efficiencyJobs

Co-funded by the
Lifelong Learning Programme
of the European Union

Proyect: 2013-1-ES1-LEO05-66818-AN

RENEWABLE SOURCES OF ENERGY IN PUBLIC BUILDINGS IN SLOVENIA

Roman Kekec,

STENG-national cleaner production centre

Zaragoza, 28th of September 2015

Renewable sources of energy

- an integral part of the fight against climate change,
- contributes to economic growth and increases energy security,
- biomass, solar energy, hydropower, wind energy, thermal energy,
- 3 areas: electricity, heating/cooling and transport.

The benefits of using renewable sources of energy

- positive effects on climate and economy.

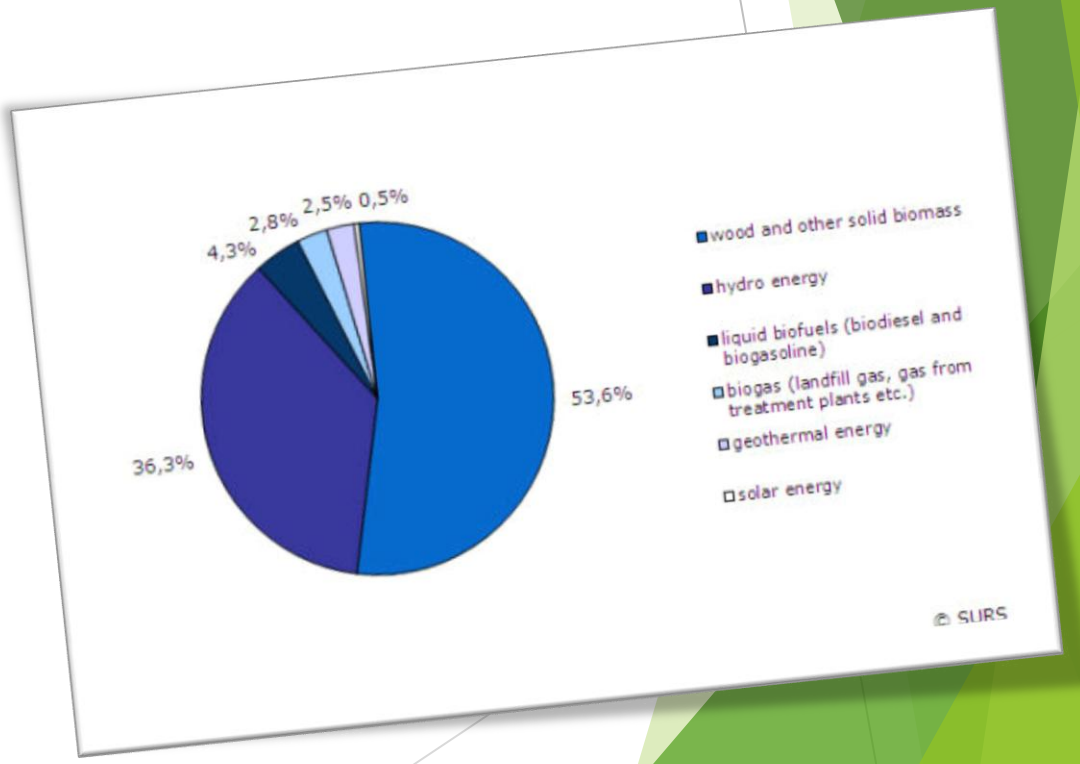
The European Commission estimates that achieving the objectives set in the climate and energy package by 2020 will mean:

- reducing CO_2 emissions by 600-900 million tonnes per year,
- reduction in fossil fuel consumption from 200 to 300 million tonnes per year,
- opportunity of new jobs.

Renewable sources of energy in Slovenia

The production of energy from non-renewable sources (oil, coal, natural gas and uranium) still dominates in Slovenia, which represents three-quarters of the final energy consumption in Slovenia. Most of the energy produced in nuclear power plants and thermal power plants. Renewable energy sources in Slovenia in 2010 accounted for only 12% of final energy consumption, but Slovenia over the next ten years aims to increase this share to 25 % of final energy consumption.

