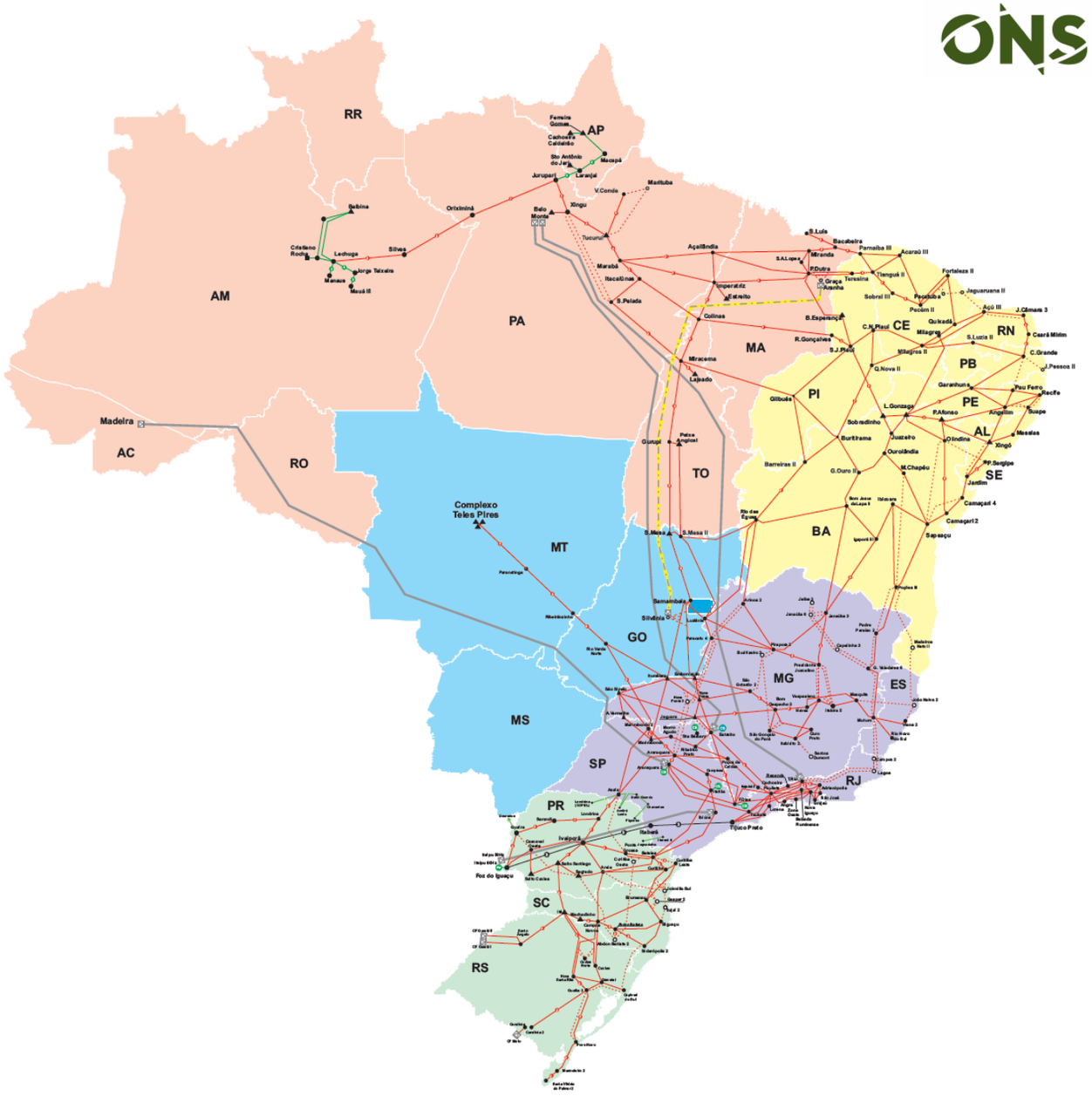
Real-Time Dynamic Security Assessment of Bulk Power Exchange Using PMUs

Arthur Mouco Ph.D.

