

# **Exergy as a global energy sustainability indicator. A review of the state of the art**

J.C. Romero, P. Linares

**Abstract—** This paper looks at the suitability of using exergy as an indicator for energy sustainability studies, by reviewing the relevant literature and describing and assessing the different uses that have been proposed for it as a global energy sustainability indicator.

Exergy is a thermodynamic property that links the first and the second thermodynamic principles as well as connects a system under study with the environment where it belongs. Since the first principle of thermodynamics measures quantity of energy and the second measures irreversibilities, i.e. quality of energy, having a single thermodynamic indicator which is able to deal with both issues at the same time means a great advance in energy sustainability studies.

Our review shows that using exergy for weak sustainability studies presents some problems, but still offers a worthy contribution to this field, more valuable than pure economic analyses. Strong sustainability assessments featuring exergy show more drawbacks and complications, but can also play a key role in a sustainability framework designed in order to obtain sustainable policies which are able to maintain homeostatic relations between the system under study and its environment, thus complementing traditional economic approaches which are mainly focused on the economic and social poles of sustainability.

**Index Terms—** Exergy; Weak sustainability; Strong sustainability

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to Renewable & Sustainable Energy Reviews, you can download the paper from the journal website:

[Access to the Journal website](#)

**Citation:**

*Romero, J.C.; Linares, P.; "Exergy as a global energy sustainability indicator. A review of the state of the art", Renewable & Sustainable Energy Reviews, vol.33, no., pp.427-442. May, 2014.*