The structure of the use of RES in Slovenia is currently dominated by the use of wood biomass and hydropower, which in 2010 together accounted for nearly 90 % of the total use of RES. Currently they contribute a smaller share of solar, wind and geothermal energy, which are still relatively untapped.



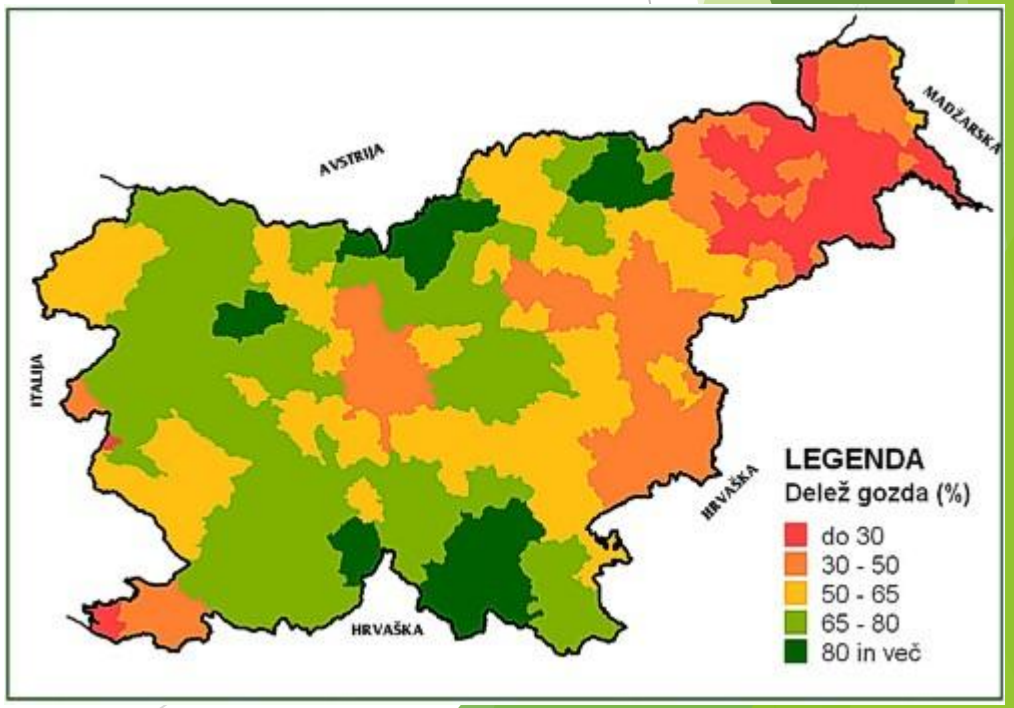
Biomass

The concept of biomass defines all organic matter. Wood biomass is the most well known example of biomass.

Slovenia is a land of forests, they cover 58.4% of our homeland. The forest area of Slovenia is at the third place in the European Union, after Sweden and Finland.

Wood is an important source of energy especially in rural parts of Slovenia, as almost 30% of apartments are heated with wood. Unfortunately, the main features of the current use are following: Outdated technology of preparation and use, poor efficiency of the combustion plants, inadequate emission values and uncompetitive prices of energy produced.

Slightly more than 4 % of primary energy needs in Slovenia are covered with wood biomass.



Wood pellets.

Firewood.

Wood chips.

Hydro power

The Slovenian power system includes 19 large hydropower plants (with a rated output of 10 MW). Their annual share of electricity production is about 30 percent.

BENEFITS:

- Economy: the low price of electricity produced by hydroelectric power plants;
- Low carbon: during operation does not cause greenhouse gas emissions;
- Improvement of flood safety.

WEAKNESSES:

- Volatility: the amount of electricity produced is dependent on weather conditions and rainfall;
- Encroachment: hydroelectric strongly impacts on aquatic flora and fauna and the natural environment.