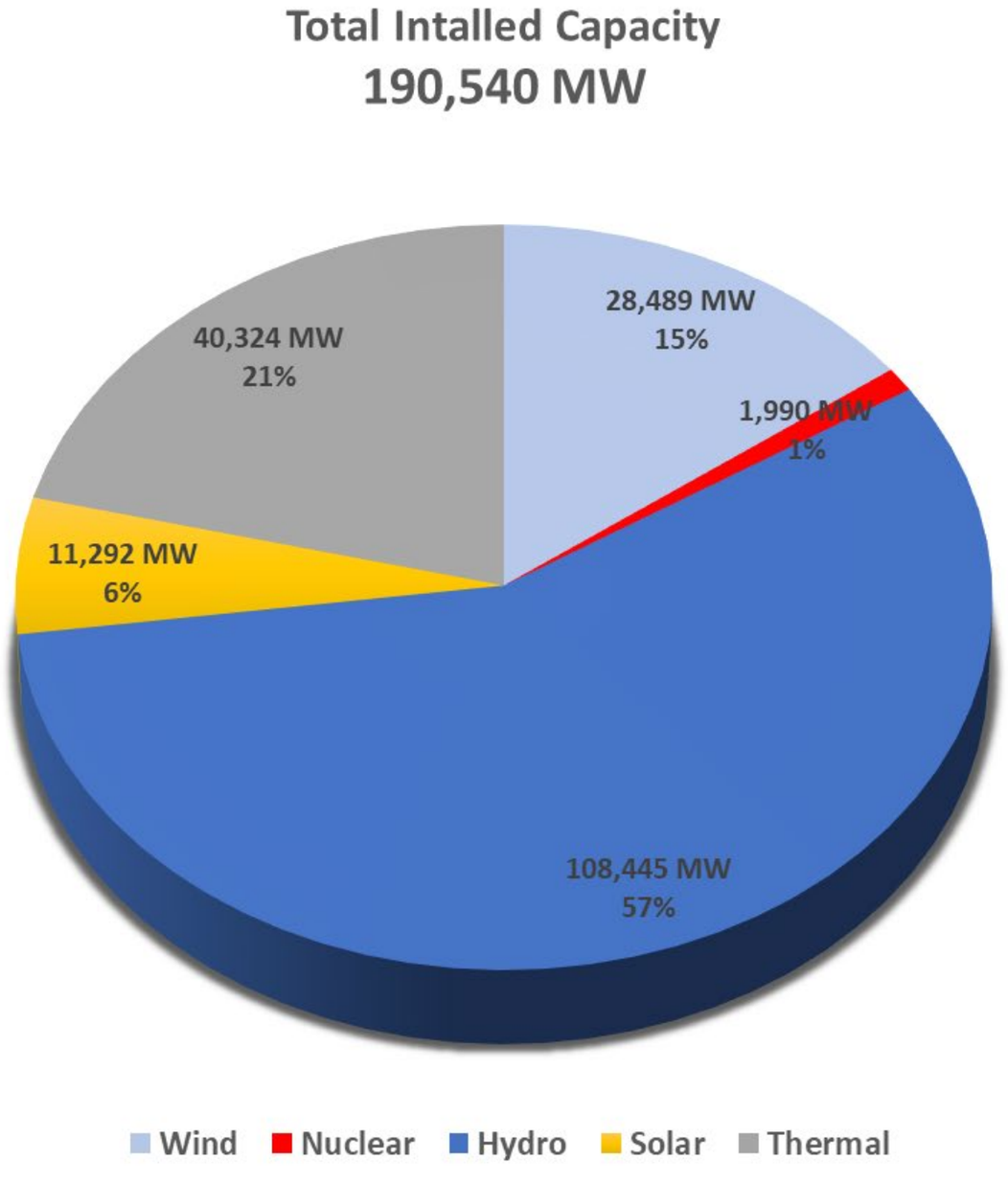
Transmission System



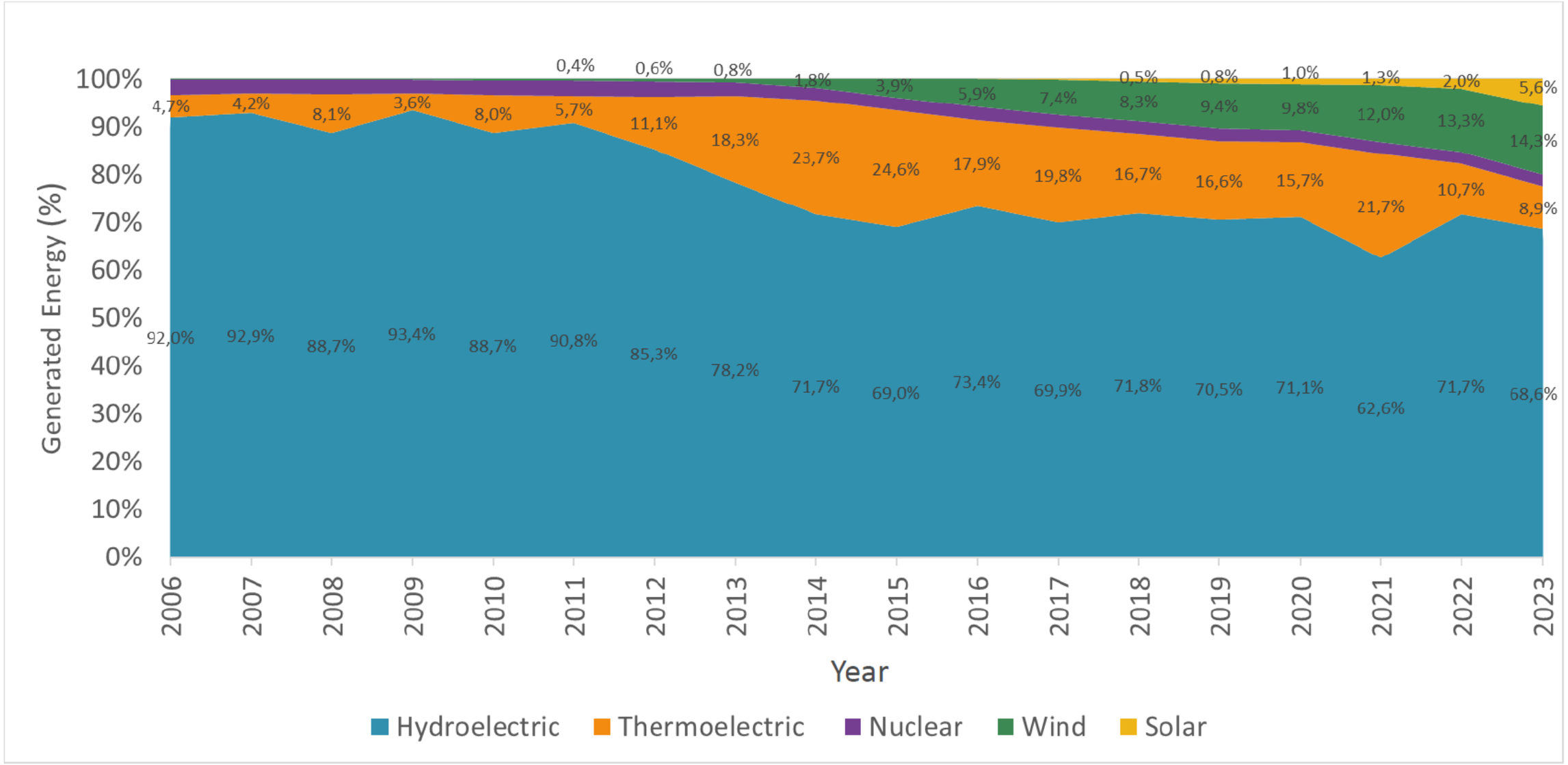
2023
