ENERGY EFFICIENCY IN PUBLIC INSTITUTIONS

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1. INTRODUCTION

We use energy to do work, energy lights our cities, powers our vehicles, trains, planes etc, we also use energy to warm our homes, for cooking, and a lot of other activities. Energy from the sun gives us light during the day. Energy is defined as: "the ability to do work".

The European Union nowadays imports 50% of the energy it consumes, which costs nearly 204 billion euros per year. If nothing changes until 2030 up to 70% of the energy in the EU will need to be imported. A lot of countries are facing unprecedented energy challenges resulting from increased import dependency, concerns over supplies of fossil fuels worldwide and a clearly discernable climate change. In spite of this, Europe continues to waste at least 20% of its energy due to inefficiency. The EU can and must lead the way in reducing energy inefficiency, using all available policy tools at all different levels of government and society.

Electricity consumption in the Europe has continued to grow in the last years despite numerous energy efficiency polices and programs at EU and national level. Total electricity consumption in the residential sector in the Europe has grown by 10.8% in the period 1999-2004, at almost the same rate as the economy (GDP). Despite increasing and the consequent impact on CO2 emissions, there is little knowledge at European level, where the electricity is used what is the status of efficiency of the installed and sold equipment and what is the likely impact of the past, present and planned policies.

Global challenges, climate change, peaking oil production and thus increasing concerns for energy security and climbing oil prices revealed that our current energy intensive, ‘business as usual’ practices are unsustainable. This is unprecedented problem and in our country because is a state in growth, that’s why we have non efficiency in using electricity.

Schools and universities are facing the problem of using energy in more efficient way. More schools and universities are designing their learning spaces to take advantage of daylight, but they still need electric lights to provide illumination when the sun does not. As education institutions determine what kind of electric lighting is needed in their facilities, the principal objective is to turn off as many electric lights as possible.

2. ENVIRONMENT AND ENERGY EFFICIENCY

Nowadays energy trends are not sustainable and a better balance between the three Es – energy security, economic development and protection of the environment must be found. It is very important to use technologies and practices that are currently commercially available and to promote clean technologies to achieve more success in reducing the greenhouse gases emissions and local air pollution.

The earth absorbs heat from the sun during the day, but much of it is radiated back towards space. However, the earth has a natural blanket of gases in our atmosphere, which traps a lot of the radiated heat. Without this natural "greenhouse" blanket the temperature on earth would be too low for us to survive. On planets and moons that do not have an atmosphere like the earth, the temperatures at night are well below freezing.

Burning fossil fuels causes this greenhouse blanket to thicken, trapping in even more heat from the sun. This causes the average temperature of the world to rise, which can make life uncomfortable for us if it is not stopped.[1]

Some of the energy we can use as a replacement to fossil fuels is called renewable energy. These include solar, wind, geothermal and hydro energy. These types of energy are constantly being renewed or restored. But many of the other forms of energy we use in our homes and cars are not being replenished. Fossil fuels took millions of years to create. They cannot be created over night. And there are finite or limited amounts of these non-renewable energy sources. That means they cannot be renewed or replenished. So, we must all do our part in saving as much energy as we can.

Energy security can also profit from improved energy efficiency by decreasing the reliance on imported fossil fuels. The citizens are aware of their crucial role in reaching these goals and if they resolve to introduce changes in their daily habits to save energy and help tackle climate change. Every small energy saving change of behavior counts - we must bear in mind that our individual decisions on how we live, how we work and how we move are all central to the way energy is used.

3. ENERGY AND ITS FORMS

Energy exists in all things. It cannot be created or destroyed, but it can be changed from one form to another. Energy that is stored and waiting to be released is called *potential energy*. The energy of a moving object is called *kinetic energy*.[2]

Forms of potential energy

- Chemical energy – food stored as fat in the body or power in a battery.
- Nuclear energy – the stored energy in an atom.
- Biomass energy – energy stored in a piece of firewood or dung that will be released as chemical and heat energy when the wood is burnt.

Forms of kinetic energy

- Mechanical energy – the energy of one object or substance moving another object or substance.

[1] *Sejfullai Latif &Memeti Havzi, Pollution and protection from pollution of the environment/Tetovo 2005.*
[2] *http://www.ftexploring.com/energy/enrg-types.htm*

- Thermal energy – energy associated with heat.
- Sound energy – the energy of compression waves.
- Electrical energy – the energy of moving charged atomic particles.
- *Radiant* energy – the energy of electromagnetic waves, including light and heat from the sun.
- Light energy – light from a source such as a flame or bulb.