Slovenia exploits 47 % of its water potential.

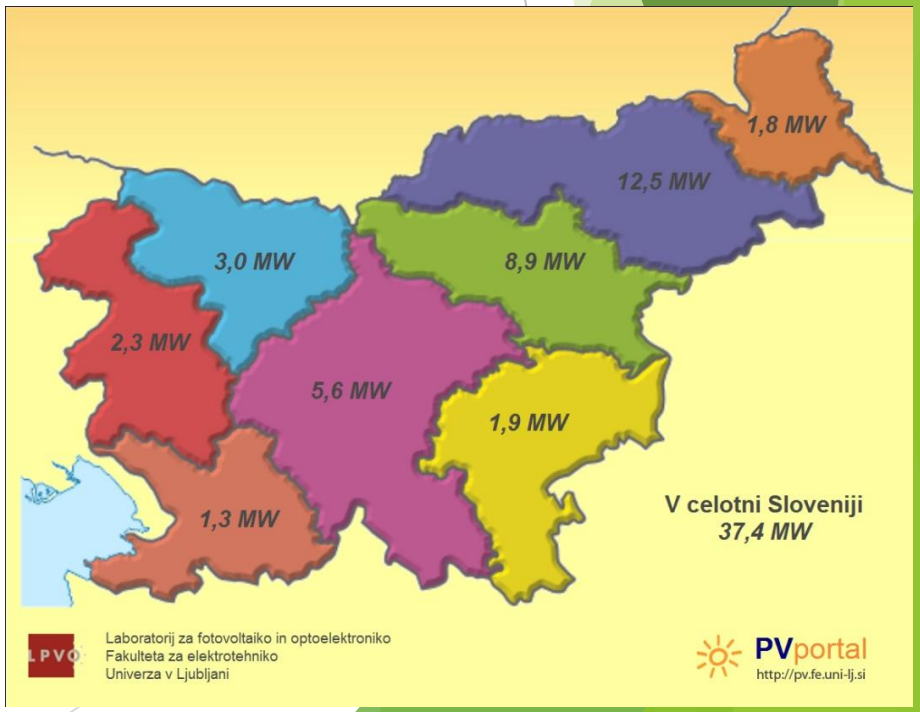
Solar energy

Electricity production

- Currently, Slovenia has around 82,000 m^2 of solar panels, which annually produce nearly 29,000 MWh of energy.

Heating

- DHW heating with solar collectors is quite widespread. Heating facilities, due to the need for greater absorption areas and accumulations of heating water, exercised only recently.



Geothermal energy

- Use of geothermal energy in water parks and spas.
- Use of geothermal heat pumps with a capacity of mostly less than 40 KW is in a substantial increase, especially in private houses and in a small number of commercial buildings and public institutions.

Wind power

- Small wind turbines in the mountains to supply alpine houses.
- In 2013, the first wind power plant in Slovenia was installed (power 2.3 MW).
- Larger wind plants are planned.

Renewable sources of energy in public buildings

- Energy renovation,
- New public buildings,
- Promoting the use of renewable energy sources,
- Commissioning the construction sector by creating new jobs.

Objective: With the Operational Programme for the implementation of European cohesion policy for the period 2014 - 2020 Slovenia has committed to restore 1.8 million square meters of public building areas, and every year energy renovate 3% of the housing stock in the use of government.

Good practice
Primary School Cirkulane

BEFORE THE RENOVATION

- Built in 1890.
- Heat oil used for heating. The annual consumption was about 14,335 liters.
- The municipality declared the object to the call for funds from the Cohesion Fund.

Cirkulane municipality accepted the Local energy concept and has nominated the municipality energy manager. By the renovation of their buildings the municipality implements its Local energy concept measures for sustainable energy development. The main goal of this endeavour is 100 % incorporation of the renewable energy sources and energy renovation of their public buildings and to became the green municipality.

Facade before the renovation.

Old heating oil boiler:
TAM TVT Standard S, 100 kW.