171 640 km

2028
200 015 km

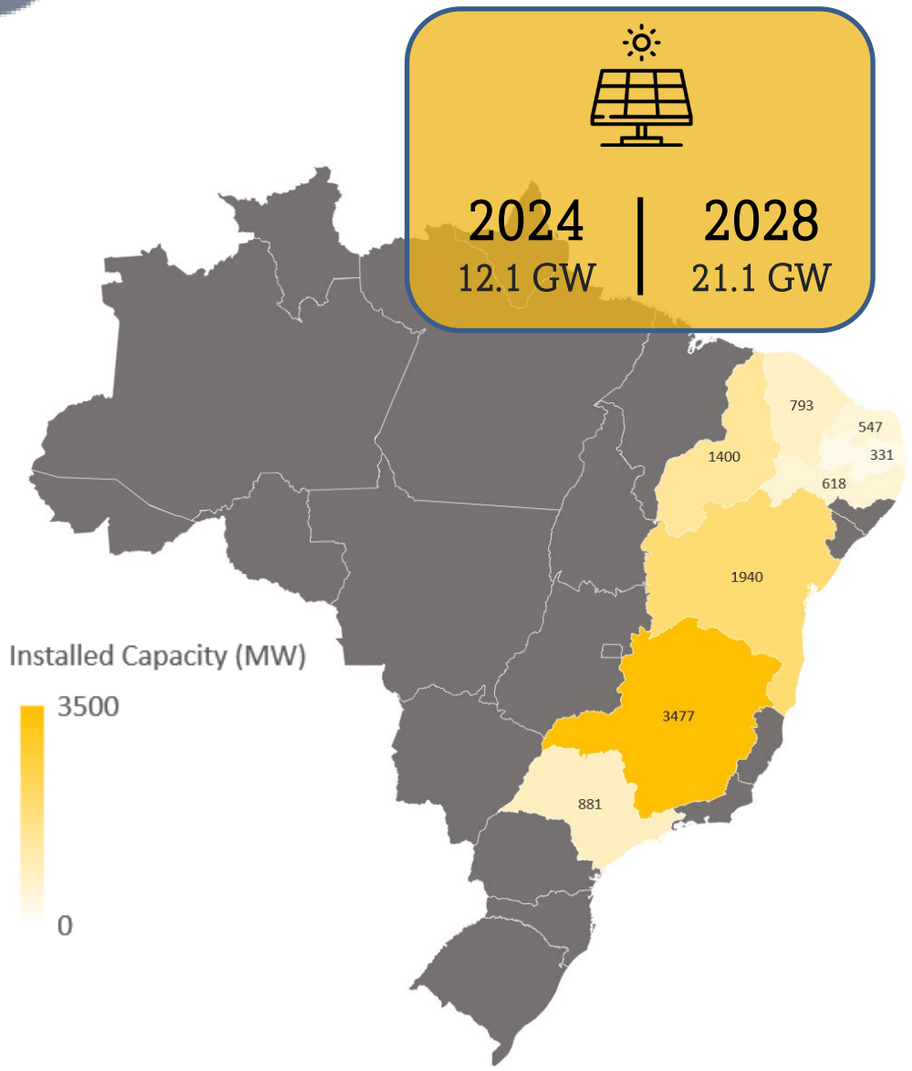
Energy Matrix

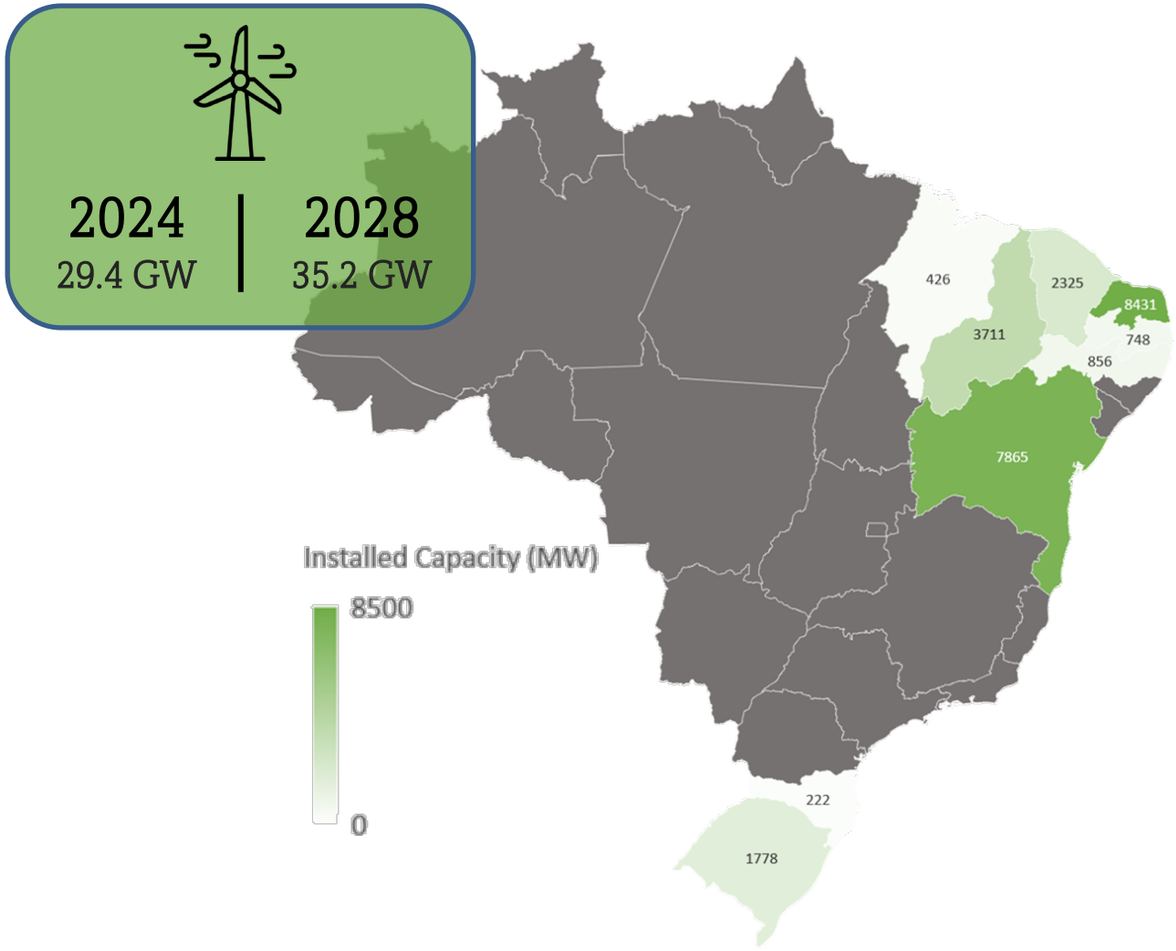


