## Multistage expansion planning of generation and interconnections with sustainable energy development criteria: A multiobjective model

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Abstract— A novel multiobjective, multiarea and multistage model to long-term expansion planning of integrated generation and transmission corridors incorporating sustainable energy developing is presented in this paper. The proposed MESEDES model is a "bottom-up" energy model which considers the electricity generation/transmission value-chain, i.e., power generation alternatives including renewables, nuclear and traditional thermal generation along with transmission corridors. The model decides the optimal location and timing of the electricity generation/transmission abroad the multistage planning horizon. The proposed model considers three objectives belonging to sustainable energy development criteria such as: (a) the minimization of investments and operation costs of power generation, transmission corridors, energy efficiency (demand side management (DSM) programs) considering CO2 capture technologies; (b) minimization of Life-Cycle Greenhouse Gas Emissions (GHG); and (c) maximization of the diversification of electricity generation mix. The proposed model consider aspects of the carbon abatement policy under the CDM - Clean **Development Mechanism or European Union Greenhouse Gas Emission Trading** Scheme. A case study is used to illustrate the proposed framework.

Index Terms— Demand side management; Greenhouse emission; Multicriteria optimization; Power system expansion planning; Sustainable energy development

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## **Citation:**

Unsihuay, C.; Marangon-Lima, J.W.; Zambroni de Souza, A.C.; Pérez-Arriaga, I.J.; "Multistage expansion planning of generation and interconnections with sustainable energy development criteria: A multiobjective model", International Journal of Electrical Power & Energy Systems, vol.33, no.2, pp.258-270. February, 2011.