these programmes related to protection of the climate include, e.g., the "Solar energy is most moral" and "There is only one Earth" programmes, intended for grades 6 – 9 of elementary schools and secondary schools, particularly for teaching of geography, the natural sciences, civic education and physics (SEVER Environmental Education Centre), "You too control the Earth" (Ctyrlístek Zlín) and the several-day programme "Week for sustainable life" (SEVER Environmental Education Centre and Rychta Krásensko) and "Seven colours of the rainbow" (Slunákov Environmental Education Centre).

8. Use of ICT in ESD

Material to work with ICT in ESD

Several web pages with **carbon calculators** or ecological footprint calculators and with **methodic materials for teachers and games / worksheets for pupils** are available here:

<http://www.teachers4energy.eu> - active learning in energy issues, European page with Czech version – information resources + working sheets (product of project supported by Intelligent Energy Europe Programme)

<http://www.kyotoinhome.info/> - school manual connected to Kyoto protocol, educational modules, European page with Czech version (product of project supported by Intelligent Energy Europe Programme)

<http://www.nadacepartnerstvi.cz/emisni-kalkulacka> - CO2 calculator for institutions

<http://www.ekoskola.cz/> - web support to Czech project Ekoškola (part of international programme Ecoschool - <http://www.eco-schools.org/>)

Web of Tesco – individual carbon calculator

<http://www.veronica.cz/?id=247> – web version of exhibition on climate change „Prima klima“ by NGO Veronica

<http://www.hraozemi.cz/uhlikova-stopa.html> - - Czech webpage introducing carbon footprint and giving links to calculators in Czech

<http://www.ekostopa.cz/ekostopa-skoly> - calculator of ecological footprint for schools (primary and secondary)

<http://detem.mzp.cz/> - web portal of Czech Ministry of Environment with information for children
European commission – Czech version of Campaign „Ztlum, vypni, recykluj, chod', změň se“

http://www.futurenergia.org/ww/cz/pub/futurenergia/chats/carbon_imprint.htm - Czech webpage introducing carbon footprint and giving links to calculators in English - <http://www.myfootprint.org/>

<http://www.hraozemi.cz/pro-ucitele/pracovni-listy.html> - working sheets, didactic materials

<http://www.dolceta.eu/ceska-republika/Mod4/spip.php?rubrique35> – information resource for consumers

Available multimedia material in the internet for children

http://ec.europa.eu/environment/youth/air/air_climate_cs.html - environment for young Europeans, includes information, games (in English), quizzes, possibility to send environmental postcard

http://ec.europa.eu/environment/climat/campaign/resources/publication_cs.htm - excellent site on climate change – links for schools – teachers, quizzes, games, information and most of all are interesting super movies

(http://ec.europa.eu/environment/climat/campaign/resources/videos_cs.htm) – teenagers from EU countries tell how they „save“ climate“ + spot „become a changer“

9. Examples of best practise on ESD and Energy Education

1. „Energy Kit“

Kit includes guide-book for teachers, working sheets for students, pictures of different technologies, videos on energy savings and alternative/renewable sources of energy, teaching tools such as examples of insulation materials, wattmeters, thermometer or model of photovoltaic cell. Kit enables to organize small (student) energy audit at school, to explain links of energy needs and environment and to give insight into „green“ architecture.

<http://ekokatalog.cz/index.php?n=3&id=149>

Produced by NGO Rezekvitek in collaboration with several EE centers, incl. SEVER

2. Project „Saving of Energy at Schools“ and working sheets „We Value Energy“

Working sheets and information sheets on small energy audit of school, which can be implemented by students. These are results of project „Saving of Energy at Schools“ implemented till 2006 consisting of education lessons on energy and auditing school energy consumption by students.

Organized by Partnership Foundation and SEVER

3. „Posters on renewable energy sources“
Set of colourful A3 posters on different renewable energy sources.
Produced by SEVER
4. Working sheets Energy, Lighting, Saving Water, Energy in Household, Consumption of Energy in the World
Set of working sheets for students 12-18 years old.
Produced by SEVER
5. Toys using solar energy
Toys such as „cyclist, jumping beetle, building kit, propellers...“, also solar battery charger – www.nelumbo.cz
6. Brochure „Green Shopping“
Tips for consumers how to orient if one wants to be an environmentally responsible consumer
Produced by NGO Veronica
7. Leaflets on energy saving, renewable energy sources, passive houses
Small colourful leaflets (three-folded A4) on different energy saving and renewable sources alternatives.
Produced by NGO Ekowatt
8. Brochure „Practical Guide for European“
Pocket-guide for environmentally friendly consumer behaviour.
Produced by NGO Veronica and SEVER
9. Series of movies „ABCD Ecology“
Series of 26 short „promotion“ (ca 5 min.) movies in which two famous actors introduce in a funny way different environmental issues and practical possibilities for more responsible behaviour of consumers and citizens.
Produced by Czech TV, published on DVDs and video cassettes by SEVER and distributed to schools and to other audiences.
10. „Green Pack“
Educational kit on environment - with information, working and activity sheets, multimedia CD, cards. Includes special chapter on climate change (http://greenpack.rec.org/ru/en/climate_change/index.shtml)
Available in English and most central and eastern European languages.
See <http://www.rec.org/REC/Programs/Greenpack/>
Produced by Regional Environmental Centre, Czech version produced in cooperation with SEVER
11. Poster „Ten Commandments of Household Ecology“
Colourful poster (A1 size) summarizing basic rules of environmentally friendly behaviour with a lot of tips how to save water, energy, prevent wastes...
Published in 2003 by NGO Rezekvítek
12. Working sheets "Posviťme si na úspory" („Let's Shine Light to Energy Savings“)
8 pages A4 with working sheets focused on saving lighting, additionally also on topic of energy saving appliances + a page with guidance to teachers
<http://ekokatalog.cz/index.php?n=3&id=102>
Published in 2003 by NGO Tereza