Renewable Generation Growth

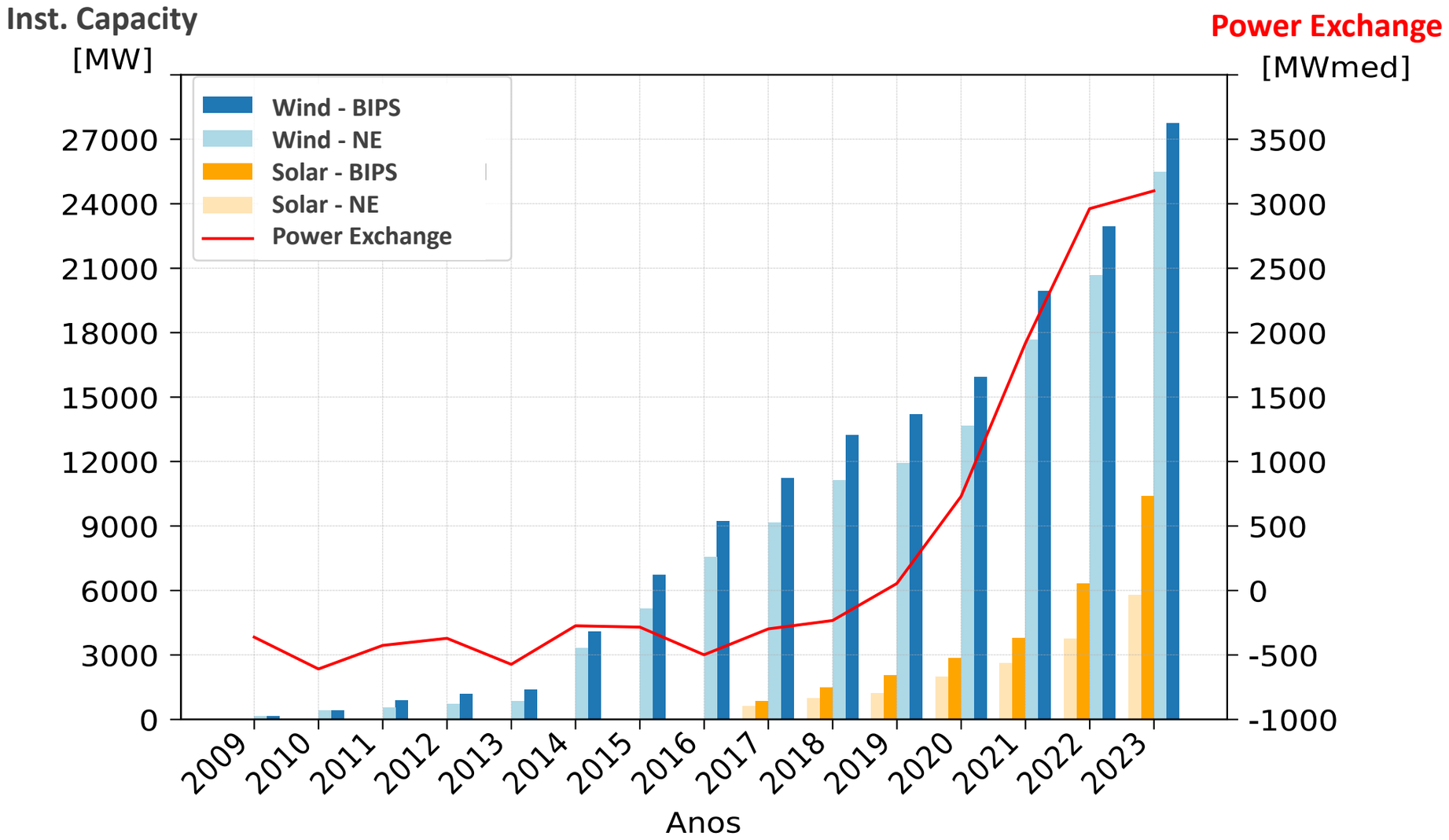


Renewable Generation Growth

