SOUTH EAST EUROPE
Transnational Cooperation Programme

TERRE

TERitory, eneRgy & Employment

Programme co-funded by the EUROPEAN UNION

e-Newsletter

Second issue

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Content:

"For a greener future of rural area"

1. Introduction

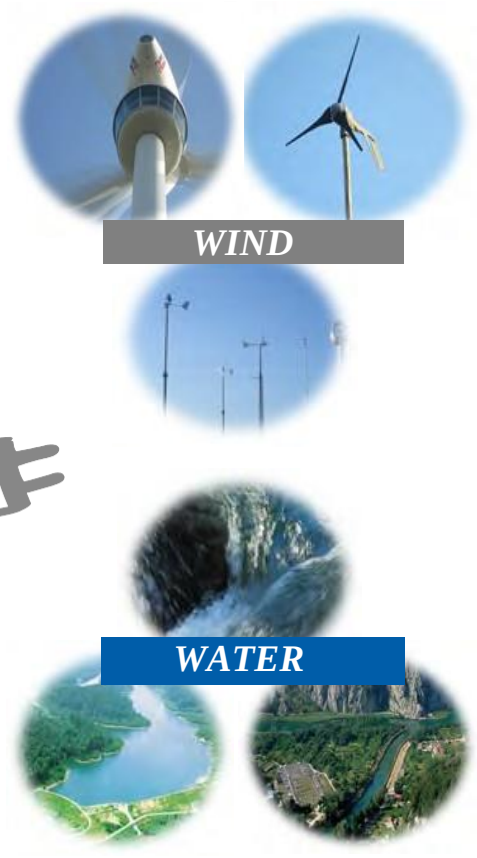
The aim of the TERRE e-Newsletter is to inform the external audience, such as RES companies, public bodies, NGOs, local development agencies, local communities, farmers, breeders, wood companies and other key stakeholders about TERRE project activities, new initiatives, events and interesting case studies.

http://www.terre-project.eu

2. Overview of renewable energy sources

Decentralized energy production from renewable resources strengthens value creation in rural areas. Using renewable resources effectively reduces the dependence on foreign energy imports, so that revenues remain in the region. More and more bioenergy villages are showing us how RES can be used to get the most out of local synergies. This supports rural development and creates efficient cycles which represent major contributions to environmental protection.

Because project TERRE "intends to experiment and demonstrate that a wise & integrated exploitation of endogenous resources to produce renewable energy (from different sources as bio-mass, sun, water, wind) is an effective engine for a self-generated and sustainable local development in the areas", this newsletter will give short overview of the most important renewable energy sources and indicate some examples of renewable energy systems.



2.1 Biomass

Biomass is biological material derived from living, or recently living organisms. As an energy source, biomass can either be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel. Conversion of biomass to biofuel can be achieved by different methods which are broadly classified into: thermal, chemical, and biochemical methods.

Wood remains the largest biomass energy source to date; examples include forest residues (such as dead trees, branches and tree stumps), yard clippings, wood chips and even municipal solid waste. Forestry biomass can be used to generate several forms of energy (including electricity, thermal energy, combined heat and power, or liquid bio-fuels) or can be manufactured into wood products like wood pellets, bricks and logs, that are then burned in industrial boilers or specifically-designed residential stoves. In the second sense, biomass includes plant or animal matter from agricultural sector that can be converted into different types of energy. Biomass can also be converted to other usable forms of energy like methane gas or transportation fuels like ethanol and biodiesel. Residential, commercial, and institutional post-consumer waste contains a significant proportion of organic material that that can be transformed into energy. Organic waste used cooking oil, animal fat, waste from starch production, waste wood from wood processing industry wood are all examples of residues that can be found in rural area and be used as renewable energy resources.







There are different renewable energy systems that convert biomass into energy; most common are:

- *Wood chip heating system*
- *Biogas plants*
- *Biomass (wood chip) gasification plant*

***Wood chip heating system** is very attractive energy source which uses wooden biomass for the heating of buildings. This is pretty rather simple system consisting of boiler, buffer memory and water tank. For most building owners, extremely low fuel cost is the main attraction of burning wood chips, and other biomass fuels such as sawdust and bark. **Gasification of wood chips** is an alternative to traditional combustion plants as it is possible to generate more efficient electricity in small plants and thereby reduce the fuel input. Gasification is a reliable and clean energy technology that can turn biomass or any material containing carbon into synthetic gas. This gas can then be used in a gas engine for the production of electricity and heat. A significant benefit is that the equipment is compact, which enables a plant to be built in small communities where electricity, steam or heat is needed.*




