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LitusGo Manual

Module 19

Energy use, consumption and management

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Preface to the LitusGo Education Manual

The LitusGo Manual is part of the LitusGo educational package which is included in the LitusGo portal: www.litusgo.eu. LitusGo aims at the training and capacity building of Local Authorities and local stakeholders in Integrated Coastal Zone Management issues and the reaction to the impacts of climate change.

This Manual consists of 20 autonomous, self-contained and inter-related modules. The modules are available in four languages, Greek, English, Maltese and Turkish and in three different forms: the dedicated wiki application in the LitusGo portal, the dvd and the hard copy version. This hard copy version of the LitusGo Manual consists of 20 self-contained booklets, one for each module, kept in a hard collective case.

List of modules of the LitusGo Educational Manual

Module 1:   European legal framework

Module 2:   Stakeholder involvement/Public participation

Module 3:   Sustainable tourism-carrying capacity

Module 4:   Water resources management

Module 5:   Fisheries/fish farming

Module 6:   Coastal water quality

Module 7:   Ecosystems management (land and coastal ecosystems)

Module 8:   Waste management/recycling/compost

Module 9:   Air pollution

Module 10:   Land uses/urban planning/coastal over-development

Module 11:   Landscape and marine-scape management

Module 12:   Coastal erosion control

Module 13:   Community annoyance issues 1: noise pollution

Module 14:   Community annoyance issues 2: light and thermal pollution, odours

Module 15:   Archeological areas/historic sites/cultural heritage

Module 16:   Extreme conditions management: flood risks, coastal flooding and storm surge

Module 17:   Droughts

Module 18:   Desertification

Module 19:   Energy use, consumption and management

Module 20:   Green buildings

Credits

The LitusGo Education Manual has been developed by the LitusGo Educational Manual Working group:

Modules 1, 2, 6, 7, 8, 9, 12, 13, 14, 16, 17, 18, 19 have been prepared by the scientific team of the beneficiary/coordinators ISOTECH Ltd. Major authors: Michael I. Loizides, Chemical/Environmental Engineer and Xenia I. Loizidou, Civil/Coastal Engineer. Constantinos Georgiades (MSc in ICZM) is responsible for the overall editing. The hard copy of the educational Manual is designed by Anastasia Georgiou.

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Dr Alan Pickaver on behalf of partner The Coastal & Marine Union (EUCC) was responsible for the quality control of the educational material.

LitusGo partnership:

Coordinator/Beneficiary:

ISOTECH Ltd Environmental Research and Consultancy
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Cyprus:

Municipality of Pafos www.pafos.org.cy
AKTI Project and Research Centre, www.akti.org.cy

Greece:

ELLINIKI ETAIRIA - Society for the Environment and Cultural Heritage www.ellet.gr **/ Sustainable Aegean Programme**, www.egaio.gr
ONISIS web development www.onisis.gr

Malta:

Municipality of Kirkop www.kirkop.gov.mt

The Netherlands:

EUCC – The Coastal & Marine Union www.eucc.net

Module 19
Energy use, consumption and management

1| Theoretical background

Terminology: A non-renewable resource is a natural resource which cannot be produced, grown, generated, or used on a scale which can sustain its consumption rate. These resources often exist in a fixed amount, or are consumed much faster than nature can create them, such as fossil fuel (coal, petroleum, natural gas, etc).

Energy forms a key part of our everyday lives: for transport, for heating and cooling, for factories, farms and offices. However, fossil fuels are a finite resource and a major cause of global warming. Europe's citizens and companies need a secure supply of energy at affordable prices in order to maintain our standards of living. At the same time, the negative effects of energy use, particularly fossil fuels, on the environment must be reduced. That is why EU policy focuses on creating a competitive internal energy market offering quality service at low prices, on developing renewable energy sources, on reducing dependence on imported fuels, and on doing more with a lower consumption of energy [2].

In December 2008, EU leaders adopted a comprehensive package of measures to reduce the EU's contribution to global warming and ensure reliable and sufficient supplies of energy. The package aimed to make Europe the world leader in renewable energy and low-carbon technologies. The aim was for the EU to achieve a 20% reduction in its greenhouse gas emissions by 2020 (compared with

1990 levels), mainly by boosting the use of renewable energy and curbing energy consumption. However, these goals are nowadays hard to achieve by 2020. It was therefore considered necessary to redefine the tools which will make it possible to set the EU on the path to competitive, secure and sustainable energy. The new European energy strategy includes 5 main priorities:

- limiting energy use in Europe;
- building a pan-European integrated energy market;
- empowering consumers and achieving the highest level of safety and security;
- extending Europe's leadership in the development of energy technology and innovation;
- strengthening the external dimension of the EU energy market.

The Commission also intends to launch new large-scale European projects concerning:

- smart grids linking the whole electricity grid system;
- electricity storage;
- large-scale sustainable biofuel production;
- energy savings both in cities and in rural areas.

