

Appendix 3: Guideline for organising and providing informative and training activities

“Training sheet” for topic 1: The Energy efficiency in the sustainable development

Energy efficiency (energy saving and renewable energy use) is a practice which allows an important contribution to the CO₂ emissions reduction being also convenient from the economic point of view.

For encouraging energy efficient behaviours is important to underline that this practice is related to global environmental emergencies (mainly the Global Warming) and international and European commitments.

	Information/awareness raising (2-4 h)	In depth training/operative skills (16h)
Objectives	<ul style="list-style-type: none"> ⇒ To sensitise the teachers and the schools staff and to motivate their engagement in and out of the school ⇒ To clarify links between the local energy efficiency and its global issues and how the schools can act 	<ul style="list-style-type: none"> ⇒ To enable teachers to transfer to their students knowledge and competences on climate change. ⇒ To enable teachers to understand how schools can contribute to the CO₂ emissions reduction
Minimum contents	<ul style="list-style-type: none"> ⇒ Sustainable development : history, issues and European Union Policies ⇒ Energy needs and energy resources available ⇒ The climate change and its causes ⇒ How the school can act with students, families and local communities; the EGS Manifesto 	<ul style="list-style-type: none"> ⇒ Sustainable development : history, issues and European Union Policies ⇒ Energy needs and energy resources available ⇒ The energy consumption of human activities ⇒ The climate challenge ⇒ The greenhouse effect and greenhouse gases effect ⇒ The Parameters of the global climate ⇒ How the school can act with students, families and local communities; the EGS Manifesto
Suggested methods	<ul style="list-style-type: none"> ⇒ An informal conference could be the best way for an initial involvement of schools teachers and staff. ⇒ Two stages are suggested: <ol style="list-style-type: none"> 1. open conference: more schools are reached but only 1-2 representatives each one (initial sensitisation); 2. one conference for each school: only one school is reached but more teachers and staff representatives are involved (consolidation in each school). ⇒ Presentation of official documentation or documentary such as “An inconvenient Truth” (Al Gore Film) and final discussion eventually with national and local stakeholders (e.g. energy supplier, politician, energy consumer, environmental specialist) 	<ul style="list-style-type: none"> ⇒ School Lessons and presentation of some scientific teaching-support documents (8h) ⇒ Presentation of norms related to CO₂ monitoring and reduction (es. PAS 2050, ISO 14064) (8h)

“Training sheet” for topic 2: Energy sources and environmental aspects

Each energy source has specific environmental aspects and impacts associated to its exploitation. To cope with misinformed assertions, precise and clear information should be provided to teachers and, consequently, the youth to enable them to take positions and make choices as objective as possible.

	Information/awareness raising (2-4 h)	In depth training/operative skills (8-12h)
Objectives	<ul style="list-style-type: none"> ⇒ Providing basic knowledge of different energy resources and productions environmental impact (locally and globally) ⇒ To clarify methods to calculate / illustrate different environmental impacts ⇒ To allow accurate positions and choices with regard to new energy sources exploitation 	<ul style="list-style-type: none"> ⇒ To enable teachers to transfer to their students knowledge and competences on energy resources and energy production environmental impact (locally and globally) ⇒ To activate deep discussion about benefits and problems from different energy production systems ⇒ To allow accurate positions and choices with regard to new energy sources exploitation
Minimum contents	<ul style="list-style-type: none"> ⇒ Pollution of the Air, Water, and Land like Air–Smog in cities with high population density, from coal fired electricity generation, as well as due to industrialization. Water – Heavy metal leakage to the water table whenever they cleaned their cooling towers. Oil spillage on the high seas. Land – Strip mining of coal, and sand mining of oil ⇒ Nuclear energy, nuclear wastes ⇒ Benefits and environmental related to renewable energy sources 	<ul style="list-style-type: none"> ⇒ What are benefits and problems from different energy production methods? ⇒ Comparison between different energy production and renewable energy production E.g. impact on landscape; air emissions from biomasses; biologic impact of mini hydro, ecc. ⇒ CO2 balance and calculation methods
Suggested methods	<ul style="list-style-type: none"> ⇒ An informal conference could be the best way for an initial involvement of schools teachers and staff. ⇒ Recognised energy experts (national and or local) can be invited for analysing the environmental aspects related to renewables (strengthening and weakness points) 	<ul style="list-style-type: none"> ⇒ Presentation of calculations systems ⇒ Exercises for CO2 calculation ⇒ How to analyse the environmental aspects (positive and negative) and how to mitigate negative aspects.

