Paris Session 2022

Inserting Crucial Environmental Issues into Energy Planning: Paths for Carbon Reduction

C3 - Power System Environmental Performance

PS1 - The use of sustainability indexes, less or more complex, are common in the scenario analysis of generation expansion for different countries. Compacting different metrics related to different compartments (i.e., technical, economic, social, environmental) into single aggregated scores made of multi dimensions is very complex and needs a transparent approach. The ExternE approach transforms all impacts into monetary values to allow summing up, weighing ad comparing solutions according to a common base. What is the experience from the audience in the development of sustainability indexes? Can other examples be brought from the audience? Sustainability indexes and external costs have also been addressed in numerous CIGRE projects and published as TB650 Sustainable development performance indicators for electric power generation (2016) and TB616 Externalities of Overhead High Voltage Power Lines (2015). What is the experience from the audience in the application of approaches like those referred to, in the process of planning of system expansion?

Ricardo C. Furtado, Brazil

• *Question 1.2 - The ExternE approach transforms all impacts into monetary values to allow summing up, weighing ad comparing solutions according to a common base. What is the experience from the audience in the development of sustainability indexes? Can other examples be brought from the audience?*

- Sustainable Regional Insertion Index (SRII)
- Indicator System to Evaluate the Efficacy and Effectiveness of Environmental Programmes

CEMIG 475 - Development of a tool to monitor and evaluate the economic, social and environmental sustainability of municipalities in impact areas of hydroelectric dams

CEMIG GT0598 - Methodology for Evaluation, Monitoring and Control of Efficacy and Effectiveness of Environmental Programs and Actions Resulting from Environmental Licensing of Hydroelectric Generation Projects

• *Question 1.2 - Sustainability indexes and external costs have also been addressed in numerous CIGRE projects and published as TB650 Sustainable development performance indicators for electric power generation (2016) and TB616 Externalities of Overhead High Voltage Power Lines (2015). What is the experience from the audience in the application of approaches like those referred to, in the process of planning of system expansion?*

- The research that created the SIGS also proposes external environmental costs for different types of generation sources
- Such costs may be used in the planning process of the electric power system expansion

Renewable Sources	Proposed Values
	Amounts converted to US$/MWh and updated for July 2019
Hydroelectric with Reservoir	6 a 13
Small Hydroelectric (até 30 MW)	1 a 3
Run-of-the-river Hydroelectric	4 a 13
Solar Photovoltaic	11
Heliothermal Concentrated	3 a 4
Wind Offshore	2 a 3
Wind Onshore	2 a 3
Biomass	20 a 27
Geothermal	12

Renewable Sources	Proposed Values
	Amounts converted to US$/MWh and updated for July 2019
Combined Cycle Coal	55
Coal	53 a 77
Diesel	52 a 69
Fuel Oil	62 a 92
Natural Gas	23 a 29
Combined Cycle Natural Gas	26 a 33
Lignite	110 a 113
Nuclear	12 a 31