13. Web calculator of individual ecological footprint

www.hraozemi.cz („Play about Earth“ - Hra o Zemi)

Prepared by Association of Czech environmental NGOs Zelený kruh (Green Circle)

14. Web about ecological footprint with information on ecological footprint of schools and communities at www.ekostopa.cz, includes possibility to calculate on-line ecological footprint of school on-line (for registered schools)

Prepared by NGO Institute for ecopolity

15. Traveling climate exhibition “Prima klima”

The exhibition - consisting of 12 tables - has three sections. The theory – greenhouse effect, carbon cycle, the influence on main ecosystems, climate change and mitigation - is based on the fourth IPCC report. The second part shows the practical measures, which everybody can take in order to contribute to the mitigation. The last two panels go beyond the IPCC and present the 350 ppm concept. The exhibition is full of innovative graphic and text ideas.

It is also accompanied by different experiments which enable us to present the exhibition in

All panels can be seen at <http://www.veronica.cz/?id=247>

Produced in 2008 by NGO Veronica

16. Project/campaign „Change your Clothes, Change the Climate“

Project aims to analyse the impacts of clothing on climate change and communicate the results in an attractive way to the general public and key decision makers in the clothing sector in the Czech Republic. The goals also include the promotion of good practices in sustainable clothing and presentation of more favourable alternatives in eco-fashion. The project aims to present and promote environment-friendly clothing as an ethical and prestigious option. Dressing environmentally friendly and responsibly is not difficult and can be very fashionable and creative. Customers have a lot of opportunities how to change their behaviour and there is a lot of inspiration already available. Project provides both theoretical background (a research study, presentation) and practical issues (eco-fashion show, do's and don'ts of a responsible consumer, educational leaflet, web pages www.ekosaty.cz and www.ekomoda.cz).

Prepared by British Council Czech Republic in cooperation with Academy of Arts, Architecture and Design in Prague and leading Czech designer Liběna Rochová, UK designer Kate Fletcher – www.katefletcher.org And Cambridge Institute – Cecilia Malvido

17. Educational lessons „The most moral energy is solar“, „We have only one Earth!“ and „Climate Change“

Lessons are focused on students from 12 to 18 year old and they fit especially to geography, biology, civics and physics. Lessons „The most moral energy is solar“, „We have only one Earth!“ are offered to schools for several years.

The lesson on „Climate change“ is now newly developed, lasts 1,5 – 2 hours and will include:

Topics:

- What are the climate changes
- What are their reasons
- Impacts of climate changes
- What to do

Activities:

- Greenhouse Effect Play (students simulate increase of CO₂ which doesn't leave heat waves to space) + clarification of greenhouse effect
 Critical reading of texts of climate change written from different points of view
 Identification (agreement/disagreement) of students with several statements about climate change + information from IPCC panel
 Stories of people all over the world illustrating impacts of climate change – searching couples with similar story
 What to do – video and discussion
 Provided by SEVER

18. Campaign „Become a Climate Advocates!“

Czech republic is involved in project „Challenge Europe“ organized by British Council from 2008. It is focused on young people between 18-35 years old working in different professions. They work for one year as „climate advocates“ and search for new ways of decreasing CO₂ emissions or try to use already known approaches in an innovative way.

19. Project and brochure „Green Office“

Project for public bodies such as municipal and county offices as well as for schools or businesses. Covers tips for running of the office – how to choose papers, computers, means for cleaning, how to handle with wastes. Criteria are possibility to recycle, biological degradability, health effect, material and energy demands of production, length of transport etc. Important is not only direct impact, but also multiplying effect of such approach of public institution to other consumers and positive effect to market/producers (because public institutions are big consumers of certain commodities – such as paper). In Czech Republic Ministry of Environment, Office of Ombudsman, several regional governments started to green the office. In Hradec Kralove province there is competition for municipal offices and schools since 2008.

<http://zeleneuradovani.cz/>

Promoted and supported by methodological materials by NGO „Network of Eco-counselling Organizations STEP.“

20. Enersol

Enersol is a project a annual competition for secondary vocational schools focused on introducing the topic of renewable energy resources to secondary students and to activate them. Project started on the base of international cooperation with VEV Nijkerk/Kentek Hilversum (Netherlands) in 2001-2005. <http://www.nuov.cz/enersol>

21. Project and educational materials „Ecoschool“

International project where students learn about 4 basic topics and at the same time plan and implement practical improvements – wastes, energy, water, school environment. In Czech republic it has been already running for 4 years. Almost 200 primary schools are currently involved in this project (data from last year). Students establish whole-school working team, create „Eco-codex“, analyze present situation in mentioned topics and suggest improvements which they later try to implement.

Methodology includes 7 steps:

1. establishment of working team
2. analysis of environmental state of school
3. planning activities based on the analysis

4. monitoring and evaluating of activities
5. environmental education in curriculum (following solved issues)
6. informing and cooperation
7. creating of school eco-codex

Successful schools receive international title and logo of Ecoschool. Title is given for two years, then it is necessary to renew it. About 200 schools in CZ are involved.

<http://www.ekoskola.cz/>

Organized by NGO Tereza.