“Training sheet” for topic 3: Education for sustainable development and sustainable energy

To teach sustainable development and sustainable energy number of information and best practices sources and methodologies are available.

The www.EGS-project.eu web site provide users with a rich data base of best practices related to the sustainable development and energy. Specific courses can be planned and realised but the integration of sustainability and energy efficiency in classic fields study is recommended as well.

Activities which allow the sensitisation of parents are very useful for stimulating sustainable behaviours among schools’ communities.

	Information/awareness raising (2h)	In depth training/operative skills (8h)
Objectives	<ul style="list-style-type: none"> ⇒ Awareness about different areas of Sustainable development in education ⇒ To sensitise teachers and schools’ staff and to motivate to use different implementation possibilities; best practices, eco-gestures, reality-embedded educational actions. 	<ul style="list-style-type: none"> ⇒ To enable teachers to compare various approaches in a critical way ⇒ To understand assessment methods
Minimum contents	<ul style="list-style-type: none"> ⇒ Sustainable development in education and different teaching methodologies ⇒ Examples from used methodologies in practice ⇒ Basic information of assessment and it’s possibilities 	<ul style="list-style-type: none"> ⇒ Sustainable development in education ⇒ Teaching and involving methodologies ⇒ Practical exercises and critical discussions on benefits to use such methodologies ⇒ Practical exercises of assessment
Suggested methods	<ul style="list-style-type: none"> ⇒ Conference could be the best way for an initial involvement of schools teachers and staff. ⇒ Invitation of some schools and/or experts and practical case studies presentation 	<ul style="list-style-type: none"> ⇒ Lessons on education approaches which can be adopted ⇒ Practical exercise in class and working groups ⇒ Assessment methods and application ⇒ Workshop: Critical discussion of benefits to use such methodologies

“Training sheet” for topic 4: Green Economy

Economic and financial sustainability is a key aspect for allowing that energy efficiency and renewable sources become permanent choices.

For this reason, in the framework of international agreement and voluntary norms, economic and financial mechanisms have been conceived.

To work on sustainable energy the knowledge of such mechanisms is basic.

	Information/awareness raising (2-3h)	In depth training/operative skills (6-8h)
Objectives	<ul style="list-style-type: none"> ⇒ To provide basic knowledge to teachers and schools' staff how energy supply, energy production, climate change and economics are linked ⇒ To motivate teachers to provide students and parents with information about sustainable economic development and job opportunities ⇒ To clarify links between energy efficiency and economic opportunities 	<ul style="list-style-type: none"> ⇒ To enable teachers to transfer knowledge and competences on green economy to their students ⇒ To start discussions on different approaches for economic development (growth, sustainability ..) ⇒ To understand possibilities of green economy and empower teachers to work on a shift of awareness towards a sustainable economy ⇒ To enable the professional development
Minimum contents	<ul style="list-style-type: none"> ⇒ Costs of Climate Change for National and International economy (e.g. Stern Review) ⇒ Climate Protection pays off and fosters innovation ⇒ Green Economy in General: definitions, market share, branches, job opportunities ⇒ Sustainable energy production and creation of value (global and regional) ⇒ Energy efficiency and added value 	<ul style="list-style-type: none"> ⇒ Ecology is the economics of the 21th century ⇒ What are the lead markets of a green economy ⇒ Principles of a sustainable energy economy (including European Union Policies) ⇒ Ways towards a sustainable energy economy (renewable energy and energy efficiency as an economic factor) ⇒ Chain of economic added-value in a low carbon economy ⇒ Grid-parity: electrical power from RE meets market price ⇒ CO₂ avoidance costs ⇒ Carbon cap- and trade system (CO₂-emissions trading – a way to reduce greenhouse gases?) ⇒ Industry and SMEs: Future demand for employees. Which fields of studies are recommendable to meet the demand?
Suggested methods	<ul style="list-style-type: none"> ⇒ Open conference with presentations on relevant economic topics ⇒ Additionally a discussion with local stakeholders (e.g. energy supplier, politician, energy consumer, environmental specialist) 	<ul style="list-style-type: none"> ⇒ Lessons and presentations ⇒ Workshops on relevant topics (or topics where teachers express special needs) ⇒ Information where to get teaching-support documents ⇒ Support with relevant references (books, internet, local experts)