Because of the variety of economic and ecological benefits it affords, many farmers set up biogas plants as a further source of income. Biogas can be generated from different renewable resources. Instead of being tied to a certain crop type, farmers can adapt flexibly to different framework conditions. Even catch crops, whole-plant silage and energy beets deliver top yields. No other use of energy is as efficient as biogas utilization in a co-generation plant. Because they simultaneously generate both electricity and heat (hence "co-generation"), the efficiency of cogeneration plants is considerably higher than that of conventional large-scale power plants, which only generate electricity. Farmers additionally save on long-term energy costs when they use exhaust heat from the co-generation unit to heat buildings or stables. The exhaust heat can also be marketed via local heating networks to external purchasers to further increase profits. Plant operators can also integrate businesses from the local community to procure substrates. Utilizing renewable raw materials and other agricultural products contributes to value creation in rural areas. An efficient recycling economy is the result – reaching all the way to the use of fermentation residues as fertilizer.

Sun

Solar energy, radiant light and heat from the Sun, is harnessed using a range of ever-evolving technologies such as solar heating system and photovoltaic systems.

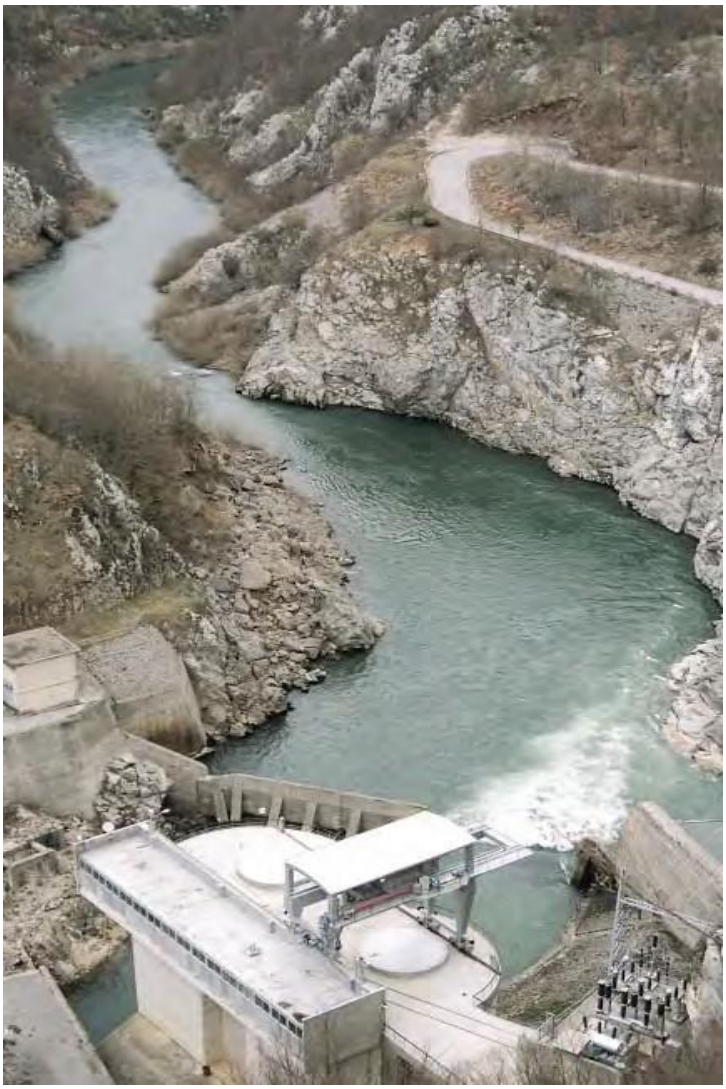
***Solar thermal systems** are mainly used for heating domestic hot water, and to a lesser extent, to support heating, where it's technologically and economically feasible; such as in low-temperature heating. Basically the part that solar thermal system differs from the other types of heating systems is solar collector, a device in which the radiant energy heats the working fluid. The working fluid circulates system, and in the hot water tank heats the hot water. Hot water tanks are used for storage of hot water with low losses, and the heated water can be used throughout the day. Such systems typically have an additional energy source for heating (wood, biomass, gas, electric. energy) used in unfavorable periods.*

