

Solar hybrid methanol production from coal and natural gas by solar thermochemical process
: CO₂ reduction and Cost evaluation

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ABSTRACT

We have proposed a project to develop an innovative technology to produce solar hybrid fuel (SH-methanol) was proposed. The primary aim of the project is to produce solar hybrid fuel (SH-methanol) which are commercially competitive to fossil fuels of LNG and gasoline. The SH-methanol can be produced from fossil (coal, natural gas) and solar energies through a solar thermochemical process using concentrated solar energy. The difference between the higher heat values of the solar hybrid methanol (SH-MeOH) and the intact fossil fuels (coal and natural gas) is 169.3 kJ, indicating that we can introduce 14% solar energy by using SH-MeOH, compared to the intact fossil fuels. The cost of the SH-MeOH was competitive to LNG (in Japan). When the fossil fuels of each 1.0 kWh of the coal fired- and LNG fired-power plants were replaced with the SH-fuels, we can reduce the CO₂ emission amount from 0.71 kg/kWh to 0.43 kg/kWh_(CO₂ reduction by about 40%).