“Training sheet” for topic 5: How to promote energy efficiency in our school

Schools’ energy performances are based on structural aspects, plants and behaviours of teachers, schools’ staff and students.

Tools and methods allowable for improving the energy efficiency, the energy audit approach for performances assessment are basic elements for setting up and achieving an energy efficiency program in schools.

	Information/awareness raising (4h)	In depth training/operative skills (16-20h)
Objectives	<ul style="list-style-type: none"> ⇒ To underline the strategic role of schools. ⇒ To underline the strategic role of schools and their teachers for increasing the awareness among students and families. ⇒ To demonstrate that the reduction of energy consumption and costs is possible ⇒ To encourage proactive attitudes among teachers and schools staff and stimulate energy efficiency initiatives 	<ul style="list-style-type: none"> ⇒ To enable teachers to transfer to their students knowledge and competences on energy efficiency of buildings: energy audits and improvement solutions and renewable sources applicable. ⇒ To activate all (teachers, other staff, students and stakeholders) acting in practice for energy efficiency
Minimum contents	<ul style="list-style-type: none"> ⇒ Main figures related to CO2 emissions and global warming ⇒ Main contents of EU policies ⇒ The EGS Manifesto and network ⇒ Main figures of schools (students, families, stakeholders) ⇒ Energy efficiency concept, RES and RUE ⇒ Presentation of some best practices acted by schools ⇒ Presentation of some informative and training documents to be used 	<ul style="list-style-type: none"> ⇒ What are “Energy audit”, “Energy certification” and which are legislative requirements and technical norms ⇒ How to implement energy efficiency action programme in practise ⇒ How to carry out an energy audit ⇒ Renewable sources (kind and figures) ⇒ Energy efficiency as a cross topic according to the EGS project and using the EGS database (energy in English; energy in the history; physics; energy in arts; energy in vocational education, etc.)
Suggested methods	<ul style="list-style-type: none"> ⇒ An informal conference could be the best way for an initial involvement of schools teachers. ⇒ Two stages are suggested: <ol style="list-style-type: none"> 1. open conference: more schools are reached but only 1-2 representatives each one (initial sensitisation); 2. one conference for each school: only one school is reached but more teachers are involved (consolidation in each school). ⇒ Participation of 1-2 “Mentor” school(s) ⇒ Video (s) 	<ul style="list-style-type: none"> ⇒ School Lessons and presentation of some teaching-support documents (8h) ⇒ Survey at school - energy audit simulation (4h) ⇒ Implement of energy efficiency action programme - energy team (2 h)

“Training sheet” for topic 6: European standards, Labialisation, Norms

A number of norms exist that allow the improvement of energy management, the energy and environmental performances of products, the environmental communication.

These norms are related to external consultancies and to new professionals in companies. Their knowledge opens up new job opportunities for young after their high school diploma.