22. Programme „School for Sustainable Life“

The aim is to develop education for sustainability at schools and at the same time increase public participation in practical activities on sustainable development and improving environment in communities. Primary and/or secondary students analyse the issues in the community, suggest and implement project to improve some of these issues. They search for partners for such projects and thus the schools work as initiating centre of community-based projects. Methodology is based on Local agenda 21. Schools choose different topics based on local needs and issues – eg. planting trees, improving public spaces, safe pedestrian and cycling paths and other transportation issues, waste management, energy savings etc.

www.skolaprozivot.cz

Implemented by Partnership Foundation and SEVER, general partner is Toyota Motor Europe from 2004.

23. Educational course and book „Human And Environment – A Week For Sustainable Life“

5-day residential program for students 12-16 years old. Includes following teaching units:

- Human society, importance of communication and cooperation in environmental protection
- Local nature and environment
- Historical development of relation between human and nature – past and future
- Ecological ethics, position of human in nature
- Global issues and globalization
- Economy and environment - (un)sustainable development

Environmental protection tools – possibilities to solve environmental issues, individual participation in environmental protection

The week is opened by unit „how human society operates“, which contributes to team-building, creating group spirit, establishing atmosphere of trust and good cooperation. At the same time it develops ability to solve problems and team work. This unit is followed by practical field study of local environment. Activities interconnect knowledge and skills gained in different subjects such as science, biology, chemistry, geography, history, arts. Course continues by developing such skills as handling with information and problem-solving. From hands-on experience other – more abstract topics – are derived – position of human in nature, global issues, and sustainable development principles. Frequent educational method in this part of the programme are simulation games and guided discussions. Again knowledge and skills from different subjects are interconnected. Final unit is devoted to individual and social possibilities of solving environmental issues – it tries to raise

student interest and awareness and introduces practical activities to save environment and make development more sustainable.

Yearly about 40 courses is provided by SEVER in its residential centre in Krkonose for different schools, methodology is described in a book „Human And Environment – A Week For Sustainable Life“ (www.ekologickavychova.cz).

ANNEX V - Country Study by the Hungarian team of HSEE

Contents

- Number of schools
- Number of potential CD schools
- The National Curriculum (NAT) and ESD in Hungary
 - Energy education according to NAT in Hungarian schools
- Extra Curricular energy education in Hungary
 - Some Examples for Extra Curricular energy education in Hungary
 - For schools
 - For citizen learners
- Best practices

The numbers and types of schools in Hungary:

Primary:	2 888	from the age of	6 to 8
Secondary 4 years	518	from the age of	15 to 18 not for CD
Secondary 6 years	156	from the age of	13 to 18 15-18 not for CD
Secondary 8 years	102	from the age of	10 to 18

Altogether: 3 146 possible partners of 3 664 schools

The number of schools has decreased dramatically since the 90s. It is partly because of the ageing population in Hungary and partly because of the financial problems.

The schools are mostly run by local governments, about five percent of them by different churches, while some are run by the state directly or run by charitable trusts.

The general recession effects the operation of schools badly.

At the moment there are no data available for the number of students in schools (neither the total number nor the number in different age-groups).

Number of schools potentially joining the carbon Detectives project:

*According to the above numbers **250 schools to involve in CD project seems reasonable.***

See the reasons below.

The National Curriculum (NAT)

The energy education is part of the National Curriculum, the NAT. In Hungary schools have to create their own curriculum based on NAT. The students study about energy at certain grades.

The NAT contains several core cultural areas and energy is part of two of them, the “Man and Nature” and the “Way of Living”. The first includes the sciences, the second everything practical in connection with everyday life.

From the point of energy use and its impact on the environment the target age groups are the 5th, 6th and 7th graders. But of course they deal with energy in the lower and upper classes as well.

The students must acquire basic competences during their studies (NAT 2007) and one of them is the environmental awareness. So in classes they have to work a lot with energy. Carbon Detective can be effectively integrated into the schools’ Local Pedagogical and Environmental Education Curriculum.

The Carbon Detectives will be (we hope) a useful and enjoyable tool for both teachers and students to fulfil the NAT requirements.

There are expectations for having EE/ESD in schools but there are no centralised guidelines, workpackages. CD used widely can be helpful.

Extra-curricular energy education in Hungary

The need and demand for EE have been growing fast in Hungary. It is obviously part of sciences as Biology, Geography, Chemistry, Physics, but it should be integrated into all subjects like Maths and P.E., as well as part of the whole school life. **Some NGO's took the responsibility for introducing ESD in a holistic way into schools and into all kind of education.** They can react faster to changes of the environment than the state educational system.

They apply for grants to be able to implement their educational goals and edit their materials. The energy stakeholders, e.g. energy providing, utility companies recently have launched energy educational programs for every age-groups. See more information on that below.

To help the teachers to raise awareness there are some initiatives e.g. the Eco Schools network.

Although to be a member of the network is voluntary. The Eco Schools network was launched about 10 years ago by OKI (Education Research Institute) later renamed OFI (Education Development Institution), in 12 schools. After the experimental period another 144 could join. The schools wishing to join have to accomplish some criteria system. There are some criteria that already have to be fulfilled and some others are to be guaranteed in advance. It means that the **level of ESD in the schools can vary greatly**. Every year new schools can enter.

Today there are 450 Eco Schools in Hungary.

Mostly these schools are potential participants in our CD project.

According to their activity in other EE/ESD projects we can reckon on one third of them to participate in CD.

It's seems a relatively low number but **schools/eco-schools have been already taking part in different ESD projects, energy projects as well.**

We can say that there is a kind of „competition” among similar programmes.

