ÉPOQUE: ENVIRONMENTAL PORTFOLIO FOR QUALITY IN UNIVERSITY EDUCATION

DIDACTIC MANUAL

Contents

1 SCOPE OF THIS DOCUMENT

The didactic manual addresses to university teachers and adult trainers, to help them realise the added value of incorporating environmental issues in their course delivery. The didactic manual serves a twofold purpose: on one hand, it will be the reference document for teachers and trainers who will teach the courses developed within the partnership, providing all appropriate information, tasks, assignments and evaluation techniques. Moreover, the manual works as a dissemination and awareness tool, addressed to many more stakeholders (such as education experts, school teachers, especially those who are involved in pedagogy and early education courses, school principals, directors and managers, as well as families, since it will be a very comprehensive source of information on why environmental issues should be a priority to schools, as early as possible.

The lead partner of the activity, the University of Napoli, developed the structure of the manual and suggested it to the partners for review and approval. All partners were equally involved in drafting the different sections of the manual, based on their competencies and areas of expertise, allocating the sections to be produced in a clear and transparent way.

The final version of the manual was delivered by month 24 of the project. The didactic manual was also included in the CD with the complete set of intellectual outputs for the teachers and it was distributed during the final project conference.

In detail, the manual will include, inter alia, the following sections:

- Environmental awareness;

- What is the Enviromental Portfolio;

- European and National Legislation on sustainable use of resources;

- Sustainable use of Energy and Education;

- Training courses developed;

- Task descriptions;

- Didactical techniques and methods;

- Applied examples – Connection with O2 and ISP

- Possibilities for further development;

- Good practices for each one of the courses developed;

- Reference material;

- Further reading;

- Useful links.

2 ENVIRONMENT AND EDUCATION

2.1 ENVIRONMENTAL AWARENESS IN THE EUROPEAN UNION

By the term "environmental awareness" we mean the ability to recognize the fragility of our natural environment, to understand its laws ad be sensitive to its changes, to identify the cause-and-effect relationship between the condition of the environment and human behaviour, to comprehend the necessity of humans to respect and protect the natural world from its anthropogenic afflictions, to understand the importance of a sustainable use of natural resources with the aim of preserving them for future generations.

Even if the European Union has always demonstrated an environmental awareness, by introducing laws to ensure the careful use of natural resources, to minimise adverse environmental impacts of production and consumption, to protect biodiversity and natural habitats and to integrate environmental concerns in other policies[1], the environmental challenges have dramatically evolved since its foundation. A few decades ago, for example, the focus was on traditional environmental themes such as protecting species and improving the quality of air and water by reducing emissions of pollutants. Nowadays, a more systematic and integrated approach is emphasised which takes into account the correlation of different environmental issues and their global dimension. This means moving from remediation to prevention of environmental degradation and ensuring that other areas (agriculture, energy, transport, fisheries, regional development, research and innovation) take fully into account the environmental consequences of their policy and funding decisions[2].

This kind of approach to environment is a key challenge for the European Union, if we consider that most of the environmental sectors are protected by the European legislation, but the implementation of the policies remains problematic. In particular, a more harmonic connection between environment and economy should be addressed: "greening the economy reduces environmental costs through more efficient use of resources, while new environmentally friendly technologies and techniques create employment, give a boost to the economy and strengthen the competitiveness of European industry"[3]. Environmental policy also meets the EU overall objectives of moving to smart, sustainable and inclusive growth that will transform

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[1] "Environment and Climate Change", *Eur-Lex Access to European Law*, accessed December 9, 2015, http://eur-lex.europa.eu/summary/chapter/environment.html?root_default=SUM_1_CODED=20&locale=en.
[2] European Commission, "Environment. A healthy and sustainable environment for present and future generations", *Eur-Lex Access to European Law*, accessed December 9, 2015, http://bookshop.europa.eu/en/environment-pbNA0414868/downloads/NA-04-0414868-868-EN-C/NA0414868ENC_002.pdf?FileName=NA0414868ENC_002.pdf&SKU=NA0414868ENC_PDF&CatalogueNumber=NA-04-0414868-868-EN-C.
[3] *Ibidem*

Europe into a knowledge-based, resource-efficient economy. For instance, strengthening the resilience of our ecosystems, which provide food, fresh water, raw materials and many other benefits, contributes to productivity and quality of life, while reducing public health bills[4].

In November 2013, the European Parliament and the Council of the European Union adopted the seventh Environment Action Programme (EAP) which covers the period up to 2020. The EAP to 2020 sets out a long-term environment strategy designed to be sufficiently flexible to respond to the current environmental challenges and the increasingly systemic risks they contain, by providing an overall approach towards the environment, setting the course for a green and competitive economy that will safeguard our natural resources and health for present and future generations. The program is guided by the following vision: "in 2050, we live well, within the planet's ecological limits. Our prosperity and healthy environment stem from an innovative, circular economy where nothing is wasted and where natural resources are managed sustainably, and biodiversity is protected, valued and restored in ways that enhance our society's resilience. Our low-carbon growth has long been decoupled from resource use, setting the pace for a safe and sustainable global society"[5]. The nine priorities to be achieved by 2020 are: 1) to protect, conserve and enhance the Union's natural capital; 2. to turn the Union into a resource-efficient, green, and competitive low-carbon economy; 3. to safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing; 4. to maximise the benefits of the Union's environment legislation by improving its implementation; 5. to increase knowledge about the environment and widen the evidence base for policy; 6. to secure investment for environment and climate policy and account for the environmental costs of any societal activities; 7. to better integrate environmental concerns into other policy areas and ensure coherence when creating new policy; 8. to make the Union's cities more sustainable; 9. to help the Union address international environmental and climate challenges more effectively[6].

Along with the EAP, the Strategy on the Sustainable Use of Natural Resources, proposed by the European Commission on December 2005, demonstrates the European Union's attempt to reduce the environmental impacts associated with resource use and to do so in a growing economy[7] . More recently, the Roadmap to a Resource Efficient Europe [8] outlines how we can transform Europe's economy into a sustainable one by 2050. It proposes ways to increase resource productivity and decouple economic growth from resource use and its environmental impact. It illustrates how policies interrelate and build on each other. Areas where policy action can make a real difference are a particular focus, and specific bottlenecks like inconsistencies

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[4] *Ibidem*
[5] European Commission, "Living well within the limits of our planet. The 7th EAP – The new general Union Environment Action Programme to 2020, *European Commission website – Environment*, accessed December 9, 2015, <http://ec.europa.eu/environment http://ec.europa.eu/environment/pubs/pdf/factsheets/7eap/en.pdf>
[6] *Ibidem*
[7] "Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions - Thematic Strategy on the sustainable use of natural resources", *Eur-Lex Access to European Law,* accessed December 9, 2015, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52005DC0670>
[8] "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Roadmap to a Resource Efficient Europe", *Eur-Lex Access to European Law,* accessed December 9, 2015, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52011DC0571>

in policy and market failures are tackled to ensure that policies are all going in the same direction. Cross-cutting themes such as addressing prices that do not reflect the real costs of resource use and the need for more long-term innovative thinking are also in the spotlight. Reducing energy consumption and eliminating energy wastage are among the main goals of the European Union. EU support for improving energy efficiency will prove decisive for competitiveness, security of supply and for meeting the commitments on climate change made under the Kyoto Protocol.

2.2 Sustainable use of Energy and Education

In order to achieve the aforementioned goal of protecting environment within the frame of a growing economy, we need to work to make public opinion, decision-makers and market operators fully aware of the EC priorities to promote sustainable development through a better and more effective management of natural resources. This action of environmental awareness raising includes the need for the modernisation of education (in general), or to be more specific, the refreshment of University Curricula, adult education programs and Vocational Educational Training attempting to fit them with the specific needs of the labour market and to create a new generation of teachers, scientists, engineers and green professionals with high environmental awareness. The sustainable use of natural resources is a matter of knowledge to be reached through a multidisciplinary approach and a kind of education which pay attention at the same time to a change in know-how and skills and to the needs of the labour market. Concerning energy issues, in particular, natural resources can be managed in a sustainable way only if people start becoming involved as early as possible. Since "environmental public awareness is shaped throughout the whole life of particular people living in a given local community, performing specific work and having definite personal characteristics which have a deciding effect on their sense of responsibility and ability to emotionally perceive the environment as having value in itself", then the knowledge "acquired during school education and then systematically improved in adulthood is an essential factor in heightening the environmental awareness of an individual and, at the same time, an indispensable condition for the development of a pro-ecological lifestyle"[9].

In order to succeed all the above, the trainers who will undertake the teaching of the Courses of Environmental Portfolio or topics of it, it is recommended by the consortium to be aware of the environmental awareness in the European Union as well as the European and National legislation on sustainable use of resources. Therefore, the first chapters of this manual are devoted to the aforementioned topics. The European and National legislation is considered essential for the trainer's background and he can decide the amount of information that he considers useful for his students.

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[9] "Planning and Management of Lakes and Reservoirs: An Integrated Approach to Eutrophication", *United Nations Environment Programme*, accessed December 9, 2015, <http://www.unep.or.jp/ietc/Publications/techpublications/TechPub-11/4-2.asp>

3 EUROPEAN AND NATIONAL LEGISLATION ON SUSTAINABLE USE OF RESOURCES

3.1 EUROPEAN UNION

One of the funding principles of the European Union is the protection of the environment. Based on Title XX of the Treaty on the Functioning of the European Union, EU environment law covers aspects as wide-ranging as waste management, air and water quality, greenhouse gases and toxic chemicals. Along with the European Union's establishment with the relevant Treaty in 1987, a whole chapter for the protection of the environment was introduced with its objectives and principles. During the same year, in a 1987 report of the United Nations sustainable development was defined as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs". Sustainable development is a key objective of the European Union. Since then, Europe has established series of laws regarding the environment. Most EU environmental rules set the minimum standards and then the Member States should decide how they will achieve those standards. In fact, the laws on the environment are inextricably linked to those for the internal market, which are very specific, so Member States can't go beyond a prescribed level of protection that EU environmental policies impose. Having a chronological overview in the history of the EU Treaties concerning the protection of the environment made so far, we would gather the main Treaties below:

•   Treaty establishing the European Coal and Steel Community (Signed: 18 April 1951; Entered into force: 23 July 1952; Expired: 23 July 2002). Purpose: to create interdependence in coal and steel so that one country could no longer mobilise its armed forces without others knowing. This eased distrust and tensions after WWII. The ECSC treaty expired in 2002.

•   Treaties of Rome: EEC and EURATOM treaties (Signed: 25 March 1957, Entered into force: 1 January 1958). Purpose: to set up the European Economic Community (EEC) and the European Atomic Energy Community (Euratom). Main changes: extension of European integration to include general economic cooperation.

•   Merger Treaty – Brussels Treaty (Signed: 8 April 1965; Entered into force: 1 July 1967). Purpose: to streamline the European institutions. Main changes: creation of a single Commission and a single Council to serve the then three European Communities (EEC, Euratom, ECSC). Repealed by the Treaty of Amsterdam.

• Single European Act (Signed: 17 February 1986 in Luxembourg, 28 February 1986 in The Hague; Entered into force: 1 July 1987). Purpose: to reform the institutions in preparation for Portugal and Spain's membership and speed up decision-making in preparation for the single market. Main changes: extension of qualified majority voting in the Council (making it harder for a single country to veto proposed legislation), creation of the cooperation and assent procedures, giving Parliament more influence.

• Treaty of European Union – Maastricht Treaty (Signed: 7 February 1992; Entered into force: 1 November 1993). Purpose: to prepare for European Monetary Union and introduce elements of a political union (citizenship, common foreign and internal affairs policy). Main changes: establishment of the European Union and introduction of the co-decision procedure, giving Parliament more say in decision-making. New forms of cooperation between EU governments – for example on defence and justice and home affairs.

