

Theoretical Possibilities for Increase of RES-e in Slovenia

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- Primary energy: 293,3 PJ
- Final energy: 194,2 PJ
- Electrical energy consumption: 45 PJ

$$1 \text{ PJ} = 1 \cdot 10^{15} \text{ J} = 277,77 \text{ GWh}$$



- **Four main rivers in Slovenia are used in this evaluation (Sava, Drava, Soča and Mura).**

- **Length of river in Slovenia and on border:**

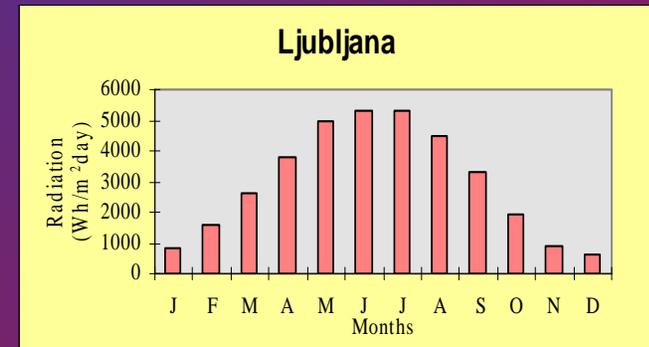
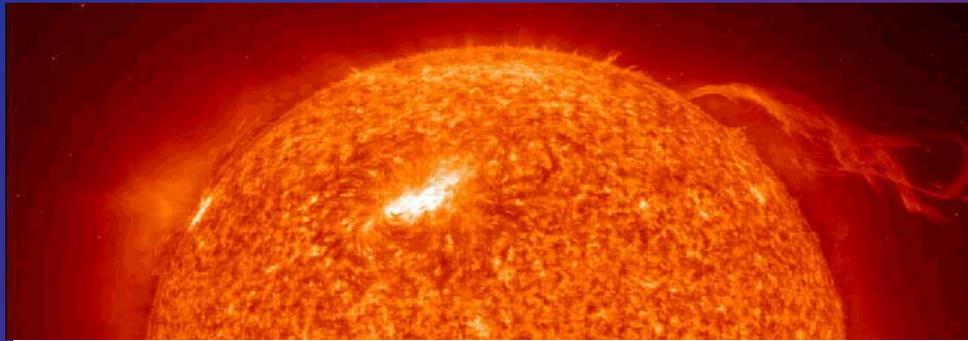
- **SAVA: 221 km**
- **DRAVA: 142 km**
- **SOČA: 96 km**
- **MURA: 95 km**

- Whole potential of four main rivers in Slovenia:

$$Q = 52,2 \text{ PJ/a}$$

- Whole potential of electrical energy production from hydro power plants in Slovenia ($\eta = 80\%$):

$$Q_{el} = 41,7 \text{ PJ/a}$$



- **Theoretical potential of solar radiation comprises the whole amount of solar energy falling to the earth.**
- **Average value of annual solar radiation in Slovenia: 3102,6 Wh/m²dan**

- Theoretical potential of solar radiation in Slovenia:

$$Q = 82.580 \text{ PJ/a}$$

- Theoretical potential of solar radiation without fields, rivers, lakes and roads:

$$Q = 16.980 \text{ PJ/a}$$

- Theoretical potential of solar radiation with consideration of all roofs in houses:

$$Q = 308,6 \text{ PJ/a}$$

- Theoretical potential of electrical energy production ($\eta = 10\%$):

$$Q_{el} = 30,8 \text{ PJ/a}$$



- Theoretical potential at burning whole wood biomass:

$$Q = 2.385 \text{ PJ/a}$$

- Theoretical potential at burning allowed increase (57%):

$$Q = 34,5 \text{ PJ/a}$$

- Allowed increase used in a steam turbine ($\eta = 30\%$):

$$Q_{el} = 10,35 \text{ PJ/a}$$

- Theoretical potential at burning whole amount of landfill gas (stored waste):

$$Q = 1,77 \text{ PJ/a}$$

- Theoretical potential of electricity production from landfill gas ($\eta = 30\%$):

$$Q_{el} = 0,531 \text{ PJ/a}$$

- Theoretical potential at burning whole amount of sewage sludge gas (wastewater treatment plants):

$$Q = 0,896 \text{ PJ/a}$$

- Theoretical potential of electricity production ($\eta = 30\%$):

$$Q_{el} = 0,268 \text{ PJ/a}$$

- Theoretical potential at burning whole amount of biogas from animal waste (pigs, caws, horses, chickens):

$$Q = 25,5 \text{ PJ/a}$$

- Theoretical potential of electricity production ($\eta = 30\%$):

$$Q_{el} = 7,65 \text{ PJ/a}$$

- Theoretical potential at planting all farm lands (490.000 ha) with feed beet:

$$Q = 71,66 \text{ PJ/a}$$

- Theoretical potential at planting areas in growing over (60.000 ha):

$$Q = 8,74 \text{ PJ/a}$$

- Theoretical potential of electricity production from growing areas ($\eta = 30\%$):

$$Q_{el} = 2,62 \text{ PJ/a}$$



- Theoretical potential of wind energy in Slovenia (0,1 % of solar energy changes into the wind energy).

