Should Renewable Energy Substitute Coal Power Plants Rather Than Kerosene in Aircraft ?



- 1. 1 kWh of renewable energy ...
- 2. ... can substitue 2,5 kWh of coal (lignite, brown coal) in a coal power plant (efficiency of a coal power plant: 40%) this is ...
- 3. equivalent to 0.9 kg CO2 (0.36 kg CO2 for 1 kWh of energy burning lignite\*).
- 4. ... but if used in an aircraft it generates LH2 with energy of 0.6 kWh (efficiencies: 70% electrolysis, 83% liquefaction & transport)
- 5. LH2 aircraft consume (say) 10% more energy (higher operating empty mass, more wetted area); so a kerosene aircraft needs ...
- 6. only 0.55 kWh, which can be substituted. This is equivalent to 0.14 kg CO2 (0.26 kg CO2 for 1 kWh of energy burning kerosene\*).
- 7. Note: Not considered is that hydrogen aircraft may come with higher non-CO2 effects than kerosene aircraft.
- \* UBA, 2016. CO2 Emission Factors for Fossil Fuels. Available from: https://bit.ly/3r8avD1

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- 2. ... can substitue 2,5 kWh of coal (lignite, brown coal) in a coal power plant (efficiency of a coal power plant: 40%) this is ...
- 3. equivalent to 0.9 kg CO2 (0.36 kg CO2 for 1 kWh of energy burning lignite\*).
- 4. ... but if used in an aircraft it generates "Sustainable Aviation Fuel" (SAF) from "Power to Liquid" (PtL) with an energy of 0.22 kWh (efficiencies: 70% electrolysis, 32% Fischer-Tropsch process, 99% transport; https://perma.cc/BJJ6-5L74, p. 44)
- 5. which substitutes the same amount of kerosene. This is equivalent to 0.057 kg CO2 (0.26 kg CO2 for 1 kWh of kerosene\*).
- \* UBA, 2016. CO2 Emission Factors for Fossil Fuels. Available from: https://bit.ly/3r8avD1

Origin:

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