Emergy Assessment of Global Renewable Sources
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ABSTRACT

The empower that is derived from solar, geothermal and tidal sources drives the productive processes of the geobiosphere and is responsible for developing exergy gradients (work potential) to be transformed into secondary exergy sources (wind, and chemical potential of rain water) and tertiary sources (chemical and geopotential energy of river discharges and the available energy of breaking waves). In this paper we use the geobiosphere emergy baseline (GEB) to compute transformities for secondary and tertiary renewable exergy sources. We also refine methods used to compute secondary and tertiary sources.

In particular, we develop an emergy accounting procedure for landscape systems that prevents double counting. We suggest that when evaluating landscape systems, the geobiosphere tripartite (solar, tide, geothermal) solar equivalent inflows be summed, and compared to the largest of the secondary and tertiary flows. The driving energy for the landscape system is then the larger of these two values.

Additionally, we suggest that defining spatial and temporal boundaries is critical to emergy evaluations. Spatial boundaries should be three dimensional and include a depth below the land surface, in order to compute geothermal exergy inflows, and a height above the land surface, to include adsorption of geostrophic winds and other atmospheric phenomena. Moreover, specifying the temporal boundaries of an analysis helps to allocate driving emergy sources properly, especially related to landscape scale analyses.

Citation