• Treaty of Amsterdam (Signed: 2 October 1997; Entered into force: 1 May 1999). Purpose: To reform the EU institutions in preparation for the arrival of future member countries. Main changes: amendment, renumbering and consolidation of EU and EEC treaties. More transparent decision-making (increased use of the ordinary legislative procedure).

• Treaty of Nice (Signed: 26 February 2001; Entered into force: 1 February 2003). Purpose: to reform the institutions so that the EU could function efficiently after reaching 25 member countries. Main changes: methods for changing the composition of the Commission and redefining the voting system in the Council.

• Treaty of Lisbon (Signed: 13 December 2007; Entered into force: 1 December 2009). Purpose: to make the EU more democratic, more efficient and better able to address global problems, such as climate change, with one voice. Main changes: more power for the European Parliament, change of voting procedures in the Council, citizens' initiative, a permanent president of the European Council, a new High Representative for Foreign Affairs, a new EU diplomatic service. The Lisbon treaty clarifies which powers: belong to the EU; belong to EU member countries; are shared.

3.2 AUSTRIA

The preparation of the Austrian Resource Efficiency Action Plan (REAP) started in the second half of 2009 and was adopted by the government in early 2012. The development of the REAP was carried out by the Austrian National Strategy on Sustainable Development and mentioned in the coalition agreement of the Austrian Government. The Resource Efficiency Action Plan provides a framework and impetus for resource efficiency, outlining five core strategies:

• Raise awareness on resource efficiency;
• Increase resource efficiency in production and product design;

- Public procurement – the State as role model and driving force;
- Further develop secondary material and closed loop economy;
- Create and use synergies in cooperation of stakeholders.

REAP is accompanied by other strategies aimed at improving resource efficiency, e.g.:

- The Austrian Raw Materials Plan;
- The Austrian Strategy on Research, Technology and Innovation (FTI Strategie);
- The Austrian Energy Strategy;
- The Austrian Masterplan Green Jobs;
- The Masterplan Environmental Technologies (Masterplan Umwelttechnik);
- The National Action Plan for Sustainable Public Procurement;
- The upcoming Waste Prevention Programme 2011.

In 2010 a new Austrian Sustainable Development Strategy (SDS) was adopted, combining a regional and national strategy with a main focus on the promotion of sustainable consumption and production patterns. Other priorities addressed in the SDS include climate change mitigation, clean energy, sustainable traffic, conservation of natural resources, health, social integration and meeting global challenges[10].

3.3 FINLAND

Finnish law aims to protect the nature and in particular:

1)   to prevent environmental pollution and danger, to prevent and reduce emissions, and to remove the adverse effects of pollution and prevent environmental damage;

2) to secure a healthy, pleasant and ecologically diverse and sustainable environment, support sustainable development and combating climate change;

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[10] A working programme for the period 2011-2015 is under preparation. Relevant strategic objectives or targets set out in other documents include: Economical use of natural resources (2008 Austrian Programme on Technologies for Sustainable Development. Vienna; 2008 Act on Ecological Electricity); Minimal use of primary minerals (The Austrian Raw Materials Plan); Resource conservation and increasing efficiency of resource use (2006 Federal Waste Management Plan); Extension of life span of buildings and increase of recycling rate for construction and demolition waste (2006 Federal Waste Management Plan); Increase of total energy efficiency in industry (2007Austrian Climate Strategy); Increase of total energy efficiency in buildings (2007Austrian Climate Strategy); Push for low energy and passive house standards with new buildings (2007 Energy Efficiency Action Plan); 2% reduction of final energy consumption by 2010, and 16 % by 2016 (2007 Energy Efficiency Action Plan); Improvement of energy intensity by at least 5 % until 2010 and at least 20 % until 2020 (as compared to the average of 2001-2005) (2007 Energy Efficiency Action Plan); Thermal rehabilitation of all 1950-1980 buildings by 2020 (Energy Efficiency Action Plan); Introduction of more resource and energy efficient transport technologies (2002 SDS). The share of organic farmed areas on all agricultures used areas should have increased to 20 % by the year 2010 (Action Programme Ecological Agriculture 2008-2010).

3) promote the sustainable use of natural resources and reduce the amount and harmfulness of waste and prevent the harmful effects of waste;

4) to improve the assessment and consideration of the overall impact of polluting activities; mixed

5) to improve the opportunities for citizens to influence decision-making on the environment.

This law can be applied to industry and other activities which can be damaged environment and cause pollution. This law can be also applied to activities which remains waste and waste management.

3.4 GREECE

Agenda 21[11] is the main action plan under which Greece establishes its laws in terms of sustainable development:

- *Agriculture*. The Law 1337/83 and several other Presidential Decrees, address the need for the protection of the high productivity arable land and restrict its transfer to other uses (human settlements, transport infrastructure, industrial activity etc).
- *Atmosphere*. Under the main Law 1650/86 "For the protection of the Environment", legislation has been issued for the reduction of air pollution from vehicles, heating systems of buildings, industries and other polluting activities.
- *Biodiversity*. the Convention on Biological Diversity was signed in 1992 and ratified in 1994. The Convention on International Trade in Endangered Species of Wild Fauna and Flora was ratified in 1992. Greece is also involved in implementation European Union (EU) Directives related to biodiversity (92/43/EC).
- *Desertification and drought*. The General Secretariat of Forests and Natural Environment is in charge of desertification issues. The following legislation is related to desertification and drought: The Protection of Forests Law (998/79); Grazing Lands Law (1734/87); and Organization of Agricultural Research Law (1845/89). Major groups (NGOs, women groups, and youth organizations) are ad hoc participants at all planning levels
- *Energy* issues are regulated by the Law for the Promotion of Renewable Energy Sources (2244/94), partially amended by Law 2773/99 and related Ministerial Decisions 8295/95, 8907/96,2230/99 and 12160/99 concerning "Regulation of issues connected with the production of electrical power from renewable sources of energy and conventional fuel and other

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[11] Agenda 21, established at the 1992 United Nations Conference on Environment and Development, or "Earth Summit", in Rio de Janeiro, Brazil, is the blueprint for sustainability in the 21st century. Agenda 21 is a commitment to sustainable development, which was agreed by many of the world's governments. Nations that have pledged to take part in Agenda 21 are monitored by the International Commission on Sustainable Development, and are encouraged to promote Agenda 21 at the local and regional levels within their own countries. Agenda 21 addresses the development of societies and economies by focusing on the conservation and preservation of our environments and natural resources

provisions". Law 2234/94 promotes operational industry projects, where energy efficiency is included in the target investments. According to Law 1512/85, which provides incentives for energy conservation, Greek legislation is currently being harmonized with the European Directive SAVE (93/76/EC) for the stabilization of carbon dioxide (CO2) emissions and energy efficiency of buildings. Law 2773/99 (Official gazette of Greek Republic A 286/22.12.99) "Liberalization of the Electricity Market-Regulation of energy Policy issues and other provisions", along the lines of the Directive 96/92/EC. Act No 2364/95 for the import, transport and distribution of Natural Gas in Greece. Energy related aspects of Atmosphere are regulated by other operational programs, ministerial decisions, ministerial cabinet actions etc.

- *Freshwater*. Law 1739/87 establishes the institutional framework for the management of water resources. Several resolutions have been enacted to supplement this law, in accordance with European Union (EU) directives.

- *Land management*. The new Law for "Spatial planning and sustainable development" was approved in 1999. The "General Spatial Plan" of national importance, which was approved by the Greek Parliament in the year 2000, set specific goals, concerning conflicting issues in land use management. Through these goals are aimed at the sustainable use of land, and the minimization of the negative environmental impacts. Such conflicts refer mainly to the urbanization trends of the coastal zones, which are the focus of several productive activities and residential areas for second homes as well.

- *Mountains*. Law 1892/90, which was amended by Law 2234/94, aims to encourage the economy and development of mountain areas. The law covers and supports the productive process.

- *Oceans and coastal areas*. Legislation includes: Law 1739/87 for Water Resources Management (art. 12); Law 2203/94 (A/58) for the "Ratification of the Besel Convention for the control of transboundary transport of hazardous waste" and Law 420/1970 for Fishing.

- *Waste management and hazardous materials*. For what concern the management of toxic chemicals, several directives (67/548 and 92/32, 93/67, 88/379, 76/769, 87/18 and 88/320. Concerning solid waste and sanitation, legislation has been issued aimed at reducing air pollution from waste incineration plants. Threshold values have been established for heavy metals in sewage sludge used in agriculture. Programmes are being introduced for the reduction of weight and volume of packaging material. In accordance with EU Directive 91/156, the establishment of an integrated network of waste disposal is being planned. Activities have been initiated to promote waste prevention and recycling. Recycling programs are being implemented for paper, glass, and aluminium. Awareness campaigns are being conducted. Concerning hazardous waste, the Joint Ministerial Resolution 72751/3054/85 on toxic and dangerous waste, issued in compliance with European Union (EU) Directive 78/319, provides measures for the prevention of such waste, and its recycling and reuse. EU legislation has been adopted concerning the supervision and monitoring of transboundary movement of hazardous waste. Further directives on hazardous waste are being incorporated into National legislation.

3.5 ITALY

Most of Italian environmental legislation – which is almost totally derived from the EU law - is contained in the Environmental Code, approved by Legislative Decree No. 152 of 3 April 2006 and recently subjected to a number of amendments, in particular concerning the extraction of fossil fuels and waste provision services. The main purpose of the Environmental Code is to raise citizens' standards of living through the protection and improvement of environmental conditions and the careful and rational use of natural resources. The Environmental Code consists of six parts, each of one sets out rules that refer to: Environmental Impact Assessments (EIAs); Integrated Pollution Prevention Control (IPPC) regime; Soil and water protection; Air pollution and the reduction of emissions; Waste management and remediation of contaminated sites; Claims for environmental damage.

The Environmental Code is based on the concept of "sustainable development" - i. e. balancing the needs of the current generation and the quality of life and needs of future generations - and promotes the prevention of environmental damage at source. The Environmental Code is also based on the "polluter pays" principle under EU law. The Italian environmental law affirms that legislation should only provide for the minimum controls necessary to ensure protection of the environment and that more restrictive provisions are prohibited if they are arbitrary or unjustifiably increase bureaucracy. As a general rule, the legislation is aimed to ensure freedom of access to environmental information and participation in environmental proceedings.

Other significant legislation includes: the promotion of the use of energy from renewable sources (Legislative Decree No. 28 of 3 March 2011, implementing Directive 2009/28/EC on the promotion of the use of energy from renewable sources); Waste electrical and electronic equipment (Legislative Decree No. 151 of 25 July 2005, implementing Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment); Public access to environmental information (Legislative Decree No. 34 of 19 August 2005, implementing Directive 2003/4/EC on public access to environmental information); Ship-source pollution (Legislative Decree No. 202 of 6 November 2007, implementing Directive 2005/35/EC ship-source pollution and on the introduction of penalties for infringements); Criminal offences relating to the environment (Legislative Decree No. 231 of 8 June 2001, as recently amended by Legislative Decree No. 121 of 7 July 2011, which provides for monetary sanctions for legal entities in cases of criminal offences concerning the environment, where these offences are committed for the legal entity's interest or benefit by any person who represents or administers the legal entity, or is subject to the legal entity's direction or control); Protection of wild fauna and the regulation of hunting (Law No. 157 of 11 February 1992, as amended); Asbestos and health and safety at work. The main bodies responsible for developing environmental policy and legislation are the regions, but they must exercise their powers in compliance with national legislation such as the Ministry of Environment, the Ministry of Cultural Goods, the Ministry of Public Health and the Ministry of Economic Development together with a steering committee State / regions (Conferenza Unificata Stato-Regioni), which has the power to rule on specific matters as provided by national legislation.

