Paris Session 2022

Representing Solar PV Generation in Operation Planning Studies

SC C2

System Operation and Control

PS2 > Operational planning strategies, methodologies and supporting tools

Question 2.4: Building understanding of the new forms of correlation between the different inputs to the year ahead operational plans is essential. For example, low demand associated with overnight conditions will be correlated with a lack of solar PV generation. How can power system operators adjust their operational planning to reflect these new and changing circumstances?

Maria Alzira Noli Silveira - Brazil

With high shares of intermittent generation, the uncertainty exceeds the range that can be accommodated through operational adjustments.

Intermittent Generation + System Flexibility

Those are solutions to be implemented in the long run to cope with the increase of intermittent renewable energy sources.

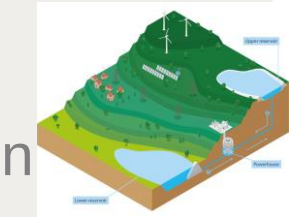
Supply Side

- Flexible generators, such as reservoir hydropower plants or modern gas turbines can quickly adjust power supply.

Demand Side

- Flexible demand response programs can quickly adjust power demand.

Storage (utility scale batteries or/and the reversible power plants or pumped storage) does a good job to fill the gap between variable renewable generation and demand by shift generation or load as necessary.



A Strong Grid

Grid infrastructure mitigates variability by the inherent smoothing benefit of aggregating intemittent renewable production plants over large geographical areas.

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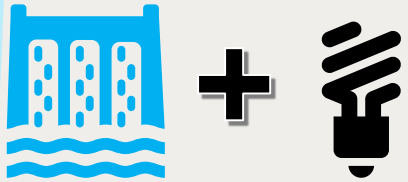
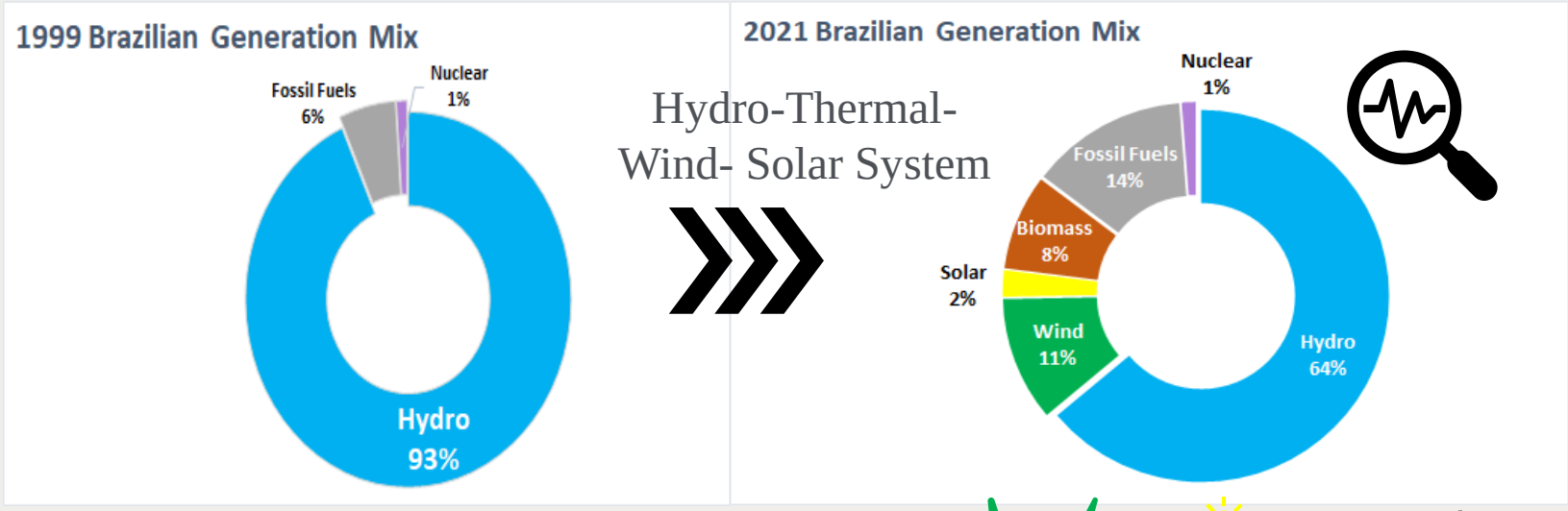
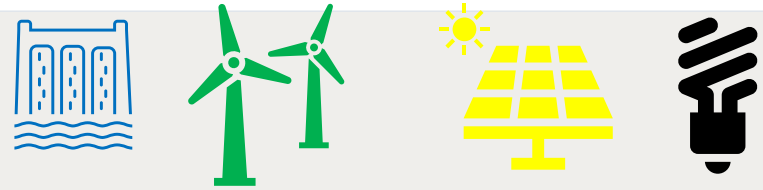
Scenarios



The operation planning studies used the hydro basins 'inflow patterns combined with load levels to establish the scenarios to be assessed.

Transitions from a primarily hydro-based generation mix at the end of the twentieth century to greater levels of intermittent renewable generation.





To represent those situations in power flow cases for operation planning studies, one must increase the number of scenarios to cover all situations along the day and year-round.