	Information/awareness raising 2h	In depth training/operative skills (16h)
Objectives	<ul style="list-style-type: none"> ⇒ To sensitise and inform the teachers and the staff school about National and European standards, labels and norms. ⇒ To clarify National commitments. ⇒ To encourage proactive attitudes among teachers and staff school in and out of the school. 	<ul style="list-style-type: none"> ⇒ To develop actions of sustainable public procurement. ⇒ To adequate training courses for students (mainly for commercial and technical schools). ⇒ To enable the professional development
Minimum contents	<ul style="list-style-type: none"> ⇒ Standards, norms and labels : definition, issues and European Union Policies ⇒ Standards, norms and labels: the certifying structure, examples of labels by products and services, false labels 	<ul style="list-style-type: none"> ⇒ Detail of Standards, norms and labels (Ecolabel, Environmental Product Declaration, energy labels). ⇒ How integrate environmental and social clauses in the public procurement ⇒ Analysis of local initiatives in sustainable public procurement
Suggested methods	<ul style="list-style-type: none"> ⇒ In order to involve schools teachers and staff, an informal conference would be the best way. ⇒ A presentation about locals initiatives concerning sustainable public procurement. ⇒ Green Public Procurement internet sites and examples of green call for tenders 	<ul style="list-style-type: none"> ⇒ Informative and training documents about sustainable public procurement would be delivered. ⇒ Cooperation with a regional network of sustainable public procurement. ⇒ Working group: developing environmental criteria for one or more product categories to be adopted in the public procurement ⇒ Stages for pupils at companies (mainly for commercial and technical schools)

“Training sheet” for topic 7: Renewable energy sources

To access the renewable energy sources and to begin a technical operator, students must attend courses of specialization. The training programs of the EGS project aim at transferring to teachers some technical information for teaching students on technologies for energy production from renewable sources. Students must then choose the specific area in which to specialize after the high school.

	Information/awareness raising (4h)	In depth training/operative skills (40h)
Objectives	<ul style="list-style-type: none"> ⇒ Providing basic knowledge on renewable energy principles ⇒ To have a general culture in matter of renewable energy policies at regional / national and European level ⇒ To be able to conduct courses, projects and ideas in collaboration/coordination with other colleagues related to renewable energy as transversal subject ⇒ Development of experience exchange and co-operation among teachers and schools' staff in matter of renewable energy. 	<ul style="list-style-type: none"> ⇒ To empower schools staff for critical reflection and discussion with students and local stakeholders ⇒ To enable participants to transfer knowledge and competences to pupils ⇒ To strengthen all participants to create a working atmosphere for innovation and awareness of the future challenges in energy supply ⇒ To enable the professional development
Minimum contents	<ul style="list-style-type: none"> ⇒ Recall : potential for energy supply ⇒ Solar energy generalities: components of solar radiation, parameters for a given site tilt and orientation, solar altitude and azimuth, sun chart. ⇒ For each sub topics in RE - solar thermal energy, photovoltaic energy, wind energy, hydroelectric and marine energy, biomass for energy and geothermal energy – the following are to be developed: Definitions, Main components, Use and applications, Economic aspects and policies at regional/national level, Environmental considerations and life cycle analysis, Statistics for national and European, perspectives 	<ul style="list-style-type: none"> ⇒ Systems integration of volatile RE (How to create a stable grid?) ⇒ Decentralised energy management and future power grids ⇒ Combined Heat and Power (CHP) generation ⇒ Smart grids, smart metering and intelligent devices ⇒ Electric mobility with renewable energies ⇒ Storage technologies for RE – a challenge ⇒ RE–benefits for developing countries (North-South-gap) ⇒ Solar cooling ⇒ Energy from biomass – competition between nutrition, energy generation and environment? ⇒ Land requirements for renewable energy sources (wind, photovoltaics, biomass) – how to calculate
Suggested methods	<ul style="list-style-type: none"> ⇒ Topics are to be explained in a simple way without any details in matter of physics' laws (transfer of heat, laws of thermodynamics...) ⇒ An informal lecture (group discussions are to be allowed) could be the best way to introduce renewable energy courses for teachers and school staff ⇒ Video(s), flash presentation, dynamic diagrams 	<ul style="list-style-type: none"> ⇒ Presentations and videos to give an input ⇒ Followed by workshops (with experts if available) to discuss actual topics ⇒ Supporting documents for teachers (studies, articles out of professional journals) and references for further information needs ⇒ Practise (e.g. calculating land requirements, reading statistics)

“Training sheet” for topic 8: Innovation in Energy Efficiency

The first step in energy efficiency is energy saving. The market offer a number of solutions for improving the buildings’ performances and to chose the best is very difficult.