Concerning the Environmental Education is noteworthy that during the 90s the Ministry of the Environment and Education together fielded a number of initiatives specifically dedicated to the issue, but have not been followed-up in subsequent decades. More recently, in 2009, the two ministries have delivered a common document containing Guidelines for Environmental Education but its impact on the Italian school system have not been evaluated jet. Something similar could be said about university research on environmental issues, which counts a number of groups spread around the national territory but is lacking coordination and common programming at the national level.

3.6 MALTA

The first major piece of environmental legislation in Maltese history took the form of the Environment Protection Act. Prior to this, Maltese environmental law was very sporadic and limited. The purpose of the Environment Protection Act was to bind the government of Malta with efforts to promote, protect, safeguard and disseminate knowledge about the environment and its conservation. The Environmental Protection Act (EPA) was later established as Malta's pinnacle law on the protection of the environment. Subsequently, during the period post EU membership, Maltese Environmental law has changed to a more substantially comprehensive and more sophisticated network of primary and subsidiary legislation.

Over 2010 and 2011, the Environment & Development Planning Act (EDPA) was brought into force. The EDPA mashes the EPA and the old Development and Planning Act into one new law in an attempt to reconcile the occasional tension between "development planning" and "environmental protection. The EDPA now serves as the skeleton that holds together the network of subsidiary legislation that makes up the body of Maltese environmental law. This body of law has been promulgated through a vast number of legal notices over a span of around ten years and with regard to very specific subjects, such as waste, noise, pollution and ambient. The National Environment Policy published in 2012 emphasizes the need to use land more efficiently. Yet Malta's biodiversity continues to be threatened through land development, invasive species, overexploitation of species and climate change. The policy outlines measures aimed to halt the loss of biodiversity by 2020. These include the compiling of a dedicated National Biodiversity Strategy and Action Plan, the creation of additional marine protected areas and strengthening the management of existing protected areas.

With regards to sustainable use of resources, Malta faces particular challenges defined by the island's geography, such as scarce water resources where the supply of water is heavily dependent (60%) on reverse osmosis plants. However, the national Water Catchment Management Plan includes increased efforts towards collecting more water. Malta's current energy supply depends strongly on imported oil, while the contribution of renewable energy sources continues to be marginal. Efforts in solar-power projects, an electrical interconnection line with Sicily and a planned gas-fired power station may ease this dependence in the future.

Both independently and as an EU member, Malta is active in global environmental-protection efforts, but is not a key player.

4 THE ENVIRONMENTAL PORTFOLIO: LEARNING SUSTAINABILITY

4.1 THE ENVIRONMENTAL PORTFOLIO: AN OVERVIEW

What is about. The Environmental Portfolio is a joint set of four courses developed through a transfer of know-how and good practices between selected partners from Northern and Southern Europe, but also Baltic and Mediterranean Countries. The Environmental Portfolio promotes a smart specialization for a new generation of green teachers, green scientists and green engineers who could significantly contribute to the sustainable development of various types of organizations, including schools. In the context of higher education modernization agenda connected to SMEs and organizations, the Environmental Portfolio means to bring out the gaps in the contemporary University curricula in terms of the knowledge and skills that are fostered through them, while on the other hand highlights the importance for the inclusion of Environmental issues, across the different disciplines. The innovative character of the Environmental Portfolio is given by the fact that it enhances environmental awareness and sustainable energy consumption focusing on: 1) Interdisciplinary approach; 2) Incorporation of aspects related to the labour market; 3) Active citizenship and participation.

Target. The Environmental Portfolio addresses students from different degree courses, school teachers and educators working in local institutions and can be held in different locations: universities, schools and museums to meet the general public. In particular, it addresses Master's student in Science and/or Engineering with a strong environmental portfolio in their bachelor. This kind of smart specialisation advancing the synergy between universities, SMEs, and enterprises (including schools) aims at the development of a human capital which will serve to the achievement of the regional development priorities like environmental management in terms of modernisation and innovations at a local level with respect to six criteria of sustainability, creation of local capabilities, integrated solutions, private funding leverage, and contribution to development goals. On the other hand, the Environmental Portfolio addresses educators (early childhood teachers, primary school teachers, secondary school teachers and/or Master's students in Education Science).

Learning techniques. The Environmental Portfolio is a blended course which rely on different kind of teaching and learning methods, formal or informal, depending on the topics. Teacher/lecturer/tutor will assume different roles in the same activity: expert, because he studied a problem before; stimulator, capable of bringing out different points of view; researcher, able to systematize and produce analysis documenting the processes of learning and teaching. Learning techniques and activities will include:

• Case study analysis: problem-based learning activity focused on dealing with real problems and critically evaluating the consequences of different solutions.

• Role playing / Small Group Discussions: Learners discover learning points themselves by assuming roles other than his/her real ones or is thrust into settings that are different from the current one (, psychodramas, socio-dramas, group role play, practice in handing social interactions).

• (Virtual) Classroom Training / Lectures: learners acquire skills and knowledge through guidance from an instructor in a formal group setting (face to face lectures, seminars, conferences, workshops, lectures, demonstrations, Internet based classes, video and audio conferences, webinars, webcasts).

• Experiential Learning: Individual or group participates in structured debriefing sessions to reflect on the experiences encountered and draws conclusions.

• Projects and Writing Tasks: Learners reflect on their understanding of concepts, information, ideas and allow them to work individually or in small groups with the content (Reports, PowerPoints, articles, postings, larger writing projects).

• Self-Study: learners acquire skills and knowledge through self-learning, guided by structured materials ranging from print to electronic systems (directive instruction, computer based modules, web-based virtual labs, CD-ROM/DVD learning modules, web explorations).

4.2 COURSE 1 – PARTICIPATORY METHODS IN SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

There has been a growing interest in the use of participatory approaches as well as interdisciplinary approaches across natural and social sciences in sustainable management of natural resource. Action research activities are widely seen as a pool of concepts and practices that enable citizens to enhance their knowledge for sustainable development. Course 1 suggests to use, as teaching material, case studies on problematic situations of interest in environmental education and sustainable development in which participatory approaches have been successful or have encountered obstacles of different nature such as authorities or communities. The methods of the social sciences and qualitative research are discussed starting from a critical analysis of these cases studies. Aim of the course is to develop transversal competencies in science, in economic and social sciences for an education that involves people as citizens. Learners learn to recognize the complexity of many phenomena with a critical integrating knowledge coming from different disciplines. The assessment is formative, trying to develop, in itinere, the ability to analyze and document the phenomena of environmental interest. By the end of this course learners will be able to identify, analyze, compare and debate different kinds of qualitative research strategies and participatory methods, from action-research to case

study analysis, from community learning to team and collaborative activities. They will be also able to connect participatory methods with the sustainable management of natural resources, to apply them to real-life cases and use participatory methods as learning tools.

4.2.1 Course I – The structure

COURSE I	CONTENT
Module 1	Topic 1: Action research, reflexivity and participatory methods Topic 2: Case study analysis
Module 2	Topic 3: Transversal competencies in environmental education Topic 4: Complexity of biodiversity and impacts on local communities
Module 3	Topic 5: Core ideas and crosscutting concepts in science education Topic 6: Complex system
Case study	Topic 7: Recycling and sustainable management of natural resources

4.2.2 Module 1 – Task descriptions

Face-to-face Lecture: Short introduction to basic principles and different kinds of participatory methods. Learners will be familiarized with reflective practice in education and encouraged to think about the very learning process, on the pre-existing beliefs put in place in learning and how to blur the separation between theory and practice in the education context. After a short introduction to action research and to the specific learning/research process related to this methodological approach, learners will have the opportunity to discuss other kinds of participatory methods, such as community learning, team and collaborative activities or other specific methodologies. In comparing different kinds of participatory methods and different practices, they will be able to compare tools and discuss their capacity of enabling people to take action for solving their own problems or communicating that to decision-makers, local communities or public opinion.

Face-to-face lecture: Introduction of case study analysis, a multidimensional and holistic approach to a subject which could include events, periods, projects, policies, institutions or complex systems in order to address a specific case which represent a sample of a theoretical object. Analyzing some practical cases, stimulates learners to investigate phenomena or class of phenomena within a real-life context and encourages them to consider alternative but realistic solutions to solve a specific problem. Different steps of the case study analysis will be illustrated: description of background and context; selection of relevant facts and issues; focus on key problems; evaluation of impacts on people and environment; identification of decision makers and strategies implemented; uncovering of possible alternative solutions (and eventually why they were rejected); selection of the best and most effective solution and discussion with supporting evidence. A particular stress will be put on the multiple sources of evidence used in a case

study (mix of quantitative and qualitative evidence), on advantages and challenges of using case studies, how case study can be used as a learning tool for it allow students to take part directly in discussion of real case studies and to learn (somehow unconsciously) through a co-operative, role-playing similar process.

Laboratory 1: The laboratory will be focused on the case study "Cooling off a Warming Planet: Analyzing the Trade-off s in Policies for Climate Change"; learners will analyse it following the teaching methodology of role playing.

Laboratory 2: Case study writing.

Assignments:

- **Homework**: Environmental-related questions will be submitted to learners to find practical application of theories already debated. Learners will select specific participatory methods to solve a particular environmental case, explain their choice and discuss with other learners and with the teacher.

- **Laboratory 1**: Learners' task will be to collectively contribute to the development of the policy statement; each member of a group will represent one of four different characters designed to embody real facts, points of view, and concerns regarding how to address the economic, environmental, social, and political consequences of climate change legislation.

- **Laboratory 2**: Learners will be asked to write a case study from well-known episodes or policies related to environmental issues. Each group will provide texts, evidence and other materials in order to build a learning tool, suitable for environmental education to submit to an imaginary class of students.

4.2.3   Module 2 – Task descriptions
Face to face Lecture: Introduction to the holistic approaches to sustainability based on the recognition of four axes of intervention: environmental, economic, social and cultural and explanation of the connections between natural sciences and social science in the research fields related to the sustainable development. Learners will be familiarized with the idea that dealing with global challenges means integrate the concerns of the economy, the environment, the society and the cultural heritage. An effective sustainable development, that means at least to limit damages caused by the growth, should always start from the simple assumption that society is integrated systems. An integrated understanding of the multiple social, cultural and economic factors related to environmental issues should go with a detailed focus on the role that, in every specific location, those factors have in preventing or promoting social changes aimed at providing healthier and fulfilling lifestyles.

Laboratory 1: Discussion and debate: sustainable policies vs green washing.

Laboratory 2: Evaluating environmental impact and rethinking biodiversity.

Assignments:

- **Homework:** Internet-based researches aimed at identifying environmental intervention in different locations and areas.

- **Laboratory 1:** Participants will be asked to discern, among the identified environmental interventions, the real sustainability-oriented interventions from the "green-washing" ones, discussing their opinions with other learners and teachers, by stressing the different factors (social, economic, cultural) of the environmental problem in each case.

- **Laboratory 2**: After the projection of documentaries or short films, learners will be asked to analyses the impact of the environment crises on local communities or rather (traditional or innovative) examples of positive integration of society and environment according to the visual material submitted. Then they will elaborate an idea of biodiversity involving not only science knowledge but also economy and social science findings in this field.

4.2.4 Module 3 – Task descriptions

Face to face Lecture: Introduction to disciplinary core ideas and revisiting them in the light of crosscutting concepts. Core ideas from different disciplines are introduced making reference to their relevance in environment related issues. Examples of core ideas can be those of matter, force, energy or entropy in physics, atom, molecule, bond or reaction in chemistry, cell, structure, function or ecosystem in biology. On the one hand, these core ideas can be deepened by discussing analogies and differences in their meaning in different disciplines; on the other hand, they can be revised and brought to a more general and holistic level by reinterpreting and mixing them in the light of crosscutting concepts such as system, interaction, transformation, conservation, irreversibility.

Laboratory: Reflexivity and environmental education: discussing the relevance of disciplinary core ideas in facing environmental issues with reference to learners' knowledge, experiences and cultural background.