It is great according our goals in EDS! **But** the problem is that the same schools are active in most projects and the average level of awareness is not so satisfactory.

Although there is no use to blame the rest. To run a school and educate/teach during the last decades is harder and harder. Less and less money, more and more bureaucracy in a rapidly changing, troubled society. They just teach as they used to. Anyway it's time to awake, and ESD with its methodology, competences can be the key to the changes.

A well organised, countrywide, comprehensive ESD program for all types of schools is missing.

Some examples for Extra Curricular Energy Education in Hungary

For schools

For citizen learners

Some energy projects: run by NGO's and energy producing companies

Some of them are developed by Hungarians for the Hungarian conditions. Most of them are adaptations.

“Kyoto in Homes”

Energy efficiency and using renewable energy sources to prevent climate change

Published by REC, Hungarian office 2008

Workshop plans about energy

www.kyotoinhome.info

Global Climate Change educational package
in the Integrated Science Model Projects book
By *Attila Varga*
Published by OFI 2008
The book has got an energy model unit in it

There are energy units in **Green Pack**
It's a *Polish EE material* for schools. It was introduced through teachers trainings. The teachers got access to the work packages after taking part in the training.

The Energy – educational package (**Sunflower** as its logo on the brown recycled paper cover)
It's for 5th -8th grade. It's one of the firsts – quite popular.
Editor *Judit Varga*
Published by Energy Club 1997 Workshop/lesson plans for kids and teachers.
With resource materials.

At Home in Energy
How to save energy around the house
It's a board game for ten-year olds
By *Mónika Blaskó*
Published by the Energy Club
www.energia.a-jatek.hu

www.energiaklub.hu
links to the
Countrywide Environmental Education Guide:
All kind of information
 Energy
 Publications
 Competitions

www.mtvosz.hu (available in English as well)
It's got a link to EE and another one to their Carbon Calculator
Climate Watch competition in 2008

Energy Club
Where is the energy? A work package
Published in 2007
10 schools are known to use it, no data about others but there are definitely more

Energy Club publications:
Last two years
„**Measure it Yourself**” for grades 5th-8th
15 schools in 2007 with audit for them, some joined later
<http://www.energiaklub.hu/hu/ismeretek/oktatas/oktatocsomag/>

Educational posters printed on paper
<http://www.energiaklub.hu/hu/ismeretek/oktatas/plakatok/>

Best practices:**The BET**

The BET was very successful in several European countries in Hungary too. The students had to reduce CO2 as many ways as they could that's why the collected ideas can be very useful for the CD as well. The materials are available on the net.

<http://www.thebet.nl/>

Recent Running Projects

www.egymozdulat.hu – (one movement)

It's for schools, students measure water, electricity, gas home consumption. Programme started 5/07/2009. Schools can register by downloading the worksheets, questionnaires and resource materials. They send back filled forms with data entered by teachers. Schools go for some prizes, like T-shirts, bicycles and all schools for a Diploma for participating. Ten students' data is needed to be registered as a school.

Energy Experience.UK

In Hungary it is called: Energiakaland. (Energy Adventure)
During the second year more than 200 schools are involved.
It has got interactive games up to 18.
It is online –but it has got materials available on paper and CD.
Photo competition for students with attractive prizes.
Writing a methodological workpackage: competition for teachers.

Because of its popularity and importance I include some details (a page is copied here):

The E.ON Energy Experience

The E.ON Energy Experience is a major new programme for teachers to help them teach young people about energy. The resources will help young people to understand about the different sources of energy we use, the relative merits of each, the options for energy production going forward and what their choices will mean locally, nationally and globally.

Young people aged 5-16 will be given the essential facts and figures. But more importantly, will be allowed to make virtual decisions about all stages of energy production, distribution and consumption and see the different effects of those decisions.

E.ON has worked closely with the education community to ensure that the programme offers an exciting interactive resource. Teacher support materials will provide lesson plans and curriculum links for geography and science curricula in England, Scotland and Wales, to help teachers get the most out of the programme too.

Teachers can sign up for the FREE every half-term E.ON Energy Experience [primary e-newsletter](#) and [secondary e-newsletter](#) to keep them informed of the latest energy issues and help engage their students with the topical theme of energy.

The E.ON Energy Experience activities require the free Macromedia Flash Player 8 or above. If you don't have this player, or if you are unsure whether you have it, you can [find out more about Flash here](#).

For primary schools

For secondary schools

Energy Home (5-7 year olds)



[Visit Energy Home](#)

Energy Nation (11-14 year olds)



[Visit Energy Nation](#)

Energy Town (7-11 year olds)



[Visit Energy Town](#)

Energy World (14-16 year olds)



[Visit Energy World](#)

Live energy events: Primary



[Find out more](#)

Live energy events: Secondary



[Find out more](#)



[Download classroom pack](#)

[Visit Plug in 2 Engineering](#)

- [Visit plugin2engineering](#)



Locations within the Energy Experience:

- [Energy Home](#)
 - [Energy Town](#)
 - [Energy Nation](#)
 - [Energy World](#)
 - [Live energy events 2008: Primary](#)
 - [Live energy events 2008: Secondary](#)
-

ANNEX VI - Current status of energy education in the UK

1. Overview of implementation of ESD in the UK

In the UK, the UK Government (for England), the Scottish Government, the National Assembly for Wales and the Northern Ireland Executive have individual responsibility for setting the education curriculum for their own nation. All have agreed teaching about education for sustainable development is important. However schools can individually decide their level of commitment and the range of work they wish to undertake with some choosing to remodel their curriculum around sustainable development and others to teach the bare minimum.