A convolution of the wind seasonal pattern throughout the year and the solar radiation pattern throughout the day combined with hydro basins' inflow patterns as well as the load pattern

Scenarios to be assessed

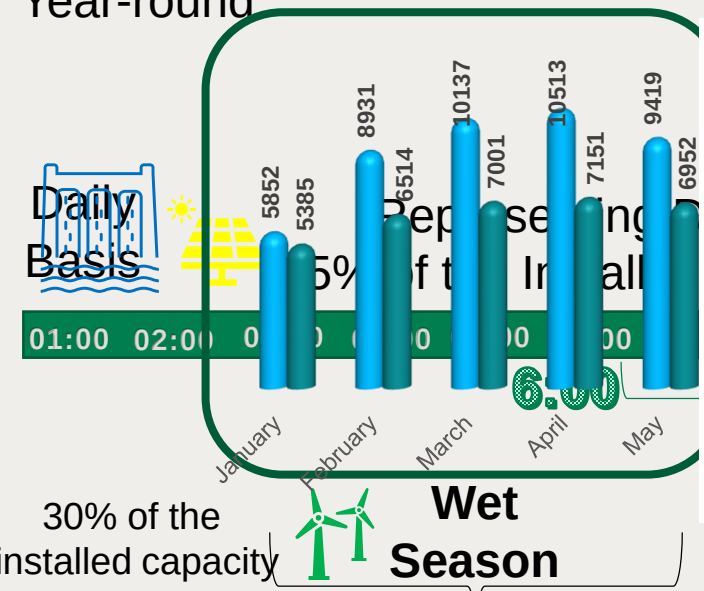
SEASONAL GENERATION BEHAVIOUR OF THE NORTHERN

Expected average generation at the Run of River plants

Capacity Factors:
70/75% - Peak load
60/80% - Light load

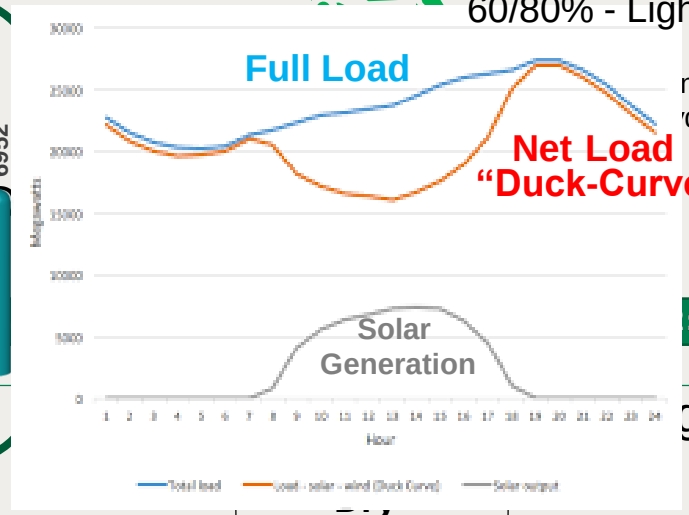
Year-round

Daily Basis

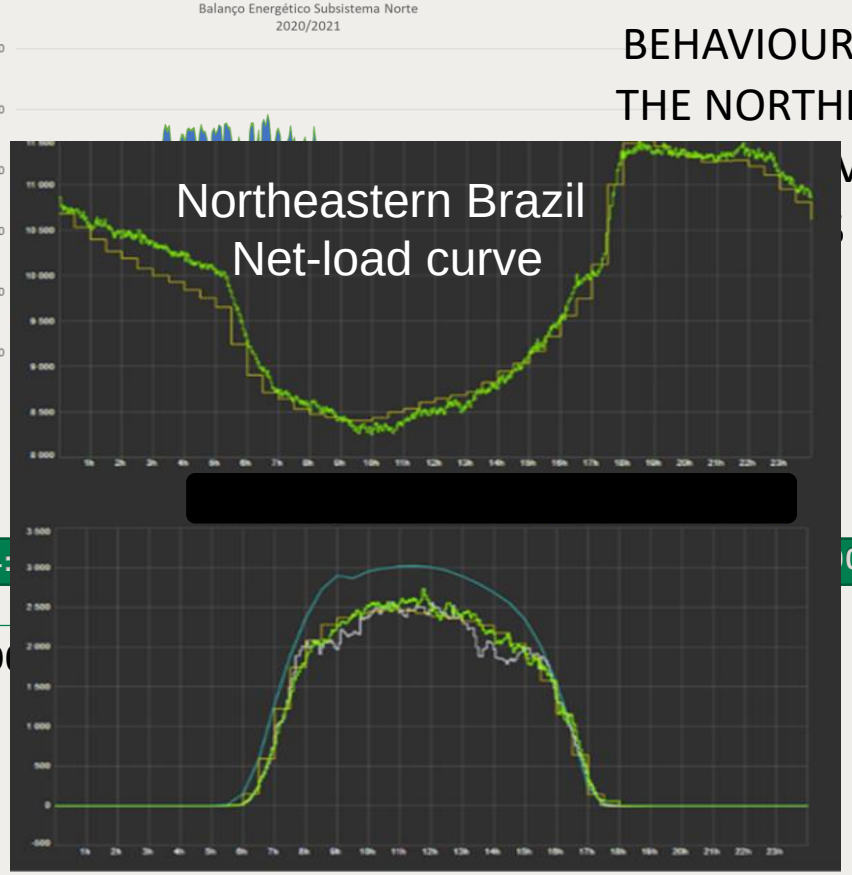


30% of the installed capacity

Wet Season



Season



Solving the "Duck-Curve problem" is one of the challenges to integrating high levels of solar energy to the Grid.

Thank you!

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