Face to face Lecture: In order to revisit the previous contents in the light of the complex systems approach, the complex systems approach will be presented making reference to its meaning and value for the analysis of environmental issues. Attention will be focused on the description of a complex system as made of small interacting parts that can give rise to emerging collective behaviours, which are non-deterministic, predictable only on a statistical basis and which are determining the ways in which the complex system interact with the whole environment around it.

Face to face Lecture: to connect the use of the complex system approach in natural sciences with its use in economic and social sciences and develop a brand-new approach to environmental issues, the idea of complex system will be discussed in relation with its application to economic and social sciences. The complex systems approach will then be revised in the light of the possibility of using it as a general, transdisciplinary approach to the study of environmental issues which can lead the students to develop a deep awareness of the huge complexity of these issues and link the knowledge they are developing to skills that make them able to make decisions that are informed and responsible from a socio-economical point of view. Attention will be also paid to discuss with students their general idea of what science is and is meant for, trying to go in the direction of including in the scientific perspective the expectations and needs that come from all of us as human being who want to preserve the environment in which they live.

Assignment:

- **Laboratory 1**: Learners will be invited to discuss the relevance of disciplinary core ideas in facing environmental issues with reference to their knowledge, experiences and cultural background. Then, students are invited to construct themselves argumentations about the relevance of core ideas in discussing ways to exploit, manage and preserve the environment.

4.2.5 Module 4 – Task descriptions

Face to face lecture: Introduction of the basic concepts of modern Waste Management policies. Brief description of the "Campania's Waste Emergency" case study. Analysis of evidences on the effects of the accumulation of waste in terms of contamination of soil, water and air. Background analysis and guidelines to approach the case study (what does it mean to adopt the point of view of a particular decision maker) and clarify the steps students should take in analyzing the case (e.g.: identify constraints and opportunities each character was operating under; then, evaluate the decisions each character made and their implications; finally, explain what you would have done differently and why).

Laboratory 1 - Role play

Laboratory 2 – Figuring out alternative solutions

Laboratory 3 – Fieldwork: good practices in recycling and sustainable management of natural resources in Campania

Assignment:

- **Homework:** Individually, students will have the time to read and think about the case study trying to answer some basic questions proposed by the teachers in his/her introduction to the case (central problem(s); possible course(s) of action, potential obstacle(s)?)

- **Laboratory 1 – Role play**: The class will be divided into groups each of one will be assigned a specific roles or position: the aim of the laboratorial activity is to break up the case in many parts, stressing the different points of view of actors involved in the case or the multilevel impact (economic, social, cultural) of the considered problematic.

- **Laboratory 2 – Looking for alternative solutions**: One half of the class will be provided with a few mini-case studies focused on a sustainable project of waste management really implemented in Campania region after the waste emergency; the other half will try to elaborate innovative environmental-sensitive solutions and to identify the consequences of its application to the case study context. The students will present to the class their cases or their solutions and finally discuss them.

- **Laboratory 3 – Fieldwork**: students will have the chance to experience good practices in recycling and sustainable management of natural resources in the students' home regions. They will visit a number of organizations and associations both aimed at local sustainability awareness campaign and at alternative or experimental management and recycling of solid urban waste.

- **Homework:** Students will be invited to synthesize the case study, core problematic, solutions implemented and limits and to write their conclusion or to figure out other possible courses of action.

4.2.6   Didactical Techniques and Methods – Applied Examples

The workshop during the project's Intensive Study Programme was conducted by three researchers of UNINA (Emilio Balzano, Caterina Miele e Marco Serpico) with the aim to actively engage students on the basis of their sensitivity, professional knowledge and experience in order to contribute to the sharing of strategies aimed at involving citizens in solving problems that concern the environment. In line with the approach and the setting of the O2 COURSE, the day before it was sent by email to all participants, a link to a web site with a case study on the emergence of waste in Campania with a request to read some of the documents in the web site in order to get a personal impression about the causes of the phenomenon also through different solutions adopted in their own country. The effect was very positive because at dinner, informally, many discussions have taken place and this has convinced the organizers of the usefulness of promoting moments of confrontation in informal settings in order to bring out authentic perspectives on issues that require to feel responsible citizens talking au pairs and not just experts who seek to defend viewpoints of their community.

The teaching session was organized helping students gain critical thinking skills, and building an understanding of environmental decision-making processes. To keep the attention of the participants bringing out their contributions and at the same time to focus on the most important issues reported by the environmental research, conductor used a presentation that:
- focused the complexity of environmental phenomena suggesting to integrate their skills with cross-disciplinary perspectives that take into account the different skills required to solve problems; - placed three sets of questions for small group discussions ; - proposed three questions to guide the work of the afternoon of the same day with a request to discuss in five different groups about the Case Study trying to bring their knowledge and perspective (as students, as citizens, as future professionals or researchers) into the debate. The conductors have played the role of facilitator in the small group discussions and in general discussions with the entire audience, used engaging activities, such as "game-storming" techniques to motivate participants and encouraging creative thought also exploring problems in new, sometimes unorthodox, ways. At the they have been able to share the effectiveness of the proposed workshop model.

 The questions that guided the afternoon's work were: In order to have a basis on which we can compare the discussions in different groups we ask you to focus on these three issues.

What do you feel are the causes of the crisis and what do you feel different actors could have done in order to avoid it? What is your point of view, as an 'expert', about ways to manage the future of the contaminated area? Referring to your experience how would you describe the pros and cons of a good waste management cycle? What are the constraints and limits of your 'ideal' cycle?

In the afternoon, the work has involved the participants in the discussions and in the preparation of the presentations.

In the end, the presentations, some of them very creative for the forms of communication, were discussed in the auditorium with the whole group class and researchers of the different project partners.

4.3 Course 2 – Current State and Future of the Baltic and Mediterranean Area in an Interdisciplinary Perspective

Course 2 explores the present and future state of the Baltic and the Mediterranean area through interdisciplinary approaches. Specifically, concerning The Baltic Sea Region, it should be mentioned that it occupies several countries and all of them forms a Council of the Baltic Sea Nations. On the other hand, the Mediterranean Sea covers portions of three continents: Africa, Asia and Europe. Furthermore, this area includes the Mediterranean climate, which is responsible for its rich flora in the entire region. Finally, both of these areas face a number of environmentally related problems, so on the occasion of this course, we will try to name these problems, study them and of course to give some solutions. Course 2 focuses on the following topics: the issue of harmful and toxic substances from the factory and agricultural activities, maritime transport, etc. which reach the Baltic Sea and of illegal marine and airplanes fuel deposits; the problem of eutrophication and the extinction of marine species and water quality in the Baltic and the Mediterranean Sea; the Baltic and Mediterranean history, geology, climate and biodiversity; study of economic, political, social and cultural status of the two regions in a comparative perspective; regional efforts to find solutions for collective addressing environmental problems in the countries directly affected; ecological risk assessment of agrochemicals in European estuaries; the controversial role of the European Union on cooperation between the two regions. By the end of this course learners will become aware of the environmental situation of the Baltic and Mediterranean Regions, understanding many various significances of Baltic and Mediterranean Sea areas to humans and environment; develop attitudes and skills for applying the knowledge acquired in the teaching practice through collaborative learning, assignments and interdisciplinary approaches; be able to discuss and propose solutions for preserving and contribute to the further development of the two regions.

4.3.1 Course II – The structure

COURSE II	CONTENT
Module 1	Topic 1: Significance and Biodiversity
Module 2	Topic 2: Problems and toxics

Module 3	Topic 3: Managing problems and Avoid climate change
Case study	Topic 4: Toxics and human wastes of the ships

4.3.2 Module 1 – Task descriptions

Main themes in this module are significance and biodiversity of Mediterranean and Baltic Sea areas. After the module 1 student understands many various significances of the sea area to humans and environment. The module provides advice information about different biodiversities and differences between them. Also, the various ways to project them will be introduced.

Intended purposes of the Module:

- Understanding many various significances of Baltic Sea areas to humans and environment.
- Special features of Baltic Sea areas.
- Understanding many various significances of Mediterranean Sea areas to humans and environment.
- Special features of Mediterranean Sea areas.

In this module, the teaching consists of 12*90min lectures, where 2 last lectures include the presentations of students.
Grading will be on a scale from 1 to 5 where 5 is the best grade. Evaluation of the course consists of essay, presentation and lecture presence, each on contributing one third of the grade.

Lecture presence of 80% is demanded.

Homework 1: Essay about the significance of Mediterranean/Baltic Sea area. The essay should examine the significance of sea area from different perspectives.

Instructions for essay: 2000 words, spacing 1.5, front Times New Roman.

Useful questions:

1) What are the main special natural characteristics in the Baltic Sea which make it problematic and sensitive sea area?
      -Handle geography, history, natural water quality ect.

2) What means eutrophication in the Baltic Sea area?
      -Think about main sources and reasons, possible solutions and policy

3) What are the biggest problems in the Baltic Sea?

Don't forget to Justify your thoughts. There is no one right answer!

Homework 2: Presentation (a'15min) about biodiversity of sea area. After presentation discussion is led by students. Could be done also in groups. Subjects of presentations will be decided based on individual interest during the course.

Homework 3: Get familiar with the Mediterranean region by reading the above resources as examples and make short, clear answers to the next questions:

1) What are the main special natural characteristics in the Mediterranean Sea which make it problematic and sensitive sea area?
   -Handle geography, history, natural water quality ect.

2) What does eutrophication mean in the Mediterranean Sea area?
   -Think about main sources and reasons, possible solutions and policy

3) What are the biggest problems in the Mediterranean Sea?
Don't forget to justify your thoughts. There is no right answer!

4.3.3   Module 2 – Task descriptions

Main themes in this module are problems and toxics in Mediterranean and Baltic Sea areas. Module handles sources of toxics and how they affect to environment and nature. Also, toxics concentration and accumulation in food chain will be introduced. After module 2 students will be able to collect samples and make research about them. Phases of research will be familiar. Student will be able to do research, analyze the results and examine results critically.

Intended purposes of the Module:

- Understanding of toxics main sources
- Knowledge of the various problems
- Propose solutions on the problems

In this module, the teaching consists of 12*90min lectures and 12*2h labs and field work.

Lecture presence of 80% is demanded.

Grading will be on a scale from 1 to 5 where 5 is the best grade. Evaluation of the course consists of study diary and lecture/lab presence, where diary contributes two third of the grade and presence one third.

Homework 1: Study diary about doing research. The diary should include: note after every lecture, lab and field work, reviewing personal learning, thoughts about learning process, doing research step by step, lab work diary and critical arguments about own research.

Homework 2: Read the publications below:
" The status of pesticide pollution in surface waters rivers and lakes of Greece. Part I. Review on occurrence and levels."http://www.sciencedirect.com/science/article/pii/S0269749105004598 and "Some Chemical Contaminant of Surface Sediments at the Baltic Sea Coastal Region with Special Emphasis on   Androgenic   and   Anti-Androgenic   Compounds" http://www.tandfonline.com/doi/full/10.1080/10934520600872433.

Based on the articles above and after a quick desk research, write an essay about:

"Pollution in surface waters, the role of pesticides and solutions. Comparative analysis between the Baltic and Mediterranean Coastal Regions"

4.3.4 Module 3 – Task descriptions

Main themes in this module are managing problems and avoiding climate change. Students will become aware of the situation of Mediterranean and Baltic Sea areas. They familiarize different components which causes various statuses. Students will be introduced to different solutions and why is important to know cultural and environmental components in study area. Students will know how to present and argue their opinions.

In this module, the teaching consists of 12*90min lectures and 6*90min discussion sessions.

Lecture presence of 80% is demanded.

Grading will be on a scale from 1 to 5 where 5 is the best grade. Evaluation of the course consists of panel discussion, article and lecture presence, each on contributing one third of the grade.

Homework 1: Panel discussion is discussion between two different perspectives. Participants prepare their arguments and counter arguments. They also make literature review to support their arguments.