4. ENERGY POLICY

Working towards sustainable energy policies requires cooperation with all departments of the local and regional government. It is also important to get all local players - public and private - involved. Energy issues should be seen as everybody's responsibility; the sustainable energy policy works best, when energy issues are mainstreamed into all activities of the authority. Integrating energy requirements into already existing sustainability strategies or environmental policies of the authority might be the easiest way forward. Energy policies defines conditions for energy efficiency and promotes use of renewable energy resources

- Macedonia plans to harmonize its policies, including the ones on environment, with those of EU so as to promote closer integration with other European countries.[3]
- In order to increase the awareness for protection of the environment for students of primary and secondary schools Macedonia organizes campaigns as

  Car Free Day Campaign, public campaigns, educational events in primary and

  secondary school.

In December 2005, Macedonia was granted the status of a candidate for membership in the European Union. In the Council Decision of 30 January 2006 on the principles, priorities and conditions contained in the European Partnership with the Republic of Macedonia the Energy sector is listed with following priorities:

- Begin to align the legislation on the internal electricity and gas markets, energy efficiency and renewable energy sources with acquits in order to gradually open the energy market to competition.
- Strengthen the independence of the Energy Regulatory Commission.
- Start implementing the Energy Community Treaty.
- Enhance administrative capacity in all energy sectors.

[3] *http://www.eva.ac.at/enercee/mk/energypolicy.htm*

Macedonia has signed the Treaty for the establishment of a European Energy Community in October 2005.

5. TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

Efficient energy use, sometimes simply called energy efficiency, is using less energy to provide the same level of energy service. An example would be insulating a home to use less heating and cooling energy to achieve the same temperature. Another example would be installing fluorescent lights and/or skylights instead of incandescent lights to attain the same level of illumination. Efficient energy use is achieved primarily by means of a more efficient technology or process rather than by changes in individual behavior.

Energy efficient buildings, industrial processes and transportation could reduce the world's energy needs in 2050 by one third, and be crucial in controlling global emissions of greenhouse gases, according to the International Energy Agency.[4]

Technologies that capture and store carbon dioxide emitted from power stations and industrial processes could contribute to about one fifth of emission reductions possible by 2050, says the International Energy Agency (IEA). Fostering energy technology innovation is a central part of the IEA's work. Development and deployment of safer, cleaner, more efficient technologies is imperative for energy security, environmental protection and economic growth. IEA experience has shown that international collaboration on these activities avoids duplication of effort, cuts costs and speeds progress.

The IEA's Technology Collaboration Programme deals with technologies for fossil fuels, renewable energy, efficient energy end-use and fusion power, as well as electric power technologies and technology assessment methodologies. IEA Implementing Agreements offer the framework for collaborative research projects. Benefits include pooled resources and shared costs, harmonization of standards and hedging of technical risks. Among the many areas covered by Agreements are bio energy, solar heating and cooling, wind turbine systems, advanced fuel cells and electric vehicles.

6. ENERGY EFFICIENCY IN SCHOOL AND UNIVERSITY CAMPUSES

Everything starts with education. School and university campuses need lighting — for security, safety, aesthetics and navigation. Except lighting students use different kinds of energy resources for other activities such us heating and warm water. That's why students need to be more energy conscious using energy sources.

The main goal of the school staff is to reduce energy consumption when there is no need, in this manner they also reduce pollution because environmental problems caused by emission of CO_2 need to be solved as soon as it is possible.

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[4] *N. Daci (1998): Chemistry of ambience, Industrial polution-prevention,Department of Natural Sciences, Book 5, Prishtina.*

Students need to be more energy conscious. Some schools need to reduce light pollution and promote the value of high-quality nighttime lighting and they have adopted to improve their energy conservation include photovoltaic panels that collect solar energy and convert it to electricity. Effective day lighting strategies, used with lighting controls and dimming systems, can reduce or eliminate the need for electric lights during the school day. Day lighting also reduces the demand on cooling systems. To achieve these goals we need to work all together – teachers, maintenance staff and students.

Schools and universities should build and operate their facilities more efficiently and continually to look for ways to reduce energy use. One of the easiest and most effective components of energy management is lighting control. Many schools can install lighting controls that significantly reduce unnecessary lighting usage.

No school is identical, but most have comparable spaces and lighting needs. For these spaces, lighting-control professionals can identify specific control strategies that will provide appropriate lighting and minimize unnecessary lighting. If the lighting process is not properly managed, lighting can become a maintenance problem.

Even if we are aware that the education starts in the early years in the way how we manage the use of electricity, all we know that institutions are the key for achieving better education and how to use energy in more efficient manner.