$$Q = 82,6 \text{ PJ/a}$$

- Theoretical potential of electricity production from wind energy ($\eta = 59\%$):

$$Q_{el} = 48,7 \text{ PJ/a}$$



- Geothermal energy is the energy in the interior of the earth and the energy which is produced by radioactive decay in the earth.
- Theoretical potential of geothermal energy calculated on Slovenian area:

$$Q = 19,7 \text{ PJ/a}$$

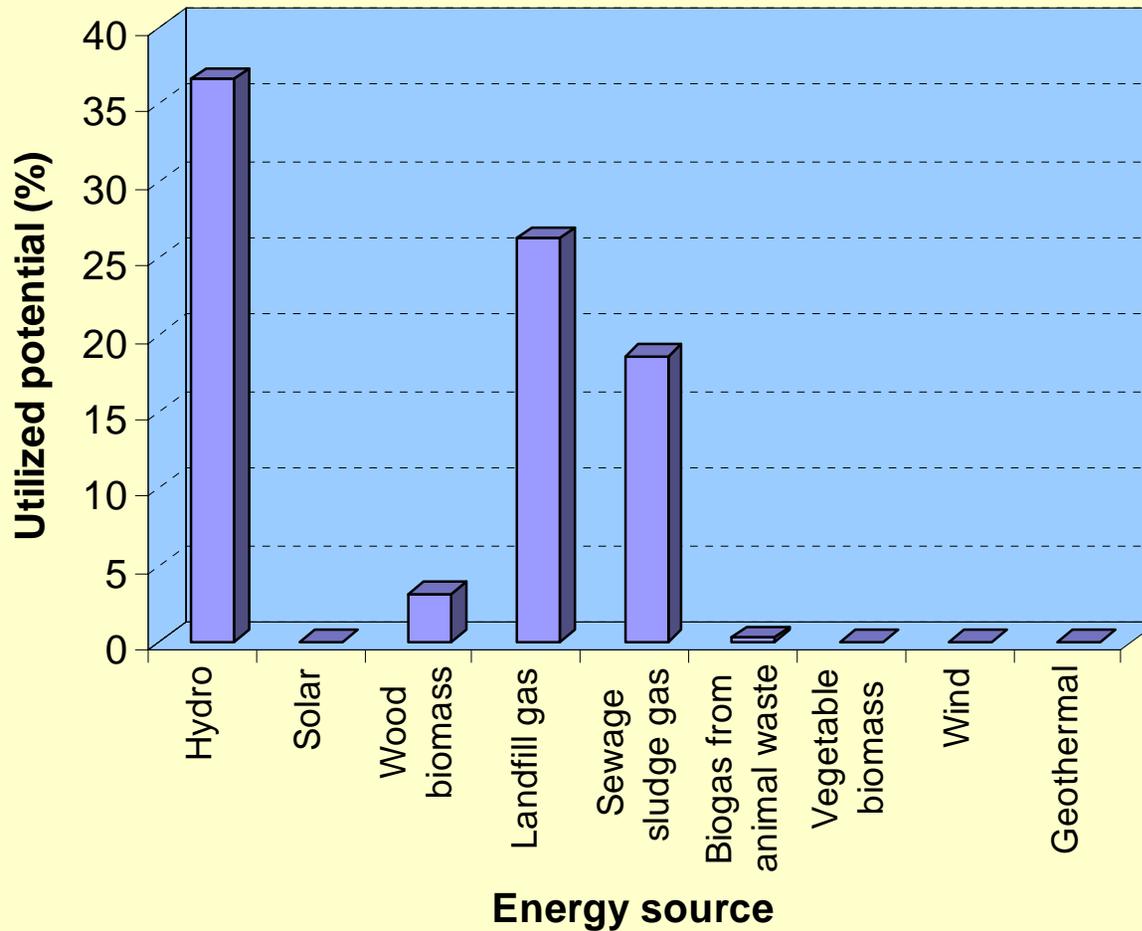
- Theoretical potential of electricity production from geothermal energy in Slovenia ($\eta = 5,5\%$):

$$Q_{el} = 1,08 \text{ PJ/a}$$

- Theoretical potentials for electricity from RES and evaluation of actual situation on this field.

	Theo. poten. for electricity (PJ)	Actual situation in (PJ)	Utilized potential (%)
Hydro energy	41,7	15,28	36,6
Solar energy	35	0,1 · 10⁻⁶	0,28 · 10⁻⁶
Wood biomass	10,35	0,32	3,1
Landfill gas	0,531	0,14	26,3
Sewage sludge gas	0,268	0,05	18,6
Biogas from animal waste	7,65	0,018	0,23
Vegetable biomass	2,62	0	0
Wind energy	55,3	0	0
Geothermal energy	1,08	0	0

UTILIZED POTENTIAL



**Thank you very much
for your attention**

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