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Integration of national energy markets: An approach based on sustainability

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The regional integration of electricity markets has been considered a desirable objective for Latin American nations. However, the establishment of rules that allow the articulation from the technical and economic perspective, is not enough, given the significant number of stakeholders and social and environmental aspects that must be taken into account. In this way, a mathematical model was developed for doing the assessment of different strategies that should be considered, obtaining prospective scenarios and the dependence that these scenarios have on parameters and it is proposed to make certain considerations. In spite of this, the model does not allow to account for social and environmental issues whose complexity is different along the sections that must be designed, constructed and operated, in order to realize the necessary expansion of the electrical transmission required to supply the new demands of an integrated international market. For this reason, two methodologies were developed to address the social and environmental considerations of the energy system, in the approach to the implementation of sustainable energy systems, which includes renewable energy systems. In the first methodology developed, the socioenvironmental sensitivity of the landscape is analyzed, based on the analysis of the network of direct, indirect and cumulative (additive and synergic) relationships of anthropic interventions such as those related to the design, construction and operation of transmission lines. With the second methodology, the aim is to systemically analyze landscape emergencies such as wellbeing and sustainability, so that different landscape units are made comparable and projects related to the development of projects associated with energy markets can be established timely and assertively. The results obtained include sensitivity maps constructed in geographic information systems, network analysis, bifurcation analysis and simulations of different scenarios. It is concluded that the analysis of a complex issue such as electricity markets merits an analysis from different theoretical perspectives aimed at guaranteeing sustainability in the economy, the environment, and society.

Biography

Johan Manuel Redondo has completed his Ph.D. and postdoctoral studies from the National University of Colombia. He is the president of the Society for Industrial and Applied Mathematics - Colombian Section and Director of the research group "Economics and sustainable development" of the Catholic University of Colombia. He has published so interesting papers in reputed journals about the modeling of complex systems like energy markets.

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