Homework 2: Critical article 2000 words, spacing 1.5, font Times New Roman. Article will be based on researches which's arguments should be handle critically.

Further directions:

Get familiar with arguments, justifying opinions and critical articles.

In this module managing problems is handled. Select topic and write critical article about selected topic.

Let your friend read it through e-platform.

You can have tips how to write from here:

https://www.tacoma.uw.edu/sites/default/files/global/documents/library/howtowriteacriticalanalysis.pdf

4.3.5 Module 4 – Task descriptions

Main themes in this module are toxics and human wastes of the ships, which are examined in case study groups. Case study research is done on Mediterranean and Baltic Sea regions. Both regions face several environmental problems. In this module, these problems will be named, studied and solutions will be proposed.

In this module teaching consists of 12*90min lectures where theoretical basis will be introduced and 6*90min meeting where results will be presented

Lecture presence of 80% is demanded.

Grading will be on a scale from 1 to 5 where 5 is the best grade. Evaluation of the course is based in case study research. Case study work is based to Baltic Sea action plan (BCAP).

Homework: Directions:

In the sea regions, many case study researchers have been made during past years. For better understanding make review of case study researches. Use matrix/table to compare different aspects and topics.

Example:

Name	Publication year	Region	Author	Ascpect & Topic	Resource
VECTORS	2015	Baltic Sea	Mel Austen, Coordinated by Plymouth Marine Laboratory	Marine environment, the mechanisms for them and the ecological impacts expected from them	http://www.marine-vectors.eu/factsheets/FS-15_baltic_overview.pdf

4.3.6   Didactical Techniques and Methods – Applied Examples

The teaching session during the project's Intensive Study Programme was organized in workshop style. First Dr. Jarkko Lampiselkä from the University of Helsinki introduced selected issues about the environmental education to the students. Next research scientist Noora Kivikko continued the session in group work style. Lecturing is considered as one of the main and traditional teaching methods in universities all around the world. There has been a critique against the lecturing, it has been regarded as out dated and a dull teaching method that is too teacher centered. However, it is important to distinguish two concepts, the teacher centered and the teacher directed lecturing. Teacher centered lecturing does not take into account the audience, but that is totally different if compared with the teacher directed lecturing. The teacher directed lecturing can and should be a student centered teaching method by the same token. Lampiselkä applied this teacher directed – student centered teaching method successfully. It comprised short introductions to the topic, eliciting photographs that dealt the topic, short group discussions, and whole class discussions. First the lecturer demonstrated his own construction, his own thoughts and views of the phenomenon to be learned, and then initiated the small group discussions and the whole class discussions. This method applied all the time when moved from one topic to next one. After the introductive lecture, Noora Kivikko started the group work.

The group working included several different components. The aim of workshop was to introduce how mobile devices can be used and what benefits it serves out. Also, different ways to create groups were presented. In workshop, we had 5 groups and 5 themes. First the whole audience used interactive electrical white board. New ideas and comments were easily added to the white board which was projected to auditorium wall. The board was also seen via their own devices. Anonymous comments were added to the white board. Audience saw others

comments and could response to others ideas and thoughts. After public white board, interactive discussion groups started to work together as a group. They focused to given theme. Aim was to find researches and information about their own themes. They used white boards as a group and all groups had their own private board. All the ideas and thoughts were added to the private board by using their electrical equipment.

After first step of group working all the groups were divided again. In the new groups was one member from the old groups. So, in the second step of group work one member had been part of the old theme. This original group member introduced the new group about their new theme. All the introduction was given via white board. This allowed creative ways to use different working spaces. Some of the groups worked outside the building and other auditoriums. The aim was to encourage and guide to communicate and focus on the essentials. What is the most important on this theme and how I communicate that all the new group members will understand the main ideas that the old group had? What I need to know that I will understand what the old group had done before the groups were new organized? These questions were presented to the new groups via the white board.

In this second part of group working the groups was instructed to present their theme the way the new group will. Groups had time to practice their presentations. In the end of this work shop the audience saw innovative and creative presentations, like plays. All original 5 themes were presented to the audience in the auditorium.

4.4 COURSE 3 - ENTREPRENEURSHIP-INTELLIGENT ENERGY

As energy sector is changing and focusing more on renewable energy sources, while increasingly integrating digital technologies throughout all stages of the energy value chain, a new branch of entrepreneurship has emerged that is called green entrepreneurship. Green businesses are businesses that are committed to reduce their impact on the environment or, on a larger scale focus on sustainability. Towards this direction, during the last decade, the concepts of "Intelligent Energy" and "Smart Grid" are widely implemented, in order to provide an advanced infrastructure that will facilitate a more sustainable and effective use of energy, the active consumer participation and an increased integration of renewable energy sources. Green entrepreneurship has already found its pace and currently expands in various application domains, such as smart cities and transport. Motivation, scope and impact of green approaches vary along these domains, where several ICTs are combined to achieve efficient and sustainable use of energy. Course 3 introduces to the current global energy status and to green entrepreneurship and presents a relative business plan to provide learners with a case study of how green entrepreneurship is actually realized. By the end of this course learners will be able to identify the concept and basic principles of Intelligent Energy; to design a smart grid architecture distinguishing its major functional components; to draft a marketing plan for the Green Business Idea and understand the rules and regulation of Starting Your Green Business; to understand the real world applications of green entrepreneurship, the importance of

costumers and the addressing of their needs; to comprehend advantages/disadvantages of implementing sustainable measures in business.

4.4.1 Course III – The structure

COURSE III	CONTENT
Module 1	Topic 1: Introduction to intelligent energy Topic 2: The smart grid concept Topic 3: Smart Grid Components and Technologies
Module 2	Topic 4: What is entrepreneurship: an introduction Topic 5: CSR principles, environmental pillar and what is a green business? Topic 6: Generate and analyse your green business idea Topic 7: Green marketing plan Topic 8: Complying with the rules and regulations to start your green business Topic 9: Starting the green business – business plan following PDCA
Module 3	Topic 10: Smart Energy Cities Topic 11: Smart Energy in Buildings Topic 12: Smart Energy in Transport
Module 4	CASE STUDIES ON GREEN ENTREPRENEURSHIP: Topic 13: Philips Lighting Topic 14: Yalumba Wine Topic 15: Elvis & Kresse Topic 16: Royal mosa Topic 17: Eastex Material Topic 18: Siemens Building Technologies

4.4.2 Module 1 – Task descriptions

The energy sector is changing and focuses on renewable energy sources, while increasingly integrating digital technologies throughout all stages of the energy value chain. Towards this direction, during the last decade, the concepts of "Intelligent Energy" and "Smart Grid" are widely implemented, in order to provide an advanced power infrastructure that will facilitate a more sustainable and effective use of energy, the active consumer participation and an increased integration of renewable energy sources.

Contextualized in the above framework, this module aims at familiarizing learners with the current energy status and introduces the fundamentals of the Intelligent Energy concept. It then presents various aspects

of the Smart Grid providing a comparison between the traditional and the smart grid to help learners identify the fundamental characteristics that drive the evolvement towards a more intelligent grid. A main scope of this module is to provide learners with information concerning a smart grid's architecture, components and major technological areas, in order to make them competent in designing smart grids for given settings and selecting the most appropriate technologies for their realization.

Face-to-face Lecture: Introduction to energy focusing on energy sources, current global energy status, projections and prospects of future energy status, as well as energy problems and challenges. Description of the Intelligent Energy concept and its expected impact. Presentation of the existing electricity/power grid, its limitations and the needs to adopt a more "intelligent" approach. Detailed description of the smart grid fundamentals and more especially of its defining traits, architecture and conceptual model, major components, as well as the technological areas being implemented throughout the energy value chain within a smart grid. Discussion of the smart grid's objectives, key success factors and benefits over the traditional grid. Brief description of relative European and international initiatives.

Assignment 1: Learners will be asked to elaborate on an extended list of the drivers leading the adoption of the Intelligent Energy concept, and one highlighting its impact, classified in various fields (e.g. environment, society, economics, energy management, etc.)

Assignment 2: Learners will be asked to write about smart grid opportunities in their countries.

Assignment 3: Based on the presented generic architecture of a smart grid and their knowledge upon university settings and needs, learners will be asked to design a smart grid architecture for a large university campus integrating renewable energy resources and define an energy management policy to achieve sustainability and maximize efficiency of energy consumption.

4.4.3 Module 2 – Task descriptions

Entrepreneurship is the capacity and willingness to develop, organise and manage a business venture along with any of its risks in order to make a profit. The most obvious example of entrepreneurship is the starting of new businesses. In economics, entrepreneurship combined with land, labour, natural resources and capital can produce profit. Entrepreneurial spirit is characterised by innovation and risk-taking, and is an essential part of a nation's ability to succeed in an ever changing and increasingly competitive global marketplace.

Green businesses are businesses that are committed to reduce their impact on the environment or, on a larger scale focus on sustainability.

Sustainability includes not only the consideration of environmental issues, but comprises of the social, economic and environmental consideration, also known as the three pillars of sustainability.

A strategy to implement values such as human rights, social equality and, naturally, environmental protection, in business is the concept of Corporate Social Responsibility (CSR).

e-learning sessions on:

1.   What is entrepreneurship: an introduction

2.   CSR principles, environmental pillar and what is a green business?

3.   Generate and analyse your green business idea

4.   Are you ready to start your green business?

5.   Green marketing plan

6.   Complying with the rules and regulations to start your green business

7.   Starting the green business – business plan following PDCA

Assignments 1:

Identification of good practices in the field of Green Business and elaborate on the principles of environmental CSR that they address, as well as the principles of entrepreneurship

Assignment 2:

Develop a marketing plan, per good practice identified in Assignment 1

Assignment 3:

Elaboration of a business plan for a green business idea.

4.4.4   Module 3 – Task descriptions

Green entrepreneurship refers to businesses that target products, services or processes with an ultimate objective of benefiting the environment. The term "green" focuses on various aspects, such as creating and consuming energy without polluting the environment, integrating renewable energy sources and minimizing the use of fossil fuels and managing energy as efficiently as possible towards a sustainable consumption and exploiting produced energy at the maximum level while implementing low-waste processes.

Green entrepreneurship has already found its pace and currently expands in various application sectors, such as smart cities and transport. Motivation, scope and impact of green approaches vary along these domains, where several ICTs are combined to achieve efficient and sustainable use of energy.

In light of the above, this module aims to provide an overview of some main green entrepreneurship application sectors along with the basic features of intelligent energy implementation.

Face-to-face Lecture: Presentation of three major green entrepreneurship application sectors, namely smart energy cities, buildings and transport. Description of the main characteristics, challenges and opportunities of each sector and insight in how intelligent energy is implemented to achieve green solutions.

Assignment 1: Learners will be asked to elaborate on a green solution for the neighborhood they live in, describing the motivation, objectives, expected impact and applications/ICTs of their proposal.

Assignment 2: Learners will be asked to describe the concept of green Heating Ventilating and Air Conditioning (HVAC) systems, their basic components and the main technologies used for their realization.

Assignment 3: Learners will be asked to provide an overview of the existing electric vehicle charging infrastructure and describe the perspectives of its evolution.

4.4.5   Module 4 – Task descriptions

"Philips" is a worldwide leading company and successful in areas of healthcare, lifestyle and lighting. The example described below is the business model in context of Philips Lighting. The objective is to generate understanding how the model works, how it is implemented in the company and what impacts it has for the customer, the company and the environment.

Face to face Lecture:

In the case study the environmental lightning service of the company Philips is described, focusing on its business model regarding energy efficiency, recycling and long-term customer relationships.

In this business model the company produces, installs, perpetuates, monitors, takes back and, to a certain extent, reuses materials from the lighting system. The customer only pays a service charge over an agreed period and for the function and quality wished for. Through this model, three aspects differ from a traditional business model:

1)   The customer receives not only a product, but a service;

2)   The relation between customer and company changes from a sales relation to a trusted service partnership that supplies and perpetuate lighting systems; and

3)   The business model has an effect on the transfer of funds, which changes from a selective payment to a continuing payment scheme.

