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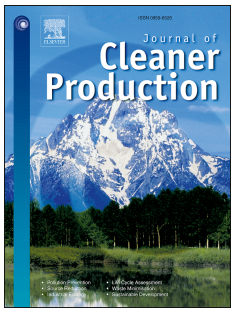

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Hossein Khajehpour, Yadollah Saboohi, George Tsatsaronis

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Environmental Responsibility Accounting in Complex Energy Systems

Hossein Khajehpour[a], Yadollah Saboohi[b]* and George Tsatsaronis[c]

[a,b] Department of Energy Engineering of Sharif University of Technology, Tehran, Iran, khajehpour@energy.sharif.ir

[a,b] Sharif Energy Research Institute, Tehran, Iran, saboohi@sharif.ir,

[c] Institute for Energy Engineering, Technical University of Berlin, Berlin, Germany, tsatsaronis@iet.tu-berlin.de

Abstract:

Environmental considerations have imposed new restrictions in the planning and management of energy systems. This research aims at describing the necessity and application of a new concept in environmental responsibility accounting. The method is based on physical quantities to overcome the weaknesses of already developed allocation approaches, and to internalize the external environmental damages using the exergy concept. The proposed method is a modification of the exergoenvironmental analysis in order to take into account the effect of non-energy streams in a macro-level energy system. In the proposed method, environmental responsibilities are to be calculated based on the exergy destruction within the system. As a case study, the method is applied to a complex energy system. It is shown that the derived environmental responsibilities are representative of the units' role in total emissions and corresponding contributions to an integrated environmental management. Comparison of the results shows that the responsibilities are higher than the emission reduction limits for service consuming units, while they are less for service providing units. The differences between the responsibilities and permits could represent the non-internalized external damage costs.

Keywords: