

PRESS RELEASE

IIT Hyderabad Analysis moots Geothermal Energy as a Greener Alternative to technologies currently in use

Researchers show that amongst renewables currently in use, carbon dioxide emissions from photo voltaic is much higher compared to geothermal energy source. Geothermal energy uses earth's heat to generate power.

HYDERABAD, XX January 2020: An extensive analysis by Indian Institute of Technology Hyderabad and Monash University, Australia Researchers has suggested geothermal energy – the use of the earth's heat to generate power – is better than photovoltaic energy in terms of carbon dioxide emissions. The researchers also suggest 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 **Prof. D. Chandrasekharam, Department of Civil Engineering, IIT Hyderabad, and Prof. G. Ranjith Pathegama, Department of Civil Engineering, Monash University, Melbourne, Australia.** Their Research paper was published recently in the reputed peer-reviewed journal *Geomechanics and Geophysics for Geo-Energy and Geo-Resources.*

Speaking about their analysis, Prof D. Chandrasekharam, said, “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-emissions energy source that it is claimed to be.”

Their study involved lifecycle assessment of renewables. Around 10 tonnes of quartz is needed to manufacture solar cells that can generate 1 megawatt of electricity from Sun. 1 MWe of electricity can support about 20,000 people annually.

Further, **Prof D. Chandrasekharam, said,** “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 an amount of 1756 thousand tonnes of CO₂ is released, and a similar amount of CO₂ is released during the conversion of EGS to ingots.”

The total CO₂ emissions during the lifecycle of a solar pv cell are about 3312 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 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 carbon-dioxide into the atmosphere instead of conserving carbon dioxide says the researchers.

While certain alternative energy sources such as solar power are being widely considered among the green energy technologies, no type of energy can be completely environmentally neutral. A comprehensive assessment of all costs and benefits must be undertaken for all green energy technologies.

“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 minimize harm to the environment, not chase the horizon of zero harm”, **write the researchers in their recent paper.**

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

In addition to the carbon dioxide emissions associated with the mining of silica and its conversion into electronic-grade quartz to be used in solar cells, disposal of waste is a huge environmental concern writes the researchers.

Solar photo voltaic does not emit carbon dioxide during its electricity generation but this cell has already emitted large quantities of carbon dioxide during its evolution. Then how can you give green energy tag to this source say the researchers.

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

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Indian Institute of Technology Hyderabad (IITH) is one of the six new Indian Institutes of Technology established by the Government of India in 2008. In a short span of less than 10 years, the institute built on an imposing 570-acre campus and has been ranked among the top ten institutes for four consecutive years in the [National Institute Ranking Framework \(NIRF\)](#) released by the Ministry of Human Resource Development (MHRD), Government of India. The Institute was also ranked #10 in the first edition of [Atal Ranking of Institutions on Innovation Achievements \(ARIIA\)](#) introduced this year by MHRD to systematically rank all major higher educational institutions and universities in India on indicators related to ‘Innovation and Entrepreneurship Development’ among students and faculties.



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IIT Hyderabad has close to 210 full-time faculty, 2,855 students of whom 20 per cent are women, nearly 200 state-of-the-art laboratories and five research and entrepreneurship centers. The Institute has a strong research focus with more than Rs. 500 crore of sanctioned research funding while Ph.D. scholars account for about 30 per cent of total student strength. IITH students and faculty are at the forefront of innovation with more than 1,500 research publications and patent disclosures, 300 sponsored/consultancy projects and 50 industry collaborations. IITH has MoUs with 50 universities in the U.S., Japan, Australia, Taiwan and Europe. IITH has been pioneering change in pedagogy with fractal academic programs that atomizes course modules, encourage interdisciplinary learning spanning innovative technology, fundamental science, liberal arts and creative arts like photography, theatre and painting.

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