Laboratory:

The students are invited to discuss individual or in group following questions:

•   What aspects change through the implementation of the business model? Explain the key challenges and how they are addressed.

•   Is there a win-win situation for the company and why/why not?

•   How can the motivation for implementing this model be described and what are possible differences in comparison to a green SME start-up?

•   Explain what an entrepreneur has to do well to have a successful business venture while changing the business model.

Assignment:

To visit the website of the company to identify the indicators of the ecological and social values and how the business model reflects those values. It is also required to find out what environmentally friendly fields cover these measures and which areas of the company they affect.

4.4.6   Didactical Techniques and Methods – Applied Examples

Trainers in adult education have the responsibility to support learners and to provide them with relevant contents to use for their future work life. The topic on Green Entrepreneurship can be seen as the link between environmental awareness and economic requirements.

With regard to the training intention and the learning goal, the following points are, among other things, taken into account:

- Actuality,
- Relation to real life,
- Interdisciplinary learning,
- Individual learning processes,
- Relevance for the learning purpose

Initially, learners experience an introductive activity to become familiar with the topic. In frame of the ISP, they were introduced to the topic by a brainstorming activity of the whole group. The aim is to prepare learners for the lecture by activating their already existing knowledge about the topic and related areas.

The methodological approach can be described as a combination of lecture and self-organised learning. This approach reflects the common practice of university education, but can be seen as an approach for adult learners in general. A key element for the motivation of young people is their active involvement and the promotion of their own learning.

Exemplary learning by independently conducted online research and identification of good practices in the field of green businesses was promoted. In group work, learners elaborated the task by using a comparative approach to evaluate the principles of CSR and entrepreneurship.

The approach includes helping learners connect between thematic areas, for example by revealing the historical contexts, assist them in search for group work and encourage them to understand rather than to memorise. In this connection, it is useful to engage learners in activities and problem solving exercises. A potential exercise to promote problem solving is the provision of a case study, followed by "reflecting questions" for group discussion. This helps them to decide for themselves, and in agreement with the group, what to do and which the best way to solve a problem is.

The intensive study programme (ISP) in frame of the project showed that the approach was benefiting for many young people as it gives them the possibility to work with people from different disciplines, different countries and different personal backgrounds who contributed with their individual strengths to the outcome of the workshop.

In order to feed the practical needs, models, methods and tools related to the field can be introduced. In case of the programme, tools for marketing mix and marketing plan were presented.

It is recommended to be aware of the topic`s/frame`s limitation. In detail, during the lecture, learners` attention was drawn towards the relevance of regulations and quality management. Due to differences in national legislations and business specific approaches, this area couldn`t be discussed in depth. Instead, an overview and possible references were given.

The workshop should be accompanied by the trainer in order to provide correct information targeting the development of knowledge, skills and competences. The aim is to enable learners to argue and judge independently.

4.5 COURSE 4 – APPLIED ENERGY MANAGEMENT SYSTEMS IN/FOR ORGANIZATIONS (INCLUDING SCHOOLS)

Energy management is the key to saving energy. Much of the importance of energy saving stems from the global need to save energy - this global need affects energy prices, emissions targets, and legislation, all of which lead to several reasons why an organisation should do its utmost to reduce its energy consumption. Reducing on energy consumption also has other benefits directly related to the organisation itself: cost and energy reduction; decreased carbon emissions and the environmental damage that they cause while promoting a green, sustainable image of the organization; risk reduction due to the possibility of increased energy prices or energy supply shortages that could seriously affect an organisation's profitability and survival. Considering the shift towards more energy efficient modes of operation within industry, public buildings, offices, etc. Course 4 aims to enable the learner to enter the workforce with the required skills for EnMS management. By the end of this course, learners will be familiarized with common energy terminology and with energy trends in the EU; they will be able to identify the various sources of energy available together with their effects in a global scenario; discuss non-renewable energy sources and their effects on society and analyse the state of energy consumption trends in Europe in the light of the EU's energy priorities and targets. They will also be able to promote and implement EnMS systems (an EnMS is key to controlling energy consumption and to reach energy efficiency targets) within any organisational setup.

4.5.1 Course IV – The structure

COURSE III	CONTENT
Module 1	Topic 1: Definitions of common energy terminology and Energy sources Topic 2: Energy trends within the EU Topic 3: EU energy priorities and energy saving strategies
Module 2	Topic 4: Energy directives Topic 5: Energy standards and Benefits from energy management systems implementation
Module 3	Topic 6: Plan-Do-Check-Act process Topic 7: Energy monitoring / planning / management skills and techniques and Energy Efficiency Knowledge Transfer Framework

	Topic 8: Implementing an EnMS within an organisation
Field Work	Topic 9: Design of an EnMS structure within a school environment

4.5.2   Module 1 – Task descriptions

The aim of this module is to provide the learner with a general background on the issues and factors that are the driving force behind energy efficiency and energy saving measures. This knowledge is necessary to be in a position to advocate for the implementation of Energy Management Systems within any organisation or building scenario.

Amongst others, dependency on fossil fuels for energy generation, greenhouse gas emissions, sources of energy and their effects on our planet, the EU energy system statistics as well as the EU 2020 strategy with particular emphasis on the energy related policies are presented and discussed.

Module 1 is divided into three topics dealing with a general background on energy consumption, energy terms, current status of energy trends within the EU member states and the way forward towards reducing greenhouse gas emissions as dictated by the EU 2020 strategy.

Topic 1: Definitions of common energy terminology and Energy sources

When dealing with energy efficiency and energy saving efforts, one must first understand the basic terminology used when referring to energy consumption, energy efficiency, energy intensity, energy use intensity, energy conservation and energy management. This topic explains each of the terms as applicable to Energy Management Systems implementation.

Within this topic, energy sources are classified into Renewable and Non-Renewable, with each energy source explained. Non-renewable sources are promoted and the learner is also provided with the necessary skills to be able to choose the best energy sources for a particular scenario.

Topic 2: Energy trends within the EU

Since each of the EU28 member states have their own energy consumption trends and each depend on different configurations of energy sources, they cannot be treated as one complete block when it comes to energy saving efforts. This topic presents the energy consumption trends for each member state, their individual share of renewable energy sources and the overall greenhouse gas emissions.

Topic 3: EU energy priorities and energy saving strategies

By 2020, the EU aims to reduce its greenhouse gas emissions by 20%, increase the share of renewable energy to at least 20% of consumption, and achieve energy savings of 20% or more. All EU countries must also achieve a 10% share of renewable energy in their transport sector.

Through the attainment of these targets, the EU can help combat climate change and air pollution, decrease its dependence on foreign fossil fuels, and keep energy affordable for consumers and businesses. This topic presents the EU 2020 energy policy in detail together with an insight on the Effort Sharing Decision involving all Member States.

Assignment 1: Comparison of energy trends amongst member states. Energy consumption, dependency on non-renewable fuels, percentage of renewable sources, efficiency measures implemented, etc.

Assignment 2: Analysis on the status in each member state as per EU energy priority area for energy efficiency.

Final Assignment: Identification and discussion of best practices in the EU Member States to contribute to the achievement of the objectives set by the EC within the energy efficiency priority area.

4.5.3   Module 2 – Task descriptions

The largest portion of Europe's energy sources come from fossil fuels that is the leading source of air pollution and carbon emissions. This implies that a large budget from each country is allocated to importing fuels making EU electricity prices amongst the highest in the world.

The cheapest and cleanest way to meet Europe's energy needs is by making our infrastructure and products more energy efficient. This is the aim behind the EU directives and standards that drive energy efficiency and reduced energy utilisation as a pathway to increase European competitiveness and energy supply independence while affordably reducing greenhouse gas (GHG) emissions and protecting human and environmental health.

The **EU directives** are legal acts which require member states to achieve a particular result without dictating the means of achieving that result. Directives normally leave member states with a certain amount of leeway as to the exact rules to be adopted by means of a variety of legislative procedures depending on their subject matter.

A **standard** is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.

Module 2 introduces the various EU directives and standards related to energy management and utilisation.

Topic 5: Energy directives

- 2012 Energy Efficiency Directive
- 2010 Energy Performance of Buildings Directive
- EU Energy Labelling Directive
- Ecodesign Directive
- Renewable Energy Directive

Topic 6: Energy standards and Benefits from EnMS implementation

Standards:

- ISO 9001:2008 Quality Management Systems
- EMAS Eco-Management and Audit Scheme
- ISO 14001:2004 Environmental Management System
- ISO 50001:2011 Energy Management System

This topic presents the overall advantages to be experienced by an organisation following implementation of energy and environmental management systems guided by the ISO 50001:2011 and ISO 14001:2004 standards.

Assignment 1: Report on the status of implementation for the key measures of the 2012 Energy Efficiency Directive across four Member States of your choice, highlighting at least one member state that has gone beyond the energy efficiency requirements stated by the directive.

Assignment 2: Report on the status of implementation for the Renewable Energy Directive across three Member States of your choice. Identify any best practices leading to the devolution of the directive.

Final Assignment: Discussion on the different directives and standards presented; their applicability, pros and cons, complementarities and differences.

4.5.4   Module 3 – Task descriptions

Using energy efficiently helps organizations save money as well as helping to conserve resources and tackle climate change. This course explains the development of an energy management system (EnMS) as specified within the ISO 50001 standard. This standard is applicable to all organisations in all sectors of operation and makes it possible for the organisation to integrate energy management into their overall operational efforts to improve quality and environmental management.

Using a step-by-step process, this course provides guidance on how to implement an ISO 50001 EnMS. The course enables organizations to establish the systems and processes necessary to improve energy performance, energy efficiency, and help reduce energy consumption and costs.

The requirements of the standard will be reviewed, while covering a step-by-step implementation approach. The course includes guidance on developing an implementation plan, creating necessary documentation, monitoring an energy management system and achieving continual improvement in energy performance.

Topic 8: Plan-Do-Check-Act process

ISO 50001 focuses on a continual improvement process to achieve the objectives related to the environmental performance of an organisation / building. The process follows four phases of the Plan–Do–Check–Act (PDCA) approach. Each phase is explained in detail with guidelines for implementation.

Topic 9: Energy monitoring / planning / management techniques and EE Knowledge Transfer Framework

Monitoring activities are the heart of the EnMS to help the energy managers be in a position to evaluate energy performance and improve it. This topic provides guidelines and requirements for a sound monitoring activity that will allow for successful implementation of the EnMS.

This topic gives a set of guidelines and essential components that are required for adequate planning procedures for operation control, procurement of energy consuming services/products, design of new products and dealing with non-conformities.

The ISO 50001 standard lists a set of twelve documents that are key to ISO certification. The documents are presented together with guidelines for their creation and maintenance within the organization.

The success of a proposed EnMS action plan depends on effective implementation by all the energy management team and support of the while organisation. This topic discusses setting up of a knowledge transfer framework to assist in the transfer of knowledge throughout the organisation including communication with outside bodies.

Topic 10: Implementing an EMS within an organization

Like all other standards, certification is possible but not obligatory. This module presents the benefits of formal certification and what is required in order to be able to reach the certification status.

Assignment 1: Description of the PDCA process for implementation of an EMS in a generic scenario.

Assignment 2: Write a proposal addressed to the top management of an organisation to advocate for the implementation of an EnMS. Describe all the benefits the organisation might take advantage of, the opportunities it presents in terms of competitive advantages and why you should be appointed as the energy manager for taking the EnMS from design to implementation and operation.

Final assignment: Discussion on the main requirements for a successful EnMS implementation considering the aspects of monitoring, planning, documentation and knowledge transfer. Identify vital characteristics of good operation together with the benefits they each present.