Solutions which integrate energy efficiency and sustainability of materials are available as well (eco-building).

Teaching course should take in to consideration these topics at least in technical high schools and for this reason teachers should be trained as well providing them with professional development sources.

	Information/awareness raising (2h)	In depth training/operative skills (24h)
Objectives	<ul style="list-style-type: none"> ⇒ To put in evidence the technological progress in Energy Efficiency ⇒ To underline the strategic role of the schools and their teachers to raise awareness of the available technologies in energy efficiency. 	<ul style="list-style-type: none"> ⇒ To enable teachers to transfer to their students knowledge and competences on energy efficiency technologies innovation. ⇒ To deepen physical concepts behind technologies. ⇒ To enable the professional development
Minimum contents	<ul style="list-style-type: none"> ⇒ Comparison between the concepts of saving energy, energy efficiency and renewable resources ⇒ Brief list and explanation of the systems for energy saving: thermostatic valves, radiant panel, condensing boiler, reducing water flow, insulation walls, automatic control of lighting, ... ⇒ Behaviors in energy saving: at school, at home, at work, ... 	<ul style="list-style-type: none"> ⇒ Comparison between the concepts of saving energy, energy efficiency and renewable resources ⇒ List and explanation of the innovative systems for energy saving: thermostatic valves, radiant panel, condensing boiler, reducing water flow, insulation walls, automatic control of lighting, ... (Demonstration with a few items and any possible visit to a school built with new technology)
Suggested methods	<ul style="list-style-type: none"> ⇒ An informal conference could be the best way for an initial involvement of schools teachers. ⇒ Participation of an energy expert 	<ul style="list-style-type: none"> ⇒ Lesson with some media as a teaching slide ... (2,5h) ⇒ Examples of calculating the energy savings resulting from the application of some technologies and devices (1,5h) ⇒ Participation of an energy expert

“Training sheet” for topic 9: Technical visits, plate-form demonstration, expositions, faires, plants, etc....

classroom lectures should be supplemented by visits to study sites. For this reason teachers should be provided to some criteria that can guide the choice of destinations and set the study visit

	Information/awareness raising (4-8h)	In depth training/operative skills (12-16h)
Objectives	<ul style="list-style-type: none"> ⇒ Awareness about the technologies that today we have in place or under study 	<ul style="list-style-type: none"> ⇒ To enable teachers accompany students during visits at plants and efficient buildings and train them on the technology
Minimum contents	<ul style="list-style-type: none"> ⇒ Description of the production cycle of plant during a tour ⇒ Explanation of energy transformations during the visit of an educational workshop 	<ul style="list-style-type: none"> ⇒ Illustration of some well known sites which are available for study visits ⇒ How organise a description of plant's layout during a tour ⇒ Explanation of energy transformations ⇒ Resuming in class on what was seen
Suggested methods	<ul style="list-style-type: none"> ⇒ A tour of one or more renewable energy installations and/or educational workshops (biogas, solar pV, Laboratory Hydrogen,...) and/or efficient/eco building 	<ul style="list-style-type: none"> ⇒ A tour of one or more renewable energy installations and/or educational workshops (biogas, solar pV, Laboratory Hydrogen,...) and/or efficient eco building (3h) ⇒ Video or slides around production cycles seen during the tour and some other systems with application examples and possible pre-dimensioning (2h) ⇒ Involving pupils in video and slides production

“Training sheet” for topic 10: Information and Communication Technologies for teaching Energy efficiency and renewable resources.

Information and communication technologies are available for supporting the energy efficiency lessons. The use of these tools is especially crucial because on the topics covered there are still books, lecture notes and other traditional documentation.

In any case information and communication technologies allow to access and spread principles and information on energy items in an international challenging and creative context.