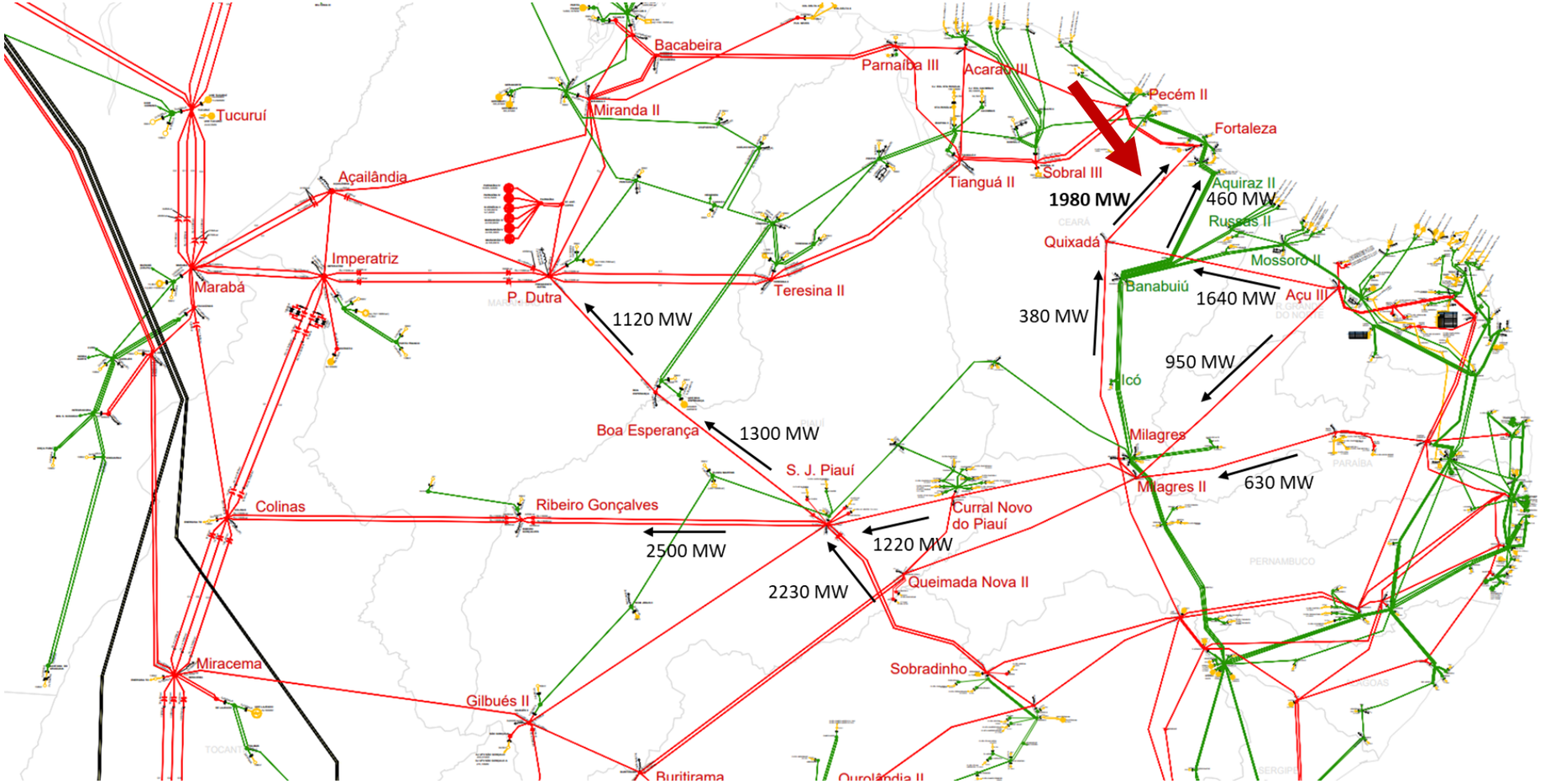




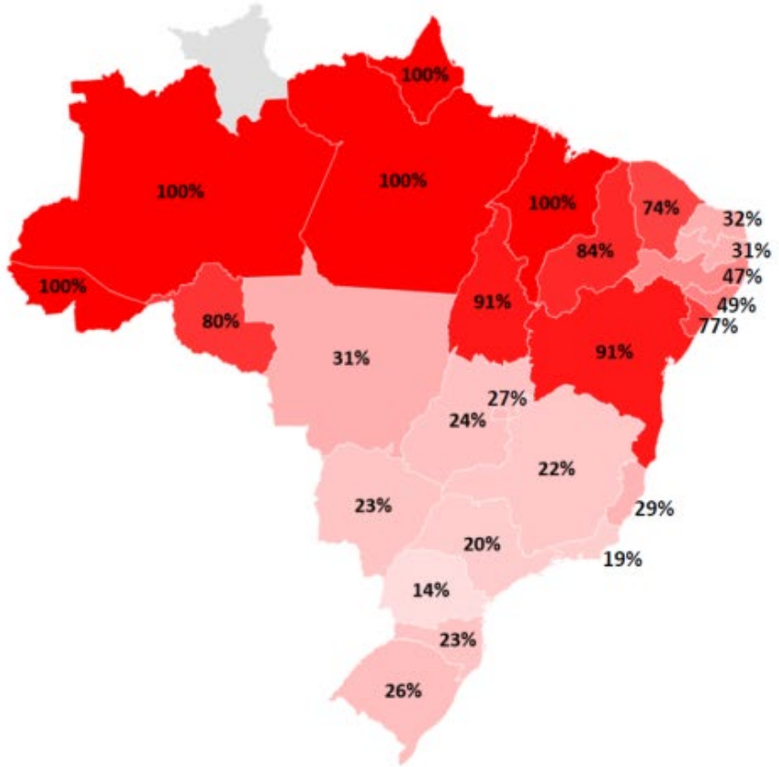