7. PRESENTATION OF THE RESULTS FROM THE INTERVIEW MADE IN THE SEEI AND PERPARIMI

The interviews made in these two institutions gave us a review that shows a big difference in using energy and energy efficiency, although they are too close in distance. We made the interview with the Facility Directors in both institutions and we are going to present these results:

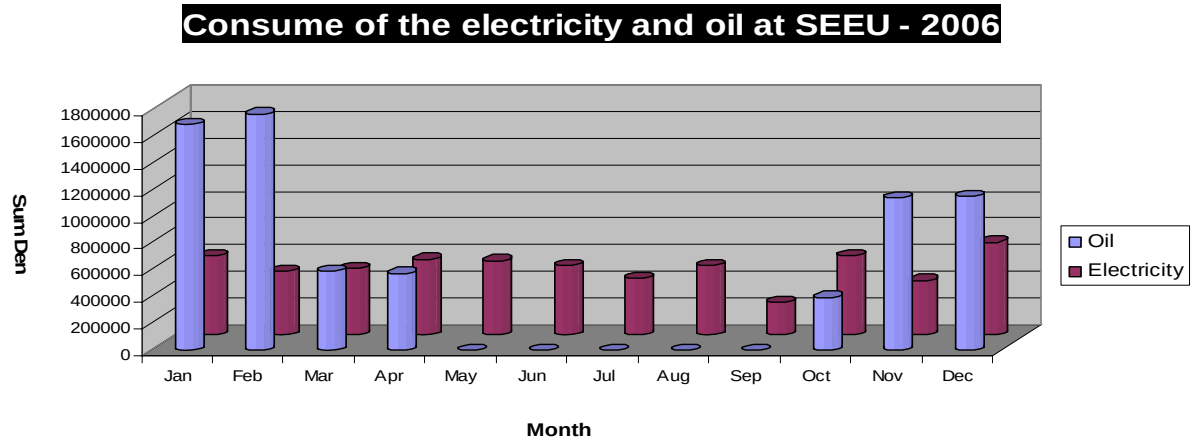
The result from the SEE-University:

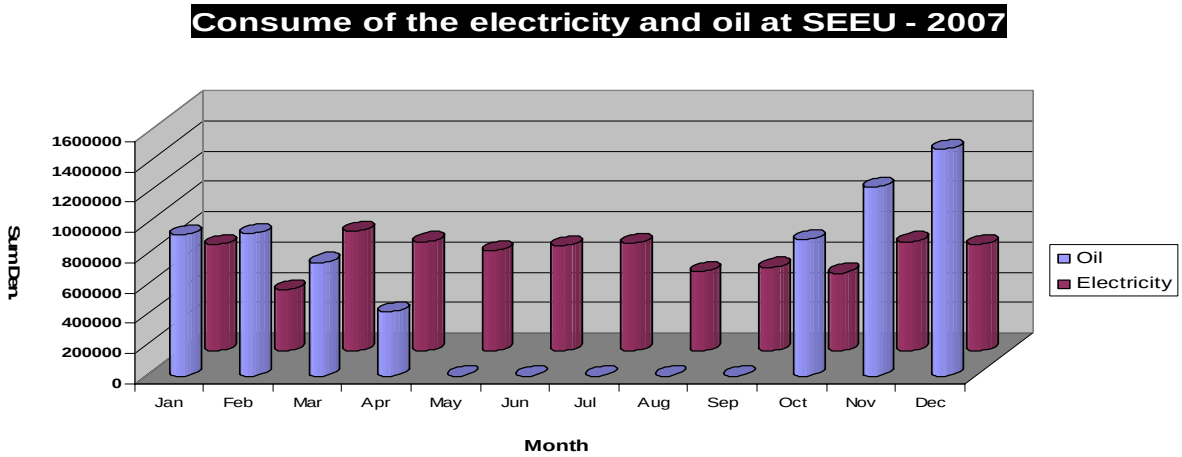
- The need for energy at SEEU is for lighting, warm water, heating, cooling and other electrical appliances (which are from the latest generation products that increase electrical efficiency), but in the new building, central cooling system contributes for more efficiency.
- We have two types of insulation in the building: prefabricate elements (made according to standard with high coefficient of isolation) and classical structure (made from bricks). In the first group are inclusions 58% of all building area, and in the second group 42%. All construction is made in that way to have more windows in buildings and to have maximum natural light.
- The lightning is from fluorescent materials which gives high efficiency, the outside lightning is automatic with non affect of human factor and they are from last generation, with high lightning and less spending of electricity – metal halogen. Till the night the light aglow is in minimum, which is refund with security system.

- The building areas covers 29 000 m^2 and all of them are heated with oil-central heating, so we use technology with manual system for regulation of energy. The dormitory buildings cover 24% of all building area, and are heated non-stop. The other areas are heated with quote practice through the day, and in night they are leaving in standby.