AFTER THE RENOVATION

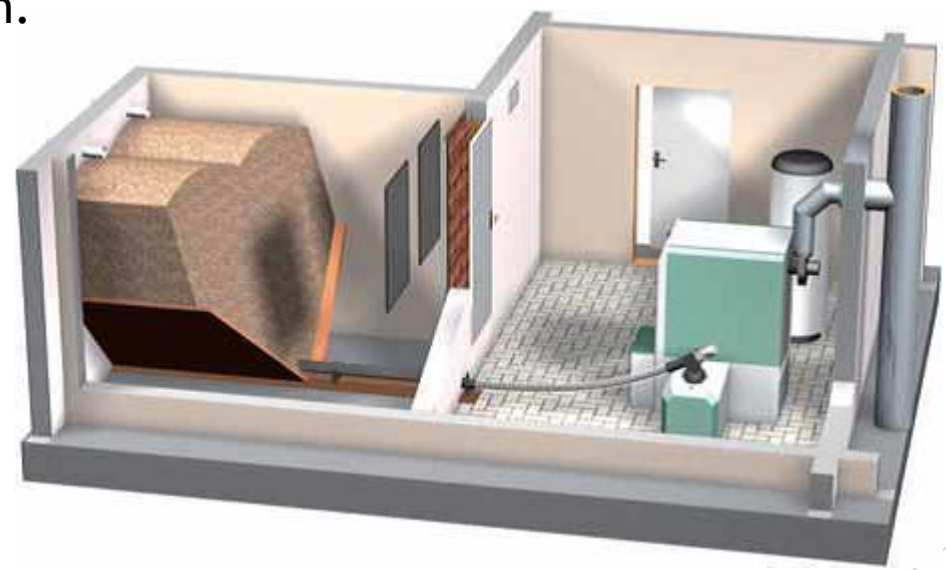
The renovation of the primary school building consisted of:

- Building enveloped by thermal insulation (roof, facade, windows and doors)
- Renovation of the heating system (new boiler house on wood pellets, water distribution system, temperature control and hydraulic balancing of the heating system),

The operation was co-financed from the Cohesion fund by 85 % of the eligible costs. VAT, ineligible costs and 15 % of the eligible costs were covered from the municipality`s own financial sources.

- Together with all measures, the use of heat decreased by 65%
- Savings on energy source amounted to 11.100 EUR per year

Facade after the renovation.



Herz Firematic 201
Type of fuel: wood pellets
Nominal power: 201 kW
Thermal efficiency: 89.7 %

Low-energy kindergarten Markovci

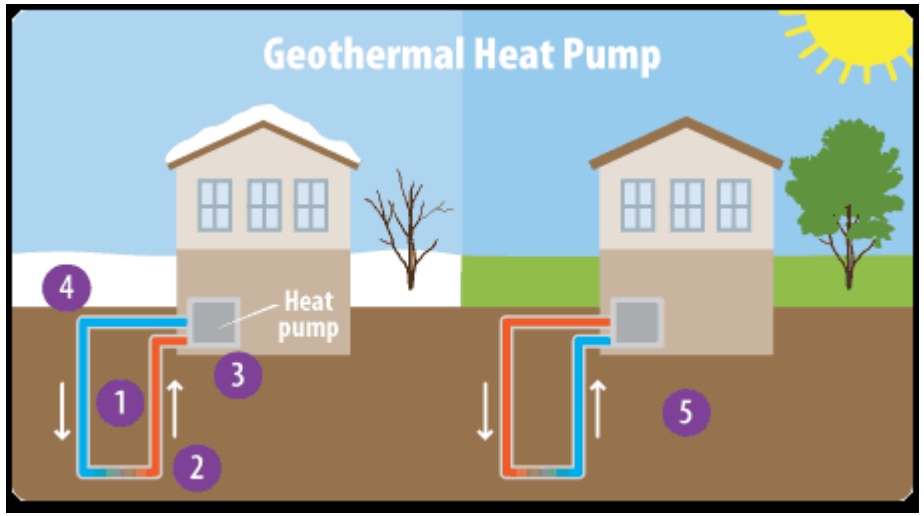
- New building – constructed in 2013.
- Due to increasing number of children in municipality Markovci, the old kindergarten did not longer provide enough space for implementing activities.
- The inhabitants of the municipality Markovci have demanded better conditions in kindergarten and also enough places for all children.