Renewable Generation Growth

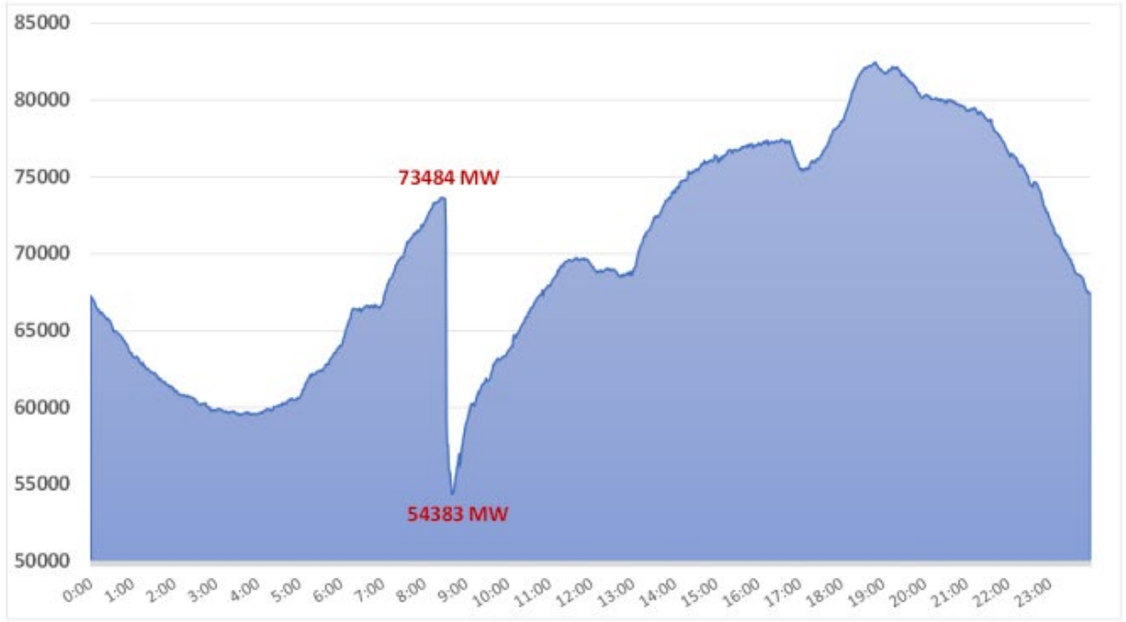


August 15th 2023 - Blackout