England

In 2006, the UK Government announced its intention for all schools in England to be sustainable by 2020 and introduced the National Framework for Sustainable Schools with its eight doorways to sustainability i.e. energy and water, food and drink, travel and traffic, procurement and waste, buildings and grounds, local wellbeing, inclusion and participation and the global dimension. Teaching materials and resources to support the programme have been prepared and are available from <http://www.teachernet.gov.uk/sustainableschools>. Sustainable Schools is currently the Government's main political driver that assists schools with sustainable development education, although many schools are also involved in its Healthy Schools Programme <http://www.healthyschools.gov.uk> and the Travelling to School Initiative <http://www.dft.gov.uk/pgs/sustainable/schooltravel>.

Recently, the Government has demonstrated its commitment to embedding ESD in the curriculum by including the Global Dimension and Sustainable Development as a specific cross curricula theme in the 2008 secondary curriculum and adopting a key area of learning, 'Knowledge and Understanding of the World', in its new Early Years and Foundation Stage curriculum. Furthermore, the new primary school curriculum which comes into force in 2011, currently endorses ESD via the development of its area of learning entitled 'Human, Social and Environmental Understanding'.

In 2007 – 8, the National College of School Leadership set up by the Government to develop world-class school leaders selected ESD as their main focus of research which resulted in the development of a set of guidance materials on sustainability for senior management and the identification of a number of flagship schools involved in the delivery of Sustainable Schools. Through this initiative, local networks have been established for these schools to help others in their region become more sustainable <http://www.ncsl.org.uk/sustainableschools>. Other local and regional networks exist to support schools deliver ESD; some are funded through the Regional government office under the Sustainable Schools programme e.g. Northwest ESD Forum, others by NGO's and local authorities e.g. Rochdale Education for Sustainability Network.

In England, schools are now required to report on their self evaluation form to the school inspectorate on how they are incorporating sustainability practices. ESD topics are also taught in some regional initial teacher training programmes mainly delivered by NGO's such as the Development Education Centres who may receive funding from the Government's Department of International Development to deliver development education.

Scotland

In 2000, the Scottish Government agreed a National Priority in Education 4: Values and Citizenship and in 2001 took the initiative to set the involvement in the Eco Schools programme as a Performance Indicator for schools and local education authorities. With a strong commitment to the UN Decade for Education for Sustainable Development (2005 – 2014) the Government through their support for Eco Schools and the development of the social studies element in the Scottish Curriculum of Excellence are pushing the ESD agenda in schools. There is an active Eco Schools network in the country which shares good practice and the Eco Schools materials and teaching resources are well utilised in schools <http://www.ecoschoolsscotland.org>.

Wales

In Wales, since 2004, the National Assembly has adopted Education for Sustainable Development and Global Citizenship (ESDGC) as the overarching theme for education <http://www.esd-wales.org.uk>. Schools are required to provide evidence to the school inspectorate of where ESD is taught in the curriculum and also demonstrate how the school is behaving in a sustainable way. ESD is included in teacher training programmes and local authorities are beginning to embrace the subject in their Children and Young People's Plans. In 2008, a new Personal and Social Education Framework encompassing ESD was developed for the revised secondary curriculum. The key local and national networks for schools on sustainable issues in Wales include Green Schools, Eco Schools, Forest Schools and the Welsh Network of Healthy Schools.

Northern Ireland

In 2006, the Northern Ireland Executive agreed a set of strategic objectives and targets for Sustainable Development which formally incorporated ESD into the Northern Ireland school curriculum, promoted the development of good practice guidance to schools and advocated for an increase in teacher training in ESD. To further assist with its implementation, the Executive has revised the school curriculum to include the theme 'Learning for Life and Work' which develops young people's knowledge and understanding of citizenship and their personal development. Northern Ireland has made a commitment to Sustainable Learning <http://www.sustainablelearning.info> and promotes the site's teaching materials to help schools reduce energy and water consumption. A nationwide Environmental Education Forum provides ESD training for trainee teachers in the province.

2. Overview of Energy Education

Energy has been taught in UK schools for many years mainly through the subjects of Geography and Science. In Geography children have learnt about the advantages and disadvantages of renewable and non-renewable energy sources and in Science they have been taught about energy transfer, electricity, heat loss, insulation, etc. Most of these activities have historically taken place in secondary schools and through the use of text books and practical investigations.

The development of national curricula in the 1980s introduced a requirement for teaching energy in primary schools as well as at secondary level and saw the emergence of teaching materials for younger children. These were not in the form of text books but mainly activity packs comprising worksheets, teachers' notes and CD-ROMs.

In more recent years the importance of teaching energy has been strengthened by a range of issues and initiatives. These include:

- Global concern for climate change and the need to reduce energy consumption and the use of fossil fuels.
- The recognition of the need to educate young people about sustainable development and the emergence of national schemes for ESD such as the National Framework for Sustainable Schools in England, which comprises eight 'doorways' including one on Energy and Water.
- The development of similar ESD initiatives in Scotland, Wales and Northern Ireland.
- Government targets for reducing CO₂ emissions in the school estate.
- The increasing growth of Eco-Schools in the UK (energy is an Eco-Schools theme).
- The development of a range of public and private sector programmes to support energy education in schools.

The nature of energy education has changed as a result of the above in that it is no longer just about the teaching of energy concepts but about the use of energy in our everyday lives and its global impact. The teaching of energy now focuses on:

- Positively influencing and changing the current energy consuming behaviours of young people, their families and their school communities.
- Developing and embedding more sustainable attitudes among young people as future energy consumers.
- Ensuring young people have opportunities to acquire skills needed for a low carbon society.

