IIT-H, Monash university analysis moots geothermal energy

Professors Chandrasekharam and Pathegama.

Geothermal energy is better than photovoltaic energy, in terms of CO2 emissions
An extensive analysis by the Indian Institute of Technology, Hyderabad (IIT-H) and Monash University, Australia, has led researchers to suggest that geothermal energy (using earth's heat to generate power) is better than photovoltaic energy, in terms of carbon dioxide emissions.

The researchers also found that a combination of renewable energy technology must be adopted in this era of dwindling fossil fuel reserves and increasing greenhouse gas emissions.

This analysis was undertaken by professor D. Chandrasekharam of the department of Civil Engineering, IIT-H, and professor G. Ranjith Pathegama of the department of Civil Engineering, Monash University, Melbourne.

The research paper was published recently in the journal "Geomechanics and Geophysics for Geo-Energy and Geo-Resources."

"While solar power does have benefits over conventional energy sources, is the hype surrounding its apparent 'greenness' justified? Solar power is far from the zero-emission energy source that it is claimed to be," said Chandrasekharam.

Their study involved life-cycle assessment of renewable energy sources. Around 10 tonnes of quartz are needed to manufacture solar cells that can generate one megawatt of electricity from the Sun. One MW of electricity can support about 20,000 people annually.

“Imagine how many tonnes of quartz has to be mined to support millions of people in the countries! A Solar pv cell involves two important stages: i) producing metallurgical grade silicon (MGS) and ii) producing electronic grade silicon (EGS) from quartz. In the first stage, 1,756 thousand tonnes of CO2 are released, and a similar amount of CO2 is released during the conversion of EGS to ingots,” he added.

The total CO2 emissions during the life-cycle of a solar pv cell are about 3,312 million kg. This is far higher than geothermal energy source, which emits about 450 g/kWh generated, reports the paper.

According to the recently-published report by the International Energy Agency (IEA), under the sustainable development policy proposed for adoption to mitigate CO2 emissions (year 2040), nearly 54 billion cells are required to meet the generation target of 14,139 TWh. This amounts to releasing huge amounts of CO2 into the atmosphere instead of conserving CO2, the researchers say.

“Unlike other renewables, geothermal energy can supply base-load electricity and the waste after its life-cycle, unlike solar PV, is negligible. The best way to go forward is to choose a combination of technologies that can minimise harm to the environment, not chase the horizon of zero harm,” write the researchers.

The researchers analysed the life-cycle assessment solar cell technology in terms of the environmental impacts during construction, operation and decommissioning stages.

In addition to CO2 emissions associated with mining of silica and its conversion into electronic-grade quartz to be used in solar cells, disposal of waste is a huge environmental concern, they say.

According to the “End of life management of solar photo voltaic panels” published by the International Renewable Energy Agency (IRENA), globally 60 to 75 million tonnes of solar pv panel waste will be generated by 2050 that cannot be recycled. Some facts are hard to digest, say the researchers.

Source: The Hindu
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