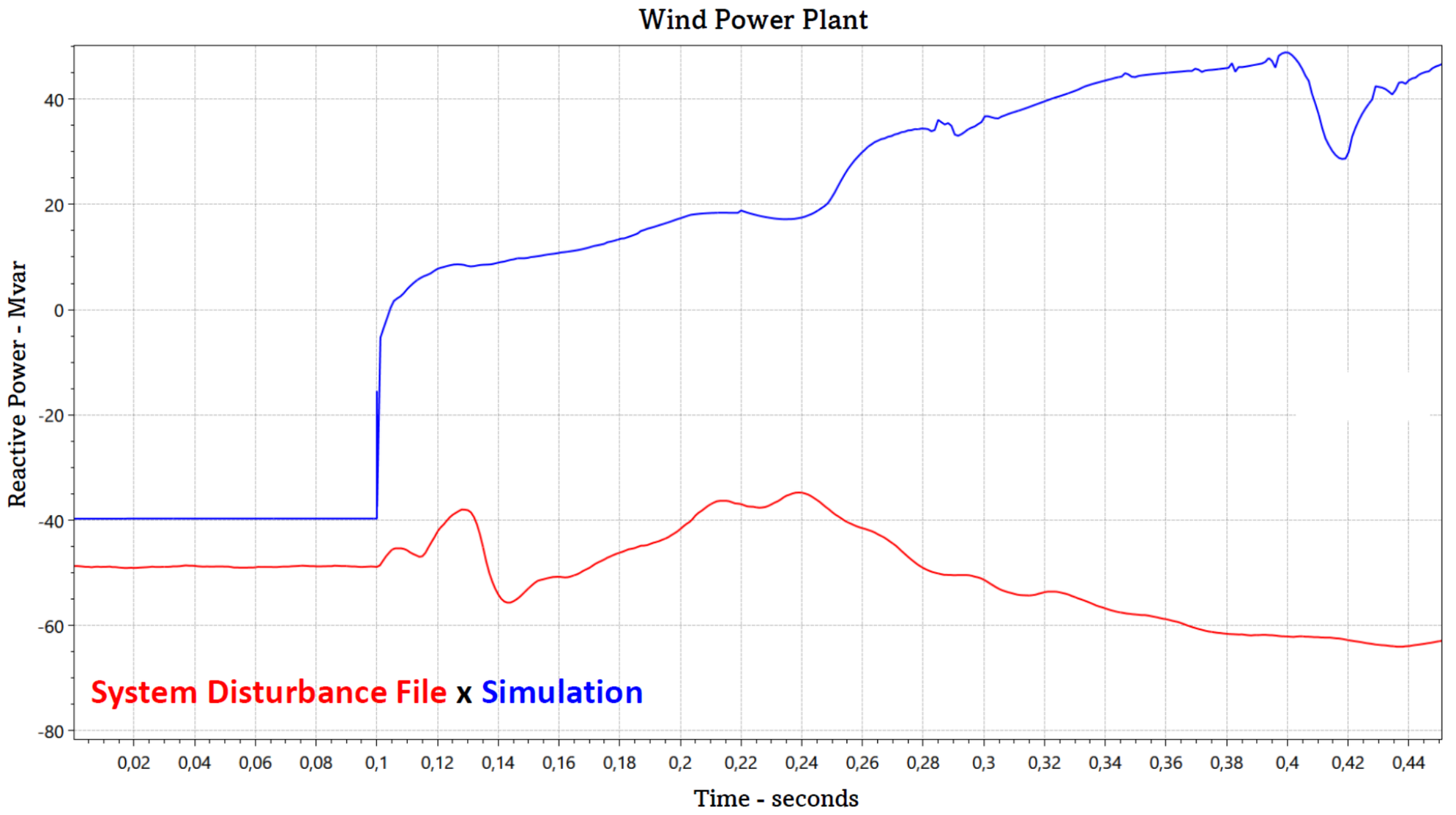


August 15th 2023 - Blackout

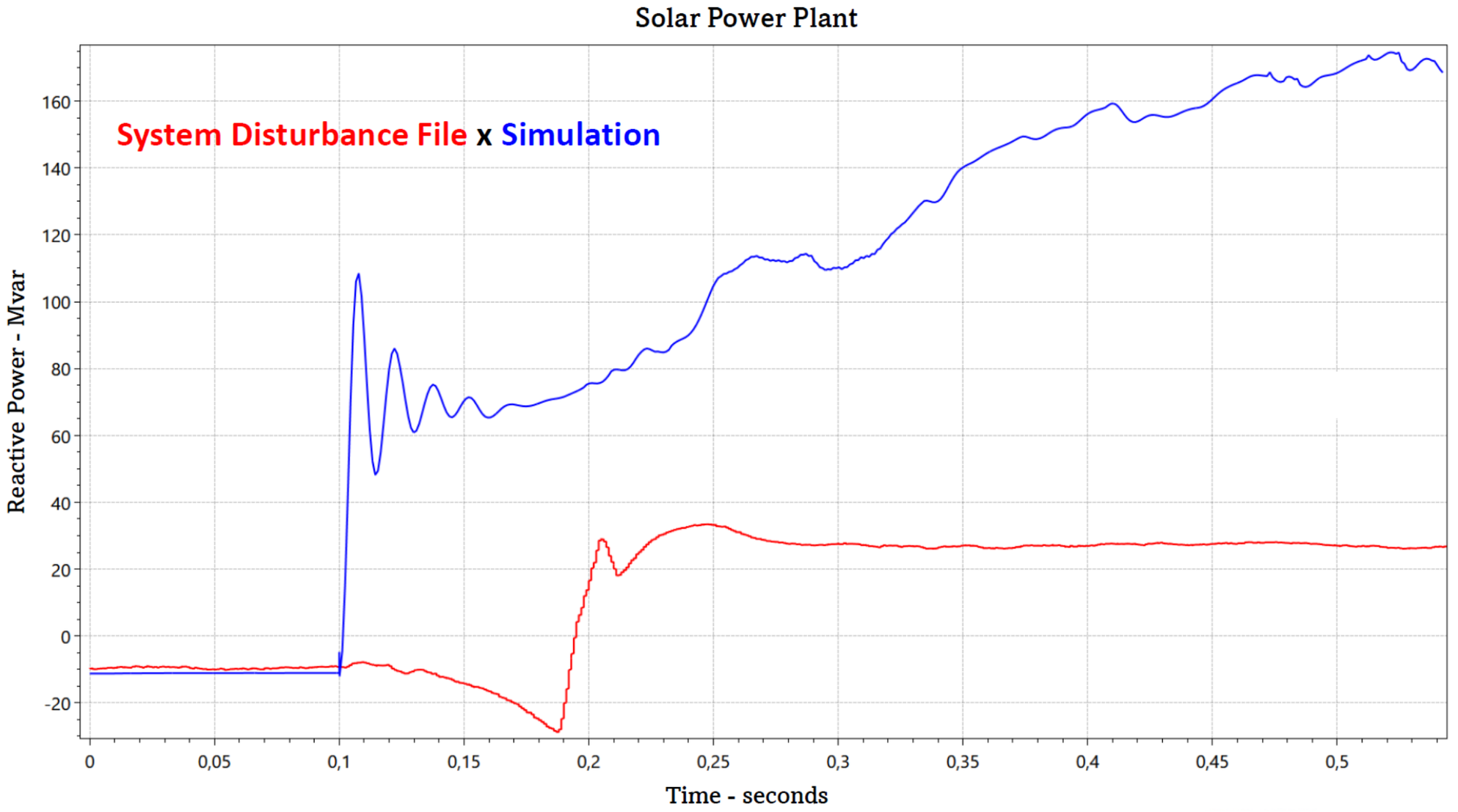