"Smart grids" is the new European "innovation" concerning energy management. A smart grid is an upgraded electricity network to which two-way digital communication between supplier and consumer, intelligent metering and monitoring systems have been added. It is a very new effort of the EU, launched in 2011. Smart grids are a tool to reduce network losses, increase the reliability of

the grid and allow large amounts of variable renewable power to be connected to the grid. Moreover, they enable consumers to control appliances at their homes to save energy, facilitate domestic generation, reduce cost and increase reliability and transparency. As such, the evolution towards smart grids during the next years can play an important role in implementing the single electricity market, increasing network security and reducing energy use while increasing consumer and social welfare and creating new "green jobs". [2]

The European Commission (through the Strategic Energy Technology (SET) -Plan, COM(2009)519) proposes to develop clean energy technologies and to act in the fields of:

- **wind energy:** the Commission wishes to build testing facilities and to set up demonstration projects. As a result of these projects, wind energy would contribute up to 33% of electricity by 2030 and more than 250,000 skilled jobs could be created. The cost of these investments is estimated at EUR 6 billion.
- **solar energy:** the implementation of the SET-Plan should equip the EU with a long-term research programme focused on advanced photovoltaic systems. In particular, the Commission proposes to create pilot plants for automated mass production and a portfolio of demonstration projects for both centralised and decentralised photovoltaic power production. These projects should allow 15% of electricity to be generated by solar power in 2020 and create 200,000 skilled jobs. The cost of these investments is estimated at EUR 16 billion.

- **the electricity grid:** the aim is to establish a sound basis for creating a real internal market, to increase the share of intermittent energy sources in total energy production, and to manage complex interactions between suppliers and customers. The goal is to connect 50% of traditional electricity networks to plants generating renewable energy by 2020. It is estimated that EUR 2 billion will be needed to finance these networks.

- **sustainable bio-energy:** there are several technologies. In order to enable them to be marketed, their effectiveness will have to be demonstrated. To do this, the Commission wishes to set up several such plants across Europe. The contribution made by these energies to the energy mix would be 14% and 200,000 local jobs could be created. EUR 9 billion are needed to set up these projects.

- **CO2 capture, transport and storage:** the development of these techniques should be encouraged in order to achieve low carbon electricity generation. Consequently, an increase in research in this field is planned. EUR 13 billion would need to be invested.

- **sustainable nuclear fission:** a new generation of reactor type (Generation-IV) should be deployed by 2040 in order to reduce radioactive waste and proliferation risks. Work has to start now in order to meet that deadline. The cost of these investments is estimated at EUR 7 billion. In the long term, **fusion** also represents a promising source of energy.

- **fuel cells and hydrogen:** this sector is already included in the Joint Technology Initiative (JTI) for 2008-2013, which has a

budget of EUR 470 million. However, larger scale initiatives are still required.

- **energy efficiency:** the Smart Cities Initiative aims at promoting the creation of market opportunities for energy efficiency technologies. Through an investment of EUR 11 billion, this initiative should make it possible, by 2020, to establish cities as nuclei from which energy efficiency technologies will spread. Smart networks, a new generation of buildings and low carbon transport solutions will be developed. The aim of these Smart Cities is to transform the energy system.

- **poles of science and research:** the European Energy Research Alliance (EERA) should strengthen cooperation between research institutes in the context of joint research programmes. These research programmes should allow the challenges of the SET-Plan to be addressed.

- **international cooperation** at the level of the G20 or bilateral agreements, such as the EU-China Near Zero Emissions Coal (NZEC) project.

2| Objective

The issue of energy consumption and management has been part of the international agenda for years. However, Local Authorities and local stakeholders, especially in the Mediterranean, are not yet well informed or trained in order to have skills and competences to promote sustainable energy management schemes at local level. A knowledge based society and the implementation of intelligent and "smart" solutions is the target of the EU strategy 2010–2020. Local societies have a significant role to play in the implementation of this strategy. The LitusGo project is making an effort to support capacity building and new skills at local level so as to achieve a better local energy consumption and management scheme.
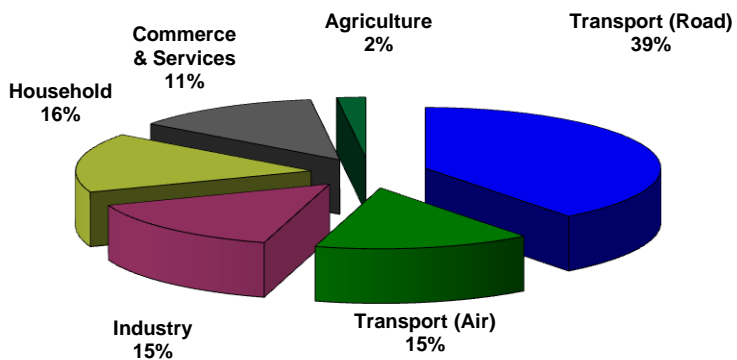
3| Problem

- Over 85% of the energy used in the world is from non-renewable supplies.
- About three quarters of the population in the EU live in or around cities. Such urban areas consume 70% of the energy in the EU and emit about the same share of greenhouse gases.
- Energy, based on fossil fuels, pollutes!
- Conventional energy costs a lot!

