

Wood to electricity, and comparison to photovoltaic production

a)

Using average photosynthetic efficiency of 0.6% from a yearly mean irradiation of 140 W/m^2 (Switzerland), how much dry wood (average density 0.56 kg/m^3) is grown every year renewably in all Swiss forest ($=11'000 \text{ km}^2 = 26\%$ of the total country area) ? (use LHV_dry of 17 MJ/kg)

Exploiting this wood via combustion and steam cycles into electricity with a conversion of 20% (10 MWth plants), how much electricity can this generate annually?

b)

Using the solar irradiation in photovoltaic panels (20% efficient) installed on all $\sim 138 \text{ km}^2$ well oriented roof surfaces in Switzerland, how much solar electricity can this generate ?

c)

Compare and comment both options. In Switzerland annual electricity generation is around 65 TWhe.