This change in the nature of energy education coupled with the development of ICT has led to changes in the teaching of energy and the materials that are used. In addition to traditional text book schools now have access to a much broader range of materials, many of which are accessed by the internet. These include lesson plans and worksheets, carbon calculators, animations, video clips and energy data spreadsheets. Examples of these materials include:

- Energy sources (activities, information cards, posters)
<http://www.berr.gov.uk/energy/sources/renewables/schools/teaching-resources/page23238.html>
- Energy fuelling the future (quizzes, games and stories)
<http://www.sciencemuseum.org.uk/on-line/energy/>
- Energy conservation (virtual reality activity)
<http://www.enconcity.com/>

The teaching of energy now facilitates more investigative and applied learning than has been the case in the past. For example:

- Children carry out research on the pros and cons of using different energy sources and their impact on climate change.
- They investigate energy use in their schools and homes and identify where energy is being wasted and make recommendations for improving energy efficiency.
- In some schools children assess energy performance by recording and analysing energy data.
- Children are also involved in activities to assess the viability of microgeneration for their homes and schools.

The growth in importance of energy education in the UK has encouraged the development of a range of programmes and initiatives from national, regional and local governments and energy providers. National governments have provided support through ESD websites by providing information and resources on energy, such as the Energy and Water doorway of Sustainable Schools

http://www.teachernet.gov.uk/sustainableschools/about/about_detail.cfm?id=63&levelselected=2

Governments in England and Northern Ireland have invested in Sustainable Learning, an energy and water management programme for schools operated by BRE. Schools can also access other government funded initiatives such as:

- the current Carbon Detectives programme
<http://www.carbondetectives.org.uk/content/home/index.html>
- the Act On CO2 calculator for assessing individual and household carbon footprints
<http://campaigns2.direct.gov.uk/actonco2/home.html>

At a regional level development agencies are supporting climate change and energy education through a range of resources including publications, websites and carbon calculators. Examples of what has been produced by the regional development agencies include:

- a database of climate change and energy education resources
<http://www.teachclimatechange.org/>
- a school carbon footprint calculator
http://www.dott07.com/flash/dott_1024.htm

At a local level many authorities have developed their own bespoke programmes to support energy activities in schools. These have often been in partnership with non-governmental organisations.

The most significant investment in energy education programmes has been provided by the UK energy suppliers. A range of online programmes are now available to support energy activities in schools. Examples include:

- **Climate Cops** – bright ideas in energy efficiency for pupils aged 7-11 years
<http://www.climatecops.com/>
- **The E.ON Energy Experience** - a programme for teachers to help them teach young people about energy
<http://www.eon-uk.com/energyexperience/>

Some of the programmes provided by the energy suppliers cover more than just energy activities and also provide rewards and grants for sustainable energy measures. For example:

- **Generation Green** - brings together schools, children, their family and friends to help them live a greener life. Rewards include a wind turbine kit for classroom use and a PC integrated weather station.
<http://www.generationgreen.co.uk/>
- **The Pod** - contains games, videos, images and other resources, all designed to make schools greener. The Pod is provided by EDF Energy in partnership with Eco Schools (England). The company has also provided grants to a number of schools for renewable energy installations.
<http://www.jointhepod.org/default.aspx>

Renewable energy companies are also supporting activities in schools. Projects include:

- **Solar4Schools** – helps schools apply for half price solar energy systems. Also provides teaching materials and activities for children.
<http://www.solar4schools.co.uk/>
- **Our Planet** - an educational website about renewable energy and climate change for primary and secondary schools. The site includes videos, games and teaching units linked to Geography, Design & Technology and Science curriculums.
<http://www.ourplanet.org.uk/>

3. Available support for ESD in schools

Teachers in the UK can access a wide range of support to help them deliver ESD in the classroom. Besides those mentioned in other sections of this report, further resources and guidance are available from:

The Governments of the Devolved Nations

- Since 2008, the Department of Energy and Climate Change (DECC) has supported the Big Green Challenge where several schools are taking part in a range of low carbon community initiatives. Information about the award winning projects including updates on their work can be found on <http://www.biggreenchallenge.org.uk>
- The Department for Children, Schools and Families (DCSF) supports the Growing Schools programme which provides resources, training and support to schools to help teachers use the 'outside classroom' as an educational resource
<http://www.growingschools.org.uk>

Non Governmental Organisations

Examples of UK wide NGO's that can support schools to deliver ESD include:

- **Sustainability and Environmental Education (SEEd)** <http://www.se-ed.org.uk> – a membership network that offers support and guidance to the education sector to help them engage with ESD
- **CREATE** <http://www.create.org.uk> - promotes and delivers sustainable energy education in schools and the wider community that helps to change attitudes and behaviour regarding the use of energy
- **Groundwork UK** <http://www.groundwork.org.uk> – through their 'One World Schools' initiative, local Groundwork Trusts work with the whole school community to help make sustainable development a reality <http://www.groundwork.org.uk/index.asp?page=100>

- **The Development Education Centre Network**
<http://www.dea.org.uk/members/decs.asp> - provides advice and support to schools on teaching about the global dimension and sustainable development
- **Wildlife Trusts** <http://www.wildlifetrusts.org> – supports schools to deliver conservation programmes which include education about the impact of climate change on endangered habitats and species
- **Global Action Plan** <http://www.globalactionplan.org.uk> – runs the environmental programme ‘Action at School’ that helps young people and staff to tackle waste, water, energy and transport issues at school