In the case of Cyprus, a country with 365 days of sunshine, the contribution of renewable energy sources is 5.4%, with solar energy being only part of this portion. Cyprus could have been a large photovoltaic industrial centre. It is not. It is dependent for more than 90% on fossil fuels (oil products). Why?
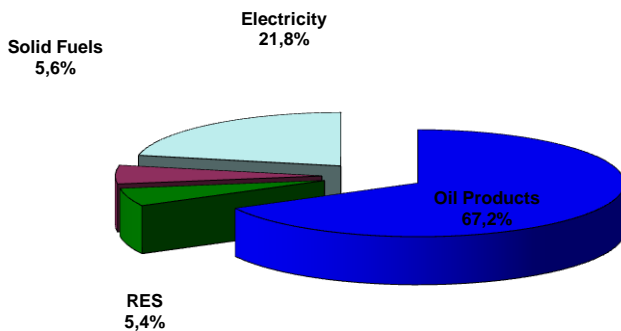
Pie 1. Final Energy Consumption by fuel type, 2010, Cyprus[1].

Pie 2. Final Energy Consumption per Sector, 2010, Cyrpus [1].

4| How to deal with the problem

When it comes to energy saving, energy management is the process of monitoring, controlling, and conserving energy in a building or organization. It is important to act locally! Local Authorities and Local Communities can proceed with specific actions to improve energy management and energy efficiency within their areas. There are specific commitments that the local decision makers have to make if they really want to promote sustainable energy management: "Cities that pilot the switch to a smart, low-carbon energy system have a huge potential to harvest multiple benefits: saving money thanks to lower energy consumption, boosting employment due to development and roll out of innovative energy technologies, stimulating entrepreneurship through new business opportunities, cleaner air and higher quality of life. The innovative integration of different technologies that make cities and communities "smart" require the commitment and close collaboration of local authorities, citizens, industry (e.g. energy, construction, transport, ICT), financial institutions, and academia." (Smart Cities and Communities Initiative, EU Conference, June 2011).

Local Authorities can implement immediate actions. Some examples follow:

- **Organise capacity building and training** programmes to enhance local expertise and local skills, so that local stakeholders are aware and ready to implement the tools and the techniques to promote sustainable energy management,

renewable energy, and transformations to the existing energy consumption systems.

- **Promote stakeholder involvement**. Stakeholders can implement actions and take initiatives to promote networking. No effort will be successful without active stakeholder involvement.

- **Networking** with European Municipalities and Communities. Cities and Communities play an important role in the implementation of the EU Energy Strategy. Look for partnerships and participate in networks.

- **Exploit and make best use of available European and national funding** opportunities:

  ➢ E.g. the **Smart Cities Initiative:** this Initiative will support cities and regions in taking ambitious and pioneering measures to progress by 2020 towards a 40% reduction of greenhouse gas emissions through sustainable use and production of energy. This will require systemic approaches and organisational innovation, encompassing energy efficiency, low carbon technologies and the smart management of supply and demand. In particular, measures on buildings, local energy networks and transport would be the main components of the Initiative. The Initiative builds on existing EU and national policies and programmes, such as CIVITAS, CONCERTO and Intelligent Energy Europe. It will draw upon the other SET-Plan Industrial Initiatives, in particular the Solar and Electricity Grid, as well as on the EU public-private partnership for Buildings and Green Cars established under the European

Economic Plan for Recovery. The local authorities involved in the Covenant of Mayors (more than 500 cities) will be mobilised around this initiative to multiply its impact.

➢ **Promote Renewable Energy Sources.** The implementation of photovoltaic and other renewable energy sources is subsidised. Promote it. Take initiatives as a Municipality.

- Local Authorities **take immediate action**:

➢ Launch public awareness raising campaigns: publish leaflets with tips for energy saving practices, go to schools, businesses, Mass Media. Have regular campaigns; not just one-offs!

➢ Target the opportunities to save energy in homes, in businesses, in Municipal buildings.

➢ Promote green buildings (see the LitusGo module on Green Buildings (Module 20))

➢ Check local energy networks for energy efficiency and gradually transform them in order to operate with renewable energy.

➢ Re-organise public transport in order to make it more efficient and more sustainable.

➢ Promote the use of bicycles (invest in infrastructure, such as bicycle lanes, rent-a-bike systems etc).

➢ Give the citizens challenges to enhance participation, e.g. set a prize for the most energy saving house.

- **Promote energy-saving landscaping.** E.g. plant trees for shade and cool during summer and use deciduous trees (there

are Mediterranean species that do this without high water consumption). Encourage citizens to do this in their gardens. Energy for air-conditioning can be dramatically minimized with energy saving landscaping.

- **Monitor the progress** of the implementation of energy saving/green energy encouragement, by analysing meter data to see how well energy-saving efforts have worked. It is important to give numbers to the citizens, in order to show that their efforts count!

References/useful information:

E-sources:

1. Statistical data from Cyprus Institute of Energy,
   http://www.cie.org.cy/indexEN.html#home
2. http://ec.europa.eu/energy/index_en.htm
3. http://europa.eu/legislation_summaries/energy/european_energy_policy/l28012_en.htm
4. http://en.wikipedia.org/wiki/List_of_countries_by_energy_consumption_per_capita

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