4.5.5   Module 4 – Task descriptions

During the final stage of the EPOQUE Course IV, the students will go through an internship period of one month during which they are required to develop an EnMS for an enterprise or school.

Using all of the topics and information covered in Modules 1, 2 & 3 the student is to carry out the below described tasks associated with this module.

The student is to produce the necessary documentation, analysis reports, monitoring tools, knowledge transfer frameworks and time plans for the implementation of an EnMS structure within the ambience detailed in the case study. Features to be covered by the student throughout the implementation of the internship phase are:

- **Create an Energy Policy**: top management's official statement of the organisation's commitment to managing energy.
- **Formulate an Energy Management Plan** that requires measurement, management, and documentation for continuous improvement for energy efficiency.
- **Appoint a cross-divisional management team** led by a representative who reports directly to management and is responsible for overseeing the implementation of the strategic plan.
- **Define operating controls and procedures** to address all aspects of energy purchase, use, and disposal.
- **Establish a baseline** of the organisation's energy use. Progress will be measured against this deadline.
- **Identify energy performance indicators** that are unique to the organisation and are tracked to measure progress.

- **Define energy objectives and targets** for energy performance improvement at relevant functions, levels, processes or facilities within the organisation.
- **Draw up action plans** to meet those targets and objectives.
- **Create all required manuals/reports**, these living documents evolve over time as additional energy saving projects and policies are undertaken and documented.
- **Establish periodic reporting of progress** to management based on these measurements.
- **Set up a Knowledge Transfer Framework** to be the basis of all planning and operations.

Assignment: Assignment were the learners are asked to produce the necessary documentation, analysis reports, monitoring tools, knowledge transfer frameworks and time plans for the implementation of an EnMS structure within the school

4.5.6   Didactical Techniques and Methods – Applied Examples

Course IV entitled "Applied Energy management systems in/for organizations (including schools)" forms part of the EPOQUE portfolio of courses. The course is based on the the ISO 50001:2011 framework and aims to empower the learner with the necessary skills to be able to argue in favour of energy conservation through energy management, to assess the performance characteristics of a building/organisation, and to develop polices and structures. These are necessary steps for an effective EnMS.

The presentation of Course IV during the Intensive Study Program (ISP) revolved around involving the students in the learning experience so as to get them to think about the extent of the effect that energy consumption has on our everyday life and get them to think of ways to reduce energy consumption. This included brainstorming exercises where the students were asked to make lists of energy consuming devices found in particular areas, identification of what energy consuming equipment can be controlled, identification of possibilities for reducing energy consumption, etc.

The students were also presented with typical energy consumption patterns for an office scenario so that they could start to appreciate which are the major energy consumers and subsequently arrive at solutions that would assist in reducing the energy consumption.

> Short assignment – University Canteen
> ∘ Make a list of all significant energy users
> ∘ Identify appropriate EnPIs (Energy Performance Indicators) for each
> ∘ Give ideas for energy performance improvement for each energy use
> ∘ Draft an energy policy
> http://energyimprovement.org/tools/2_Plan/2.1/FacilityEnergyPolicy-Example.pdf
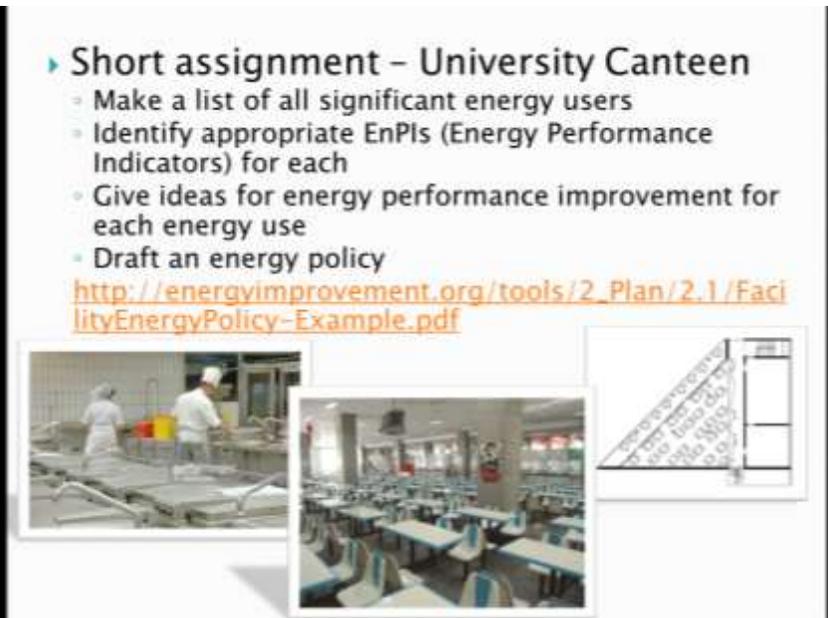
The above screenshot shows one of the tasks assigned to the students. Working in groups, the students worked to identify areas of possible improvement in energy consumption, establish methods to measure the energy consumption in those areas and also propose methods to reduce the energy consumption.

Another group work assignment asked of the students was to form a team of energy champions who are assigned to implement an EnMS within an organisation. Their task was to convince the audience why they would be the best team to implement such a system and the highlight the benefits that an EnMS would bring to the organisation. This exercise demonstrated the students' understanding of the importance of the implementation of EnMS within organisations and their ability to argue in their favour.

Further learning activities presented during the ISP related to Course IV included:

- presenting the students with a real problem and giving them a limited time to find a possible sustainable solution for it

- role playing: dividing students in different roles and asking them to defend their position giving reasons and suggestions (for example the building of a school: the architect, the engineer, the environmentalist, the minister of education, the local council of the locality, the teacher, the student, the parents and they discuss facilities to be included and energy saving measures, water supply, etc.)
- investigating local and global issues and reporting on the media via photos, articles and short videos
- making mini campaigns (line game: a statement is given and the students chose the number from 1 to 5 depending on whether they fully agree, agree, no opinion, disagree or fully disagree - once all students have declared their opinion students try to convince others why they should change their minds...)
- auditing (students are encouraged to start from auditing their own school - as regards water, electricity, waste management, intercultural relations, etc. They 'grade' the present situation, discuss ways of improvement, build an action plan and set out to do what they plan - through this process the students learn to prioritize issues according to necessity, health, safety and sustainability, consider expenses involved, time management, setbacks and the need to change plans, advertising and promotion of good practices, etc).

As can be seen, all of these methods do not make use of the usual classroom setup, giving students the opportunity to feel useful, important and actually encourage them to speak up knowing that each one of them can make a difference in life not only to themselves and those immediately surrounding them but also the whole community can benefit from their input. This helps students develop various life skills - time, financial, leadership, working in groups, understanding each other, respect, presentation, public speaking, and others besides building a good idea what a sustainable lifestyle is all about.

4.6 POSSIBILITIES FOR FURTHER DEVELOPMENT

The aim of the joint set of courses included in the Environmental Portfolio is to create a new generation of green professionals (teachers, scientists, engineers) through the transfer of know-how and good practices between Northern and Southern Europe countries, as well as between Baltic and Mediterranean countries. The programme means to really promote a change in mentality and significantly contribute to environmental awareness and its expected results, such as a sustainable energy consumption's increase in various types of organizations, including schools, and a sustainable development, more in general. In this perspective, more efforts are needed towards the modernization of higher education curricula, not only in terms of providing new knowledge and skills but also of enhancing innovative approaches. That is the reason why the Environmental Portfolio programme focuses on interdisciplinarity, on aspects related to the labour market, on active citizenship and participation. But this is also the reason why the

development and implementation of the Environmental Portfolio can be considered an important starting point in order to produce a new kind of environmental education.

What should be emphasised about the Environmental Portfolio approach is, particularly, the fact that it targets different learning contexts and promotes cooperation and networking between universities, schools, adult education providers and SMEs. The courses, then, relies on a blended set of learning techniques, both formal and informal, mainly focused on the accurate definition of a particular context, problem-based learning and experiential learning, critical analysis of real-life problems' consequences and identification and evaluation of different solutions. Consequently, the programme is totally in line with the environmental education of the future, not only aimed to present methodologies but to foster an education which starts from the analysis of a given set of problems and from the specific contribution each learning context can give towards a social transformation-, innovation- and entrepreneurship-driven economy. Current and future environmental challenges ask for a new generation of educators and professionals able to promote sustainability awareness starting from the local context they are plunged in, i.e. not only aware of those specific problems strictly related to environmental issues concerning a specific area, but also of the limits imposed by the national or regional legislation, for example, or by some specific behavioural trends widespread within the entrepreneurial world. The future environmental experts should also be able to make people use their previous knowledge, either learnt in school or in family or communities and other social groups they belong to in order to pursue meaningful changes towards a sustainable growth.

Following this perspective, further developments of the Environmental Portfolio should be addressed, in terms of its extension to new educational contexts, both formal and informal, for example, or in terms of an even wider interdisciplinary approach. The focus on building bridges among different disciplines and to address people from different background and levels of education (university students, adult learners and teachers) – what characterizes the programme the most – is at the same time an useful resource in order to deepen the investigation of environment-related topics, but also it can sometimes work as a barrier towards effective exchange of knowledge among people. This dichotomy is probably the most interesting remark emerging from the contemporary debate about the construction of a new epistemology for environmental disciplines and environmental education, in general: a multidisciplinary approach is unavoidable but at the same time a change in perspective is needed, which should in some way help moving from gathering pieces of knowledge about the environment from different disciplines and summing all these together towards rethinking these pieces of knowledge in the light of a more wide and holistic view of environmental issues. The Environmental Portfolio's follow-up could insist on the building of action-research projects and case studies as both tools of environmental education and instruments of planning a smarter, more inclusive and sustainable society, in line with the Europe 2020 agenda priorities.

5 APPENDIX AND INSTRUMENTS

5.1 GOOD PRACTICES

5.1.1 Course I – Community – based adaptation to climate change.

Course and topics most concerned: Course 1, Participatory methods in environmental research and education.

Description: Despite the fact that poorest countries and marginalised communities are more likely to be affected by climate change, until recently, little attention has been paid to communities' experiences and their efforts to cope with their changing environments. Then, some recent approaches to adaptation to climate change –community-based, participatory and built on the priorities, knowledge, and capacities of local people – can represent a good practice of participatory methodologies applied to environmental issues. Community-based adaptation (CBA) to climate change is a community-led process empowering people to cope with the impacts of climate change together with the whole range of natural, social, and economic problems they face, since marginalized community are focussed not only on climate-related risks, but also on poverty or unemployment reduction and livelihood benefits. CBA projects identify, first, the communities more vulnerable to climate change (usually, relying on NGOs, local partners and community groups which already have the trust of local communities); then, collect information on climate change and its impacts (including scientific information as well as local knowledge) in order to understand the risk; finally, build in this notion of risk and uncertainty into activities, with the aim of building communities' resilience to both current climate variability and future climate change. CBA can help farmers increase their knowledge of climate change and observe climatic parameters themselves; or to identify important areas for livelihoods, e.g. fishing and hunting grounds, when a community lives in an area prone to different types of flooding; or help to find out different kind of households and materials according to the inhabitants' needs (in particular for vulnerable people, e.g. young children, elderly people, pregnant women, and those with disabilities); or to identify local resources to deal with hazards and plan disaster risk reduction activities. Many different participatory methods and tools for CBA exists, in particular some innovative approaches aimed to work with particular groups such as children or to co-learn about climate change and adaptation. Communication about climate change should be in the first language of the community approached and in terms it can understand and in order to avoid the dangers of disempowering communities, climate change should always be discussed in the context of how people have already responded to climate stress, how this has changed over time, and on communities' own capacities to adapt. Children are often very effective communicators of climate change causes and effects, because of their better understanding of the science of climate change processes than adults in the community, through school lessons, and can draw out the implications for local livelihoods. Videos produced in a participatory way by children are can be a powerful

means of raising awareness of climate change and its impacts, especially where literacy rates in the community are low. In this case, the children were first taught about climate change using locally available materials, then they used this knowledge to develop questions and carry out filmed interviews with other community members, to give a clear picture of the impacts of climate change at the local level.