Local Authorities

Several local authorities across the UK have appointed specialised members of staff to assist schools to deliver ESD education. Some work directly with schools, others have developed a network of local support for schools. A recent Government report on “Delivering Sustainable Communities through Sustainable Schools” includes case studies which highlight good examples of local authority practice. See

<http://publications.teachernet.gov.uk/default.aspx?PageFunction=productdetails&PageMode=publications&ProductId=DCSF-00690-2009&>

Environmental Award Schemes

- **Eco-Schools** <http://www.eco-schools.org.uk/contact> - an international programme which looks at nine ESD topics and incorporates young people being involved in a sustainable school

Other Materials and Tools

Further ESD materials and tools for use in schools can be obtained from:

- **WWF – UK** - has launched ‘One Planet Schools’ which provides assembly ideas, photo-packs and on-line curriculum resources on ESD
http://www.wwf.org.uk/what_we_do/working_with_schools/
- **Action Aid** – has produced a set of primary and secondary school resources that encourage young people to explore the causes and impacts of climate change, investigate energy use and take action to reduce their energy consumption
<http://powerdown.actionaid.org.uk/>
- **Friends of the Earth** - has produced a range of posters, quizzes and lesson plans to help young people learn about ESD <http://www.foe.co.uk/learning/index.html>
- **The Development Education Association** manages a website of resources and activities to teach pupils of all ages about the 8 key concepts of the Global Dimension
<http://www.globaldimension.org.uk>

4. Use of ICT in ESD

ICT can improve the quality of teaching, learning and management in schools and so help raise standards. That's why ICT is at the heart of the UK government's commitment to improving learning for all children. Although ICT is embedded in the curricula for England, Scotland, Wales and Northern Ireland and with the same objectives, the delivery strategies for each region have slight variations and timescales in terms of funding, infrastructure and professional support.

In general all schools have computers and access to the Internet. What varies is the number and type of computers and the level of access to the world-wide web. In primary schools computers are typically available in each classroom whereas in secondary schools the tendency is to have computer suites with up to 40 computers. However in recent years increasing numbers of primary schools are delegating rooms solely for ICT use and computers are more readily available in all secondary classrooms.

In England there is a Specialist Schools Programme which helps secondary schools to develop identities through their chosen specialisms. The schools achieve this in partnership with private sector sponsors and through additional government funding. Some schools have specialist status in maths and computing and in these schools you will find a greater emphasis on ICT. Also there is an increasing trend for secondary schools to become community learning centres, facilitating their ICT resources for local community use. Many have large computer suites and video conferencing amenities.

A key development of ICT in the past few years has been the emergence of the interactive whiteboard, which is a large interactive display that connects to a computer and projector. A projector projects the computer's desktop onto the board's surface, where users control the computer using a pen, finger or other device. Many UK classrooms now have interactive whiteboards and these have enabled greater use of ICT and internet access for whole class activities. The whiteboards also make it easier to show videos and animations. Some schools also provide laptops for use by pupils to facilitate individual working and there is an increasing development of schools using ICT to facilitate learning at home. To support this there have been initiatives to facilitate home computers and laptops for families on low incomes, schemes for teachers to purchase laptops at preferential rates and the development of local networks and intranets.

The development of ICT in UK schools has greatly enriched the teaching of ESD and there is strong evidence that teachers are increasing their use of ICT for ESD activities. Teaching and learning materials have been developed by a range of organisations, including government education departments, non-governmental organisations and commercial suppliers. They cover the whole spectrum of ESD and are generally freely available via the internet. Although some materials are still provided on DVD the tendency is to produce online resources as they are cheaper to distribute and can be more readily updated.

ESD resources via the internet are available in many different forms. For teachers they include interactive activities for use on whiteboards, downloadable lessons plans with supporting teachers' notes, pupil worksheets, videos and animations. For children there are online activities including games that support their learning of energy, food, transport, etc. Due to the amount and variety of multimedia material available to support ESD it is impossible to identify and list every resource and every website that is available. In fact the biggest problem for teachers is knowing what resources are available. Teachers have limited time to search what is available and to assess the appropriateness of materials and websites for the children they are working with. Recognising this, the Department for Children, Schools and Families has produced a bespoke section for Sustainable Schools on its TeacherNet website to inform teachers in England about ESD and to help them identify available materials. See <http://www.teachernet.gov.uk/sustainableschools/> for details. A similar website is available in Scotland where ESD is known as Sustainable Development Education <http://www.ltscotland.org.uk/sustainabledevelopment/>. For support for schools in Wales see <http://www.esd-wales.org.uk/english/welcome.asp>.

In the UK there are websites that have a significant relevance to the Carbon Detectives programme. They provide calculating tools for measuring the impact of school travel, carbon footprints, food miles, etc. Most of these are appropriate for children to use and can provide useful learning experiences prior to participating in Carbon Detectives.

In addition, there are resources that facilitate energy and water monitoring activities. As an example, a primary school south of London is using software to monitor electricity consumption in the school and the amount of electricity generated by the school's solar PV panels. Children can monitor and interact with the data. They can compare consumption data with previous months and years to assess their efforts in reducing electricity use in the school. The data is available to the public via the school's website <http://www.ashleyschool.org.uk>

The use of ICT in ESD is not solely restricted to using computers and accessing the internet for teaching and learning materials. There are other ICT tools that can support ESD such as data loggers. Data logging equipment is found in many UK schools, including some primary schools, and usually comprises a remote data logger and a variety of sensors including those

that measure temperature and light. Children engaged in heating and lighting surveys of their school can use this equipment to measure and record heating and lighting levels to help identify where energy is being wasted. Infrared sensors can also be used to identify heat loss and test the efficiency of insulation.