	Information/awareness raising (2h)	In depth training/operative skills (12h)
Objectives	<ul style="list-style-type: none"> ⇒ Awareness about the technologies that today are in place for supporting teaching activities 	<ul style="list-style-type: none"> ⇒ To enable teachers to use technologies for supporting teaching activities. ⇒ To allow students to access new learning and communication technologies
Minimum contents	<ul style="list-style-type: none"> ⇒ Video-lessons and complementary material to be used or produced. ⇒ Video Games: just a description of available games to “play on the learning” <ul style="list-style-type: none"> ⇒ E-learning platform: some example of. ⇒ Chat and Forum: some examples of chat and forum already running. ⇒ LIM: Interactive Light Blackboard. A short demonstration of LIM's performances 	<ul style="list-style-type: none"> ⇒ Video-lessons and complementary material to be used or produced. How to produce a video and make it available in social forums' groups. ⇒ Video Games: how to find on line and use games to “play on the learning” that have been made in order to spread principles and basic information on energy items <ul style="list-style-type: none"> ⇒ E-learning platform: how to organise interactive and remote lessons for involving students, teachers and experts from different countries (e.g. video). ⇒ Chat and Forum: how to organise or enter specific chat rooms where students and experts can discuss on energy items ⇒ LIM: Interactive Light Blackboard how to use it.
Suggested methods	<ul style="list-style-type: none"> ⇒ Lectures based on examples and demonstrative sessions 	<ul style="list-style-type: none"> ⇒ Lectures based on examples and demonstrative sessions ⇒ Working groups and training on the job; ⇒ Simulations

“Training sheet” for topic 11: The energy management system

Especially for an organization as complex as a public entity, a company but also a school, it is important to be organized to better manage energy.

The EN 16,001 was born for this and is useful for guiding investment programs, the training and education programs, ways to work with the goal of reducing energy consumption of fossil fuels and then the air emissions and costs.

	Information/awareness raising (2h)	In depth training/operative skills (36h)
Objectives	<ul style="list-style-type: none"> ⇒ To inform schools managers and teachers on management tools available for improving the energy management and reducing the energy costs 	<ul style="list-style-type: none"> ⇒ To enable schools managers and teachers to implement a energy management system according to recognised norms and certification systems (e.g. the EN 16001)
Minimum contents	<ul style="list-style-type: none"> ⇒ What is an energy management systems ⇒ How it runs ⇒ What are the benefits and the commitments 	<ul style="list-style-type: none"> ⇒ Analysis of the normative requirements (8h) ⇒ How to carry out an energy analysis at school (12h) ⇒ How to define energy objectives and programmes (2h) ⇒ How to monitor the energy performances (2h) ⇒ How to implement the energy management system (8h) ⇒ The certification process (1h) ⇒ How to involve the schools personnel, the students and their families (3h)
Suggested methods	<ul style="list-style-type: none"> ⇒ Informal conference ⇒ Presentation of some case study (if possible by schools representatives who directly developed the energy management system) 	<ul style="list-style-type: none"> ⇒ Working sessions especially on energy analysis and energy management system implementation

“Training sheet” for topic 12: The history of energy efficiency

Energy management is an issue that has affected humans in the centuries past in relation to latitude, to changing climatic conditions and changing economic and social development.

Knowing the choices of the past is useful to those who must manage the energy in this and who should make choices for the future.

For this reason also the history of energy is an important issue to consider beyond the cultural thing in itself

	Information/awareness raising (2h)	In depth training/operative skills (8h)
Objectives	<ul style="list-style-type: none"> ⇒ To allow a successive depth by history teachers 	<ul style="list-style-type: none"> ⇒ To allow history teachers to realise teaching courses ⇒ To allow history teachers to depth and conceive more deepen teaching courses ⇒ To allow more detailed work by students
Minimum contents	<ul style="list-style-type: none"> ⇒ Energy efficiency over the centuries, general aspects ⇒ Information sources 	<ul style="list-style-type: none"> ⇒ Evolution of energy use ⇒ Evolution of energy sources ⇒ Evolution of energy efficiency solutions for buildings ⇒ Information sources
Suggested methods	<ul style="list-style-type: none"> ⇒ Informal conference 	<ul style="list-style-type: none"> ⇒ Lecture