Source: *Participatory Learning and Action*, n. 60, © The International Institute for Environment and Development (IIED), December 2009.

5.1.2 Course I – Delphi Technique

The implementation of Delphi Technique step by step.

Step 1: Presentation of topic: Dimensions of sustainable development in poverty situation (20 min).

Step 2: Discuss in your group and write down your research questions for one of the following issues (25 min).

•   Poverty and immigration

•   Social justice and poverty

•   Contribution of agriculture to poverty alleviation

•   Natural resources and poverty

•   Facing poverty in our everyday lives

Step 3: Vote in your group to choose the most interesting research question and write it down in a post-it paper (15 min).

Step 4: Put all the post-it papers on the wall so anyone can read them through. Then, each group will talk about their research questions and support their final choice (30 min).

Step 5: At the end of the workshop, after the final presentations in the forum theatre, vote for the most interesting research questions of the groups (10 min).

5.1.3 Course I – Forum Theatre

The implementation of Forum Theatre technique step by step.

Poverty and Sustainable Development: Mission Impossible?

Step 1: Write a scenario in your group and prepare a role-play connected with the issue of poverty you are dealing with. Each person in your group will play a role. Try to describe a problematic situation or a need state and provide the reasons, the consequences and possible solutions (Collaborative group work, 60 min).

Step 2: Each group will act on a performance which shows a problem/situation on the issue of poverty (10 min).

Step 3: Think for a few minutes and discuss in your group the situation and possible solutions for changing the series of events (3 min).

Step 3: The performance will then be repeated. At any time, you can call out 'freeze', come up on stage and take the place of the protagonist in order to change the series of events. You may alternatively play characters that may be able to support other characters that wish to change (10 min).

Additional Info:

- You can call out 'freeze' and offer ideas for change to the group of actors who will then perform this suggestion
- There is always a person there to support you, 'The Joker' who acts as a mediator or facilitator at all times
- No one is allowed to offer violence as a suggestion for change

REMEMBER: You are not spectators BUT spect-actors!!!

5.1.4 Course II - Management of the Mediterranean and Baltic Sea.

Course and topics most concerned: Course 2, Current state and future of the Baltic and Mediterranean Area in an interdisciplinary perspective.

Description:

MEDITERRANEAN STRATEGY ON EDUCATION FOR SUSTAINABLE DEVELOPMENT (MSESD). It is a project in the framework of the Horizon 2020 Mediterranean Environment Programme. The strategy involves governments, educational institutions, NGOs and other stakeholders of the Mediterranean region as well as international organizations. The aim of this strategy is to

develop and incorporate ESD into formal education systems, in all relevant subjects, and in non-formal and informal education of the Mediterranean countries. They believe that this will equip people with knowledge of and skills in sustainable development, making them more competent and confident and increasing their opportunities for acting for a healthy and productive life in harmony with nature10 and with concern for social values, gender equity and cultural diversity. The objectives of this strategy are to:

a)   Ensure that policy, legislation and other regulatory and operational frameworks support ESD;

b)   Promote SD through formal, non-formal and informal learning;

c)   Equip educators with the competence to include SD in their teaching;

d)   Ensure that adequate tools and materials for ESD are accessible;

e)   Promote research on and development of ESD;

f)   Strengthen cooperation on ESD at all levels, including exchange of experience and technologies within the Mediterranean region.

"To make our vision real, the Mediterranean Strategy for Sustainable Development (MSSD) recognizes that education in the Mediterranean needs strengthening by introducing sustainable development, through a holistic approach, into educational curricula, from primary school right up to universities and graduate schools (MSSD, 2005)."

5.1.5 Course II - WWF MEDITERRANEAN INITIATIVE

The Mediterranean region is considered be WWF as a global priority where ecological integrity must be conserved to contribute to a more secure and sustainable future for all. The Mediterranean Initiative, a common strategy to scale-up WWF conservation efforts in the basin has launched by WWF Mediterranean, together with 5 WWF offices in the region – France, Greece, Italy, Spain, Turkey – the WWF European Policy Office and WWF International. "Indeed, the level of protection of the Mediterranean Sea is largely inadequate. In particular, Marine Protected Areas are too few, not ecologically representative of the Mediterranean biodiversity and not effectively managed. The WWF Mediterranean Initiative is pushing actors involved in marine protection towards a threshold where marine biodiversity conservation becomes a political, economic and social priority and MPAs become the tool of choice to ensure the sustainable management of marine ecosystems."

5.1.6 Course II - MARINE LITTER

UNEP's Regional Seas Coordinating Office and the Global Programme of Action (GPA) have embarked on the development of a 'global initiative on marine litter'. Although marine litter is found in all oceans and sea areas of the world, this proposed initiative would concentrate, among others, on the establishment and development of pilot regional activities in regions that are particularly affected. The global initiative would also provide a global platform for the establishment of partnerships, co-operation and co-ordination of activities for the control and sustainable management of marine litter. Regional actions on marine litter are being developed in the following Regional Seas Conventions and Action Plans areas: Baltic Sea; Black Sea; Caspian Sea; East Asian Seas; Mediterranean; Eastern Africa; North East Atlantic (OSPAR);) Northwest Pacific (NOWPAP); Red Sea and Gulf of Aden (PERSGA); South Asia Seas (SACEP); South East Pacific (CPPS); and Wider Caribbean. In addition, Regional Seas Programme (RSP) is supporting regional activities on marine litter in the Baltic Sea.

Sources: MEDITERRANEAN STRATEGY ON EDUCATION FOR SUSTAINABLE DEVELOPMENT (MSESD). FINAL DRAFT (as formulated in the framework of the Horizon 2020 Mediterranean Environment Programme) http://ufmsecretariat.org/wp-content/uploads/2014/05/Mediterranean-Strategy-on-Education-for-sustainable-development-.pdf; WWF Marine environment: the Mediterranean Sea and its coasts http://mediterranean.panda.org/about/marine/; United Nations Environment Programme "Regional Seas" http://www.unep.org/regionalseas/marinelitter/initiatives/unepregions/default.asp.

5.1.7 Course III - Environmental education for employees/students and society

Course and topics most concerned: Course 3, Environmental human resource management

Description: The institute of environmental engineering (APINI) in Lithuania exists since 1991 as an independent research institute affiliated to Kaunas University of Technology. APINI gained attention on national level, as well as in international contexts for their environmental research, but especially for their employee development, as they take part in programmes and do research cooperation with other universities related to CSR/ sustainable development and pollution prevention. As part of the research unit of the university, APINI tries to implement sustainable development and cleaner production programmes and projects, in Lithuania and abroad. The master`s study programme "Environmental Management and Cleaner Production" is provided by the institute. In the event "Let's do it" APINI collaborated with schools and educational centres in a cleaning activity. Further, the institute designs its own training methods for employees. These methods are also provided to other companies. In view of its philosophy, the organisation is dedicated to environmental protection. The employees represent the company`s philosophy. They are encouraged to be involved in each activity and are committed with all issues related to environmental performance. Within the organisation, undertaken initiatives are the implementation of "recycling points", where waste is collected in special bins for each type of waste. Further, ecological/green products are purchased. Reuse

of old equipment is promoted by selling them on auctions. As industrial partner, the institute plays an important role in the support of environmental performances, i.e. with the use of technology. The organisation developed tools and methodologies to save energy and other consumptions rates as well as assessment tools for its consumption, also to be used by other companies. The organisation provides a programme to raise awareness among society, i.e. with a programme to educate society on principles of responsible consumption and sustainable development. For practical use of principles of sustainable development, the organisation published its responsibility report 2012 to present to society.

Source: DESUR: Developing Sustainable regions through responsible SMEs: Corporate Social Responsibility: Good Practices & Recommendations. In: www.desur.eu/wp.../force-download.php?file [11.04.2016]

5.1.8 Course III - "MeRegio – Minimum Emission Region"by Energie Baden-Württemberg AG - EnBW

Course and topics most concerned: Course 3, Intelligent Energy.

Description: In the MeRegio project a smart grid provides a transparent and flexible tariff system for optimized renewable energy integration into the grid. The solution was developed in cooperation with ABB, SAP, IBM, Systemplan and the Karlsruhe Institute of Technology (KIT). Objectives:

• Provide transparency to optimize the link between generation and the use of renewable energy

• Encourage flexible consumption by introducing price signals

• Deliver real data to analyze and improve the systems

In order to better integrate renewables into the grid, EnBW developed a dynamic tariff that allowed for flexibility in the participating customers' consumption behavior. Customers were provided with traffic light-based dynamic price signals, whose order changed on a daily basis. While a green signal stood for the availability of electricity at a low price, a red light signaled that electricity generation was low and was therefore more expensive. The households had the possibility to control their energy consumption and energy data via different technological devices (computer, mobile). The smart meter continuously relayed the consumption data of the pilot customers directly to EnBW's central billing system. The billing system then sent energy consumption evaluations via the internet to the MeRegio cockpit on the PC of each participant. An evaluation of the project showed that consumption flexibility of up to 25 per cent and an average value of 10 per cent could be achieved. EnBW (Energie Baden-Württemberg AG) is ranked among the largest energy supply companies in Germany and in Europe. With a

workforce of around 20,000 employees, EnBW supplies electricity, gas, water and energy-related products and services to 5.5 million customers

Source: Good Practice of the Year. Renewables Grid Initiative (www.renewables-grid.eu) - January 2015.

5.1.9 Course IV – Energy saving efforts in schools

Course and topics most concerned: Course 4, Applied Energy management systems in/for organisations (including schools)

Description:

•   Your Green Future constitutes of a series of interactive events which engage school students with a low carbon economy, and their potential role in creating this through their career choices. The project emerges from the background challenges of youth unemployment, skills shortages and the need to develop low carbon, resilient communities. Each event sees hundreds of 12 to 18 year olds work with businesses in a series of creative activities which investigate the changing face of business, from local sustainable business models to cutting edge technologies. Overall, Your Green Future supports the local community becoming a sustainable, low carbon economic environment in which businesses flourish, communities thrive and individuals have the opportunity to reach their potential. Overall, the events aim to: develop knowledge, job prospects and vocational skills for the students; develop work related learning in collaboration with the teachers; enhance business.

•   Teach Two – Training students for Energy Analysis in sCHool buildings, promotes the spread of an energy analysis of buildings owned by school students in Europe. The beneficiaries are teachers, staff, students and organizations responsible for managing the school sector. The schools will receive practical tools for analysing, evaluating and improving the energy performance of their buildings. The aim of Teach Two are the raising of awareness and the introduction of models of sustainable energy among the younger generations.

•   Sustainable Energy Management @ Schools in Europe focuses on: adaptation and integration of educational content in response to the priorities of the work program ERASMUS + 2014 on support for production and the adoption of Open Educational Resources in different European languages; a substantial increase in the number of recipients and the geographic area affected by the experimentation of the proposed curricular. For each of the schools involved in the project, an Energy Management Team (EMT) is constituted with the role of investigating the current situation with regards to energy use in school buildings and cooperate to improve it by using the findings of the initial investigation to produce a report providing recommendations for improving the energy efficiency of the school. The report is also followed by an energy efficiency campaign through which energy-saving behaviour can be promoted.

Sources: Your Green Future, Severn Wye Energy Agency www.yourgreenfuture.org.uk/; Teach Two, project funded by EU Lifelong Learning Programme www.teach2project.eu/en/index.asp; Sustainable Energy Management @ Schools in Europe sem@schools.eu, Erasmus+ project www.sematschools.eu/

5.2 REFERENCE MATERIAL AND RECOMMENDATIONS FOR FURTHER READING

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http://smartenergyefficiency.eu/tag/transport/