

Serbia is one of South-East European countries with a very unfavorable energy potential. Oil and natural gas indigenous resources are small, and exploitation reserves are estimated at 20 Mtoe. Due to coal exploitation reserves which are estimated at 2741 Mtoe, among which 2616 Mtoe is lignite, Serbia has relative energy self-sufficiency. Also, total hydro potential in Serbia is estimated at 2.15 Mtoe (25,000 GWh) per year, whereof around 1.46 Mtoe (17,000 GWh) per year

have been identified as technically and economically feasible and around 0.86 Mtoe (10,000 GWh) is already utilized.

Energy sector (production of electricity plus district heating) has an important economic role as the largest economic sector in Serbia, which makes more than 10% of GDP. At the moment, electricity makes 28% of total energy consumption, with total installed generation capacity of 7,124 MW (2011 year), excluding 1,235 MW installed in thermal power plants in Kosovo. The aggregate capacity of six thermal power plants (TPP) with 18 blocks is 3,936 MW (55.25% of installed capacity), while 2.835 MW (39.8% of installed capacity) is in nine hydroelectric power plants (HPP) with 50 hydro units (31 units in run-of-river HPP with capacity of 1850 MW, 17 units in reservoir HPP with capacity of 371 MW and 2 units in pumped storage HPP with capacity of 614 MW). A small part of 353 MW (4.95% of installed capacity) is installed in combined heat and power plants (co-generation) which use natural gas and oil as fuel. Apart from this, approximately 461 MWe is installed in industrial energy plants of more than 30 companies. However, significant portion of these production capacities is currently out of operation. The total share of generated electricity from TPP is much higher than their actual share in the installed capacities, as around 73.5% of electricity generation is obtained from local lignite-fired thermal power plants, approximately 25.5% is produced in large hydropower plants, and the rest of 1.0% is obtained from combined heat and power plants (year 2011), but this can vary depending on hydrology.

Serbia's municipal district heating systems operate in 55 cities and towns with the installed capacity of around 6,800 MJ/s (thereof 3,000 MJ/s in Belgrade, which is about 44%), and total heat production of 7,000 GWh. Approximately 17% of Serbian households are connected to the district heating system. The district heating systems are fuelled by natural gas (65%), heavy and light fuel oil (18%), electricity (2%), and coal (15%).

The current carbon intensity (emission of greenhouse gases per unit GDP) and environmental impact of the energy sector in Serbia is relatively high, mainly as a result of the use of domestic low calorific pit-mined lignite which is burned using old equipment without abatement technology, and has low efficiency of energy production and energy use.

Lignite combustion generates 90% of energy related SO<sub>2</sub> and NO<sub>x</sub> emissions, 65% of CO<sub>2</sub> emissions and roughly 67 kt of particulate emissions. GHG emissions of Serbian energy sector are estimated at 31 million t CO<sub>2</sub> eq. (year 2010, without Kosovo), which is about 45% of Serbia's total CO<sub>2</sub> emissions. It is expected that the emissions of greenhouse gases will increase by about 10-13% by the year 2020 comparing to 2010, as a result of increased demand for electricity.

On the other hand, due to out-of-date energy production and distribution facilities, there is a great potential for energy efficiency and reduction of operational losses and emissions of greenhouse gases, which makes the energy sector the important sector in the future climate change regime. Mitigation potential through

modernization and capacity increase of existing TPP and construction of new ones using advanced ultra super-critical technology instead of conventionally used sub-critical and closing some old TPP which operate with low efficiency is above 3 Mt CO<sub>2</sub> eq. Additional 1 Mt CO<sub>2</sub> eq. can be achieved through increasing the capacity of combined heat and power plants, and 800,000 t CO<sub>2</sub> eq. through the modernization of existing district heating systems. With additional measures in

building sector like thermal insulation of building walls, replacement of the existing lighting systems with more efficient ones, as well as the windows in the households and public buildings, total mitigation potential in energy and building sector is estimated at 12.5 Mt CO<sub>2</sub> eq./year

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