***Photovoltaic systems** are traditionally used for electricity supply facilities remote from the electricity network, and more recently for the production of electricity in the network-related systems. Photovoltaic systems base their work on the conversion of solar radiation into electricity by photoelectric effect. A solar cell is an essential element of such systems, and merging multiple cells into a single entity makes the photovoltaic module. The photovoltaic module is a device which is ready to generate electricity, however, that they are produced in relatively low power (up to several hundred watts), more photovoltaic modules are arranged in photovoltaic field in order to achieve greater strength. Photovoltaic modules generate DC electricity, so inverters must be used for submission to the grid. Electricity production in the photovoltaic system, except of sun radiation at the location, depends on a variety of factors such as; shading, angle of inclination and orientation of the PV modules, the technical characteristics of the module, the ambient temperature, the characteristics of the exchanger, the losses in cables, etc.*




Water

Hydro energy is energy that is taken from water and converted to electricity. Hydroelectric power comes from water at work, water in motion. When flowing water turns blades in a turbine, the form is changed to mechanical (machine) energy. The turbine turns the generator rotor which then converts this mechanical energy into another energy form - electricity. The operation of a generator is based on the principles



discovered by Faraday. He found that when a magnet is moved past a conductor, it causes electricity to flow. In a large generator, electromagnets are made by circulating direct current through loops of wire wound around stacks of magnetic steel laminations. These are called field poles, and are mounted on the perimeter of the rotor. The rotor is attached to the turbine shaft, and rotates at a fixed speed. When the rotor turns, it causes the field poles (the electromagnets) to move past the conductors mounted in the stator. This, in turn, causes electricity to flow and a voltage to develop at the generator output terminals.

One downside to using hydro energy is that it can sometimes change the natural flow of the water which can make it possible to harm plants and animals in the water. It can also damage areas and wildlife, as when creating a hydroelectric dam, areas must be flooded. Other reasons that many want to use hydro energy is that it is cheaper than using other methods to convert energy to electricity. It is also reliable and can be used almost immediately when turned on to meet the demand for electricity. Therefore, one must weigh the pros and cons before deciding to use hydro energy to supply their demand for electricity.




Wind

Wind power is an alternative way of providing electricity, although the cost is higher than paying for a traditional electric provider. Wind power has been used for generations in remote areas and when driving through the country you may see a large wind turbine sitting in empty fields or even nearer to an old farmhouse.

A wind turbine is a device that converts kinetic energy from the wind into electrical power. Wind turbines can rotate about either a horizontal or a vertical axis and are designed to exploit the wind energy that exists at a location. Aerodynamic modelling is used to determine the optimum tower height, control systems, number of blades and blade shape. Conventional horizontal axis turbines can be divided into three components: the rotor component, the generator component and the structural support component. The technical potential of wind capacity is determined by the locations which are suitable for wind energy. Such sites must meet a series of requirements, from which is the most important wind potential, then the possibility of evacuation of power, acceptability with regard to environmental and nature protection. The wind turbines themselves can range from a 400 watt generator to be used for residential purposes to enough to be used for wind farms. The small turbines will have direct drive generators, direct current output, and are usually used on farms and smaller rural residences. Big turbines used in wind farms for commercial production of electric power are usually three-bladed and pointed into the wind by computer-controlled motors. These have high tip speeds of over 320 km/h, high efficiency, and low torque ripple, which contribute to good reliability. The blades are usually colored white for daytime visibility by aircraft and range in length from 20 to 40 meters or more.

One of the main arguments for using wind power is that it is a renewable resource, meaning it cannot be depleted like other fuels, such as coal. Wind power does not produce any toxic substances such as carbon dioxide or any type of air pollution so it is considered to be a clean energy source.




3. Transnational project partners meeting in Szolnok

The third meeting of project partners in the project TERRE - Territory, Energy & Employment, which is co-funded within South East Europe Transnational Cooperation Programme was held on 20th and 21st March 2014. in Szolnok , Hungary. At the meeting were participated members of 12 project partners from 9 different countries.

Thematic of the meeting was financial advancement of project TERRE (WP1), introduction about main targets of TERRE and main connection between WPs, relation of WP4 in relation with WP3 and WP5 and state of implementation of WP2 and WP3 activities.

Next day, participants went to study tour to Szolnok College where geothermal pump and solar panels are installed, and visited Újszilvás, where it is located the biggest solar panel field in Hungary.

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