Journal of Geology & Geophysics
ISSN: 2381-8719
OPEN ACCESS Freely available online
Commentary

Life Cycle Assessment (LCA) Analysis in Geothermal Energy

Desheng Liu*

Department of Geography & Statistics, The Ohio State University, Ohio, USA

DESCRIPTION

Geothermal energy is a renewable base-load energy source that could aid in the decarburization of the electricity producing industry. Scientists have found that the inner core of the planet is around 10,800 degrees Fahrenheit (°F) hotter than the sun's surface. The earth's mantle has a temperature gradient from 392°F at the top boundary with the crust to 7,230°F at the mantle-core boundary. The tectonic plates that make up the earth's crust are divided into parts. Numerous volcanoes develop close to the borders of these plates, where magma is in close proximity to the earth's surface. Volcanoes spew out lava, some of which contains magma. Rocks and water absorb heat from magma deep underground. The rocks and water found deeper underground have the highest temperatures. Geothermal energy's environmental effects may be quickly and accurately estimated according to novel simplified models based on Life Cycle Assessment (LCA). The natural heat content of the Earth is captured through geothermal energy. It is a resource that is continuously replenished by the radioactive elements such as potassium, thorium, and uranium decaying at a rate comparable to the rate of present human use. It is suitable for base-load power generation. Geothermal energy can produce base-load power since it is not affected by seasonal and climatic conditions. These characteristics make it a crucial energy source that could aid in the decarburization of the power generation industry and, consequently, the shift to a low-carbon economy that is required to reduce the long-term, and perhaps irreversible, effects of global warming.

Life Cycle Assessment (LCA) is the prevailing tool for the quantification of environmental impacts of technologies. The LCA technique includes two crucial components: It considers a range of environmental challenges, including but not limited to climate change, and covers the entire life cycle. These characteristics make LCA a widely-used technique for simplifying decision-making because they enable the discovery of trade-offs (i.e., burden-shifting between environmental categories and between life cycle stages).

However, there is a lot of variation in LCA studies on geothermal energy; for instance, the carbon footprint of electricity produced by geothermal energy ranges over two orders of magnitude, from 5 to 800 g CO_2-eq./kWh. This heterogeneity is partly caused by LCA methodological decisions like how the system boundary is defined, but it is also a result of other site-specific factors like the geothermal fluid's composition or the depth of the geothermal reservoir. The latter, which is perhaps the most time-consuming step in the LCA process for any application, highlights the significance of gathering high-quality field data.

An alternate strategy relies on the creation of streamlined LCA models based on a small number of significant characteristics that account for the majority of the variability in the findings of the LCA; these parameters are often found *via* Global Sensitivity Analysis (GSA). Simplified LCA models provide for quick calculations of the environmental consequences because they only need a small amount of site-specific data. They can also be used by geothermal firms without LCA expertise or precise information to quantify the environmental performance of their plants. Policy makers can use them to promote the formulation of energy regulations using straightforward but accurate approximations. A developing technology for geothermal power generation, improved geothermal systems, was the subject of early simplified LCA models developed in the energy sector. These early models' significant drawback is that they only consider one type of environmental impact: Climate change.

Most of the geothermal installed capacity is made up of conventional geothermal technologies, which use well-known conversion techniques like dry-steam and flash plants to tap into high-enthalpy hydrothermal sources. Enhanced Geothermal Systems (EGS), on the other hand, uses hydraulic stimulation to create a "designed" reservoir and commonly produces power through binary cycle plants. It was created to harness unusual geothermal reservoirs that lack either water or appropriate permeability.

Correspondence to: Desheng Liu, Department of Geography & Statistics, The Ohio State University, Ohio, USA, E-mail: liu.deshng09@gmail.com

Received: 04-Jul-2022; Manuscript No. JGG-22-18918; **Editor assigned:** 06- Jul -2022; PreQC. No. JGG-22-18918 (PQ); **Reviewed:** 20-Jul-2022; QC. No. JGG-22-18918; **Revised:** 27-Jul-2022; Manuscript No. JGG-22-18918 (R); **Published:** 04-Aug-2022, DOI: 10.35248/2381-8719.22.11.1037.

Citation: Liu D (2022) Life Cycle Assessment (LCA) Analysis in Geothermal Energy. J Geol Geophys. 11:1037.