- Walls of the building are of wooden construction with 240 mm thick mineral wool thermal insulation,
- Wooden joinery Uw = 0,9 W/m2K,
- Installation of ventilation system with heat recovery (efficiency of heat recovery - 83 %),
- Installation of heat pumps water/water,
- Building area is 1.909, m2.

Heating and cooling system

Built with two Reversible heat pumps AERMEC WRL 160 XH:

- Heating power: Qo = 50 kW 35/25 °C
- Cooling power: Qh = 43,4 kW 7/13°C
- COP 4,8
- Heating system: underfloor heating, radiators, convectors

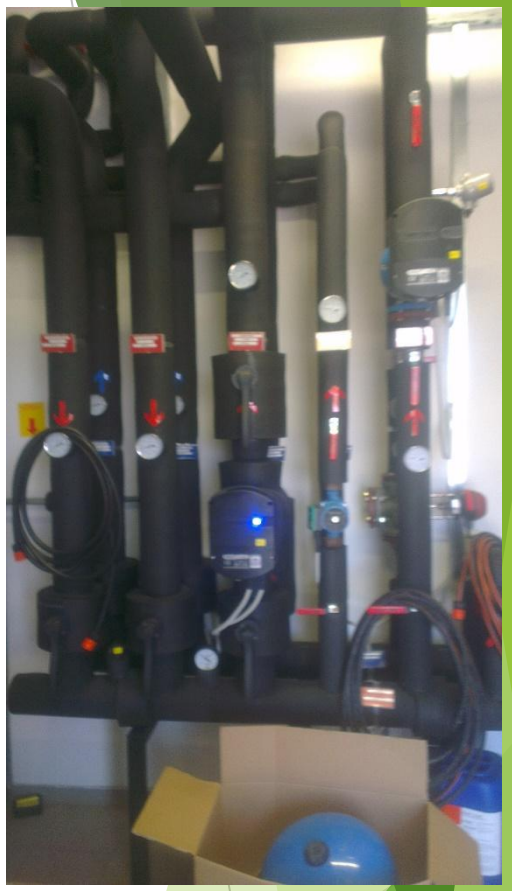


1.Water or a refrigerant moves through a loop of pipes.
2.When the weather is cold, the water or refrigerant heats up as it travels through the part of the loop that's buried underground.
3.Once it gets back above ground, the warmed water or refrigerant transfers heat into the building.
4.The water or refrigerant cools down after its heat is transferred. It is pumped back underground where it heats up once more, starting the process again.
5.On a hot day, the system can run in reverse. The water or refrigerant cools the building and then is pumped underground where extra heat is transferred to the ground around the pipes.

Boiler house

AERMEC WRL 160 XH.

1000 L hot water tank.



Heat distribution system.

Domestic hot water

The primary low-temperature system did not meet the needs of sanitary hot water and did not meet the legal requirements.

Built in:

- Daikin Altherma – high temerature heat pump,
- Air/water system,
- Water heating up to 80 °C.

Daikin Altherma.

Ventilation system

Ventilation system with heat recovery:

- AL-KO Therm AT4,
- Heating power: 50,2 kW,
- Cooling power: 55,6 kW,
- Heat recovery by 83 %.

efficiencyJobs

Co-funded by the
Lifelong Learning Programme
of the European Union

Proyect: 2013-1-ES1-LEO05-66818-AN

Thank you for your attention

fundación SANVALERO GRUPO SANVALERO

ecoversum

ENVIRONMENT PARK Parco Scientifico Tecnologico per l'Ambiente