- The purpose of the activity of saving and efficient use of energy is the unique way for doing better in this important field. In SEEU there are plans to install metering center for following the active, reactive energy and maxi Graf. For attending consume of electricity and heating energy they need to develop SCADA system (Supervisory Control and Data Acquisition) which will help every time to do the "ironing" of the maxi Graf to have permanent control for consumption of the energy. This system of data acquisition should work in cooperation with specified organs such as switch-plugs, cut-outs etc. to manage the overcharge of the electricity. The management will proceed with hardware installation which might be one of these grid systems: MODBUS, PROFIBUS, CANOPEN, TCP/IP ect, with support of soft-ware system, in the level of the expert system in the section of artificial intelligence, which is expressed by neuron grids or genetically algorithm.

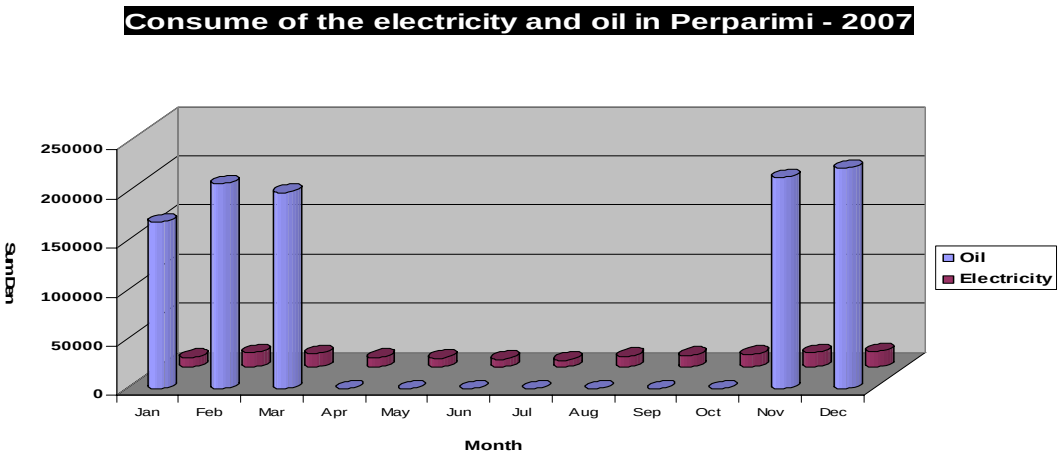
The year consumption of the electricity and oil are shown below and we can see that the difference between two graphics is evident, because in 2007 we have the new building with 5000m^2 which affects in the yearly bills.





The result from the Primary School - Perparimi:

- The need for energy in Perparimi is for lighting, heating, and some electrical appliances (for heating some offices-radiator, refrigerator), which are not efficient, because they are old and most of them damaged and this is the reason for higher electrical consumption.
- The building is made from walls of classical structure (made from bricks), 100% of building area is covered by this type of walls, and also a part of windows and doors are made from wood and are old and damaged. In this case we could not have efficient energy use.
- The lightning is from electrical bulbs (non fluorescent) so that do not have high efficiency, the outside lightning is damaged and few of the bulbs are in good condition. The heating energy is used during the day and at night they are switched off.
- The building areas covers 931 m^2 and all of them are heated with oil-central heating, so we use technology with manual system for regulation of energy. The central heating is active during the day and in night they are switched off.
- The year consumption of the electricity and oil is shown in the graph below and we can see that the electricity consumption is higher due to inefficient insulation and inefficient energy use.



8. CONCLUSION

From the interviews made in this two institutions we can conclude that there is a big difference between them, although they are near in distance but very far in efficient energy use.

One of the reasons is inappropriate education for saving the environment and inappropriate energy use. There are lots of simple things that we can do to save energy right now, which will reduce carbon dioxide emissions and help fight climate change. The same thing can be done and in school buildings if energy consumption is under control. The schools are responsible for managing their energy and that is why they need to do it in an efficient way.

The first and most important thing that these institutions can do is to give a little attention to controlling energy costs or to give energy management a higher priority.

Schools can improve the present conditions by motivating staff and pupils to adopt good housekeeping practices ensuring that the heating system is running at optimum efficiency and that there is a regular program of checking thermostats and time switch settings, boiler maintenance and so on identifying where investment can achieve worthwhile energy savings, eg more energy efficient light fittings, and better controls for the heating system.

That is why pupils and students need to be educated and informed about the environment problems and they should be more conscious about their behaviour. All of us need to contribute in energy sector, which is the biggest polluter of the environment, but also is the most important factor and necessary in our every day life.

We hope that in nearly future, we will do the right step to use renewable resources which are available in our region, and with this we can contribute in energy efficiency and will save energy for future generations with no use of non-renewable resources.

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Interview made with Facility Directors in SEEU (February, 4th 2008)

Interview made with Facility Director in Perparimi (February, 7th 2008).

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