The use of ICT as a communication tool for ESD activities is also highly important. It is increasingly common to walk into schools in the UK and see flat screen displays in reception areas to communicate information to visitors. Included in the information can be details of schools' latest ESD activities such as a school travel campaign or an energy saving week. In terms of communication it is becoming increasingly common for schools in the UK to have their own websites to provide details of their activities including those relating to ESD.

Children are sometimes involved in providing material for their school's website. They are able to use digital cameras and camcorders to present their ideas and promote their ESD activities not just on their website but also through displays in the school. Many secondary schools also have television studios and editing suites to facilitate media studies, providing exceptional facilities for communicating ESD activities.

5i. Examples of best practice on ESD and Energy Education -materials**Ashden Awards** - <http://www.ashdenawards.org/schools>

The Ashden Awards bring to light inspiring sustainable energy solutions in the UK and the developing world. The Awards website has a bespoke section for schools which includes resources for teaching energy. The activities are linked to films and case studies of Ashden Awards winners and have a particular relevance to Geography and Science.

CABE Green Day - <http://www.cabe.org.uk/files/green-day-second-edition.pdf>

Green Day is a one-day event for schools about climate change, sustainability and the built environment. It provides a fun and flexible way to integrate these themes into lessons and whole-school activities. It aims to act as a springboard to make schools more sustainable in the long term.

Generation Green - <http://www.generationgreen.co.uk/>

Generation Green brings together schools, children, their families and friends to help them live a greener life. Its aim is to encourage 'greener' behaviour and shows that by working together there is the capacity to effect long-lasting change. Lesson plans can be freely downloaded from the site and there are games to play as well.

E.ON Energy Experience - <http://www.eon-uk.com/energyexperience/>

The E.ON Energy Experience is a programme for teachers to help them teach young people about energy. The resources help young people to understand about the different sources of energy we use, the relative merits of each, the options for energy production going forward and what their choices will mean locally, nationally and globally.

Sustainable Schools -

http://www.teachernet.gov.uk/sustainableschools/about/about_detail.cfm?id=217&levelselecte d=3

Sustainable Schools, from the UK Department for Children, Schools and Families TeacherNet website, provides practical resources, guidance and the inspiration to help schools take their commitment to sustainability to the next level. Teaching resources are available for primary and secondary schools, along with a climate change film pack and ideas for assemblies.

Special Energy Investigators -

<http://www.create.org.uk/downloads/SpecialEnergyInvestigators.pdf>

In keeping with the concept of carbon detectives, these resources invite pupils to carry out a series of special energy investigations to detect cases of energy wastage in their school. They are asked to identify those responsible for wasting energy, to take steps to reduce wastage and to report on the success of their actions.

Sustainable Learning - <http://www.sustainablelearning.info/>

Sustainable Learning is a programme operated by BRE, with support from CREATE, that assists registered schools in England and Northern Ireland to reduce their energy and water consumption. Sustainable Learning complements Eco-Schools and the scheme progress booklet is a very useful tool for helping teachers and pupils to carry out an energy and water review.

Climate Choices - Children's Voices - <http://www.climatechoices.org.uk/>

This project is aimed at teachers of children aged 9-11 years who want to help children begin to understand the challenging and complex issue of climate change. Children can discover that personal action can make a difference and learn how food choices impact on climate change and how climate change is affecting food supply. A range of resources, including video clips, presentations, games and worksheet-based activities are provided.

Organic Linker - <http://www.organiclinker.com/food-miles.cfm>

This website includes an international food miles calculator which pupils in Europe can use to track food from any country in the world! As well as providing the distance the food has travelled, the website also calculates the kg CO₂ and kg Carbon created by the journey.

Travel Buster - <http://www.travelbuster.org.uk/>

The Travel Buster is a fun online teaching resource for pupils aged 7-11 years aimed at raising awareness of the impact of school travel. It allows pupils to see how the way they travel to school rates in terms of air pollution, noise and health and provides useful information and ideas for improving their travel choices.

5ii. Examples of best practice on ESD and Energy Education – case studies

The best examples of energy and ESD projects in UK schools can be found on the Ashden Awards website <http://www.ashdenawards.org/schools>. The featured schools have won prestigious awards for their outstanding sustainable energy activities, most notably for the quality of their educational programmes and their carbon management. All the schools demonstrate how children can be engaged through the curriculum to reduce energy consumption in their schools and how they can be involved in identifying and supporting opportunities for renewable energy installations.

Primary school case studies:

http://www.ashdenawards.org/files/reports/Ashley_school_case_study.pdf

http://ashden.widemediamedia.com/files/reports/sandhills_case_study_2008_0.pdf

http://www.ashdenawards.org/files/reports/Seaton_school_2007_Technical_report.pdf

http://www.ashdenawards.org/files/reports/Woodheys_2007_Technical_report.pdf

<http://www.ashdenawards.org/files/reports/Cassop%202006%20Technical%20report.pdf>

<http://www.ashdenawards.org/files/reports/Eastchurch%202006%20Technical%20report.pdf>

Secondary school case studies:

http://www.ashdenawards.org/files/reports/Currie_school_case_study.pdf

http://www.ashdenawards.org/files/reports/ringmer_case_study_2008_0.pdf

Case studies showing a broader range of ESD activities can be found on the Eco-Schools website at <http://www.eco-schools.org.uk/case-studies/>