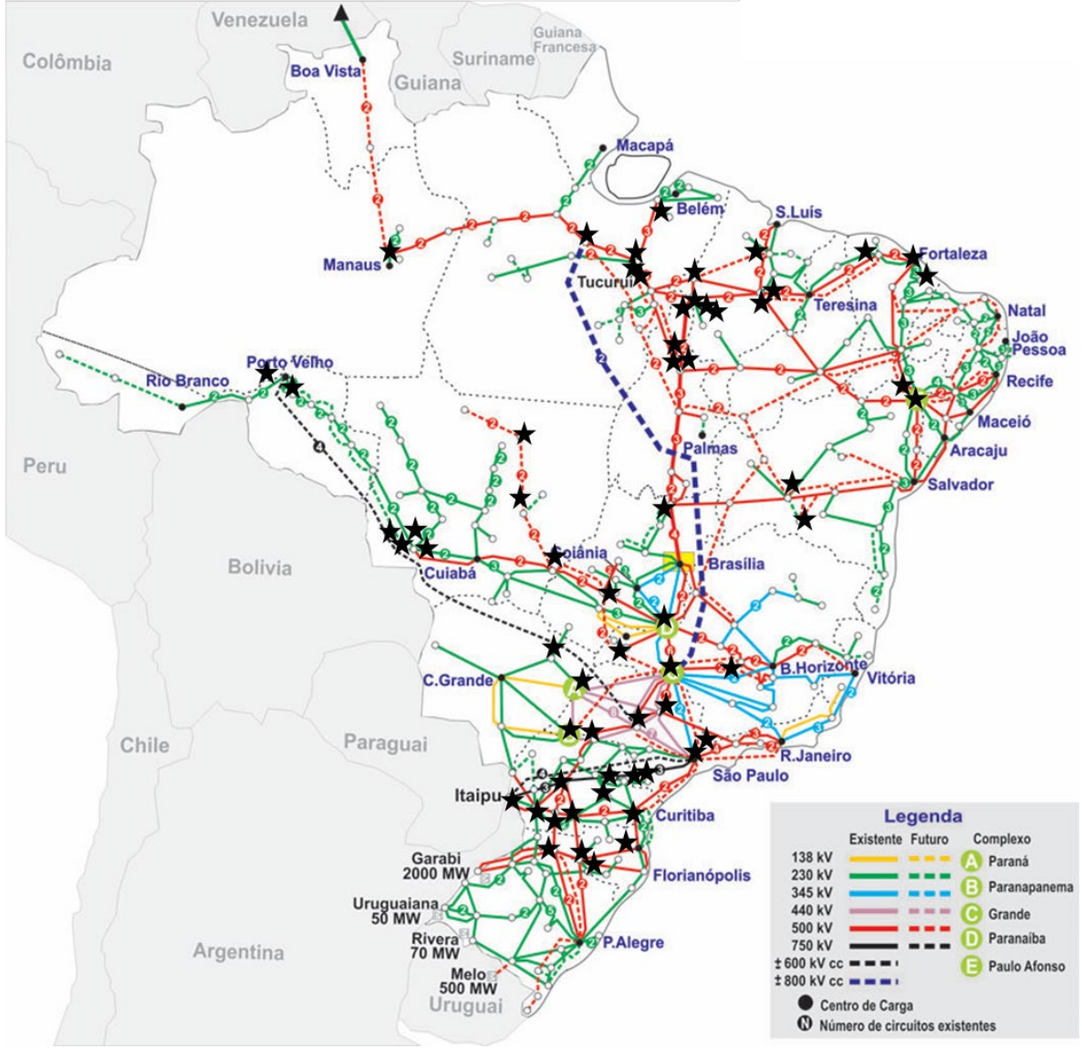
August 15th 2023 - Blackout



August 15th 2023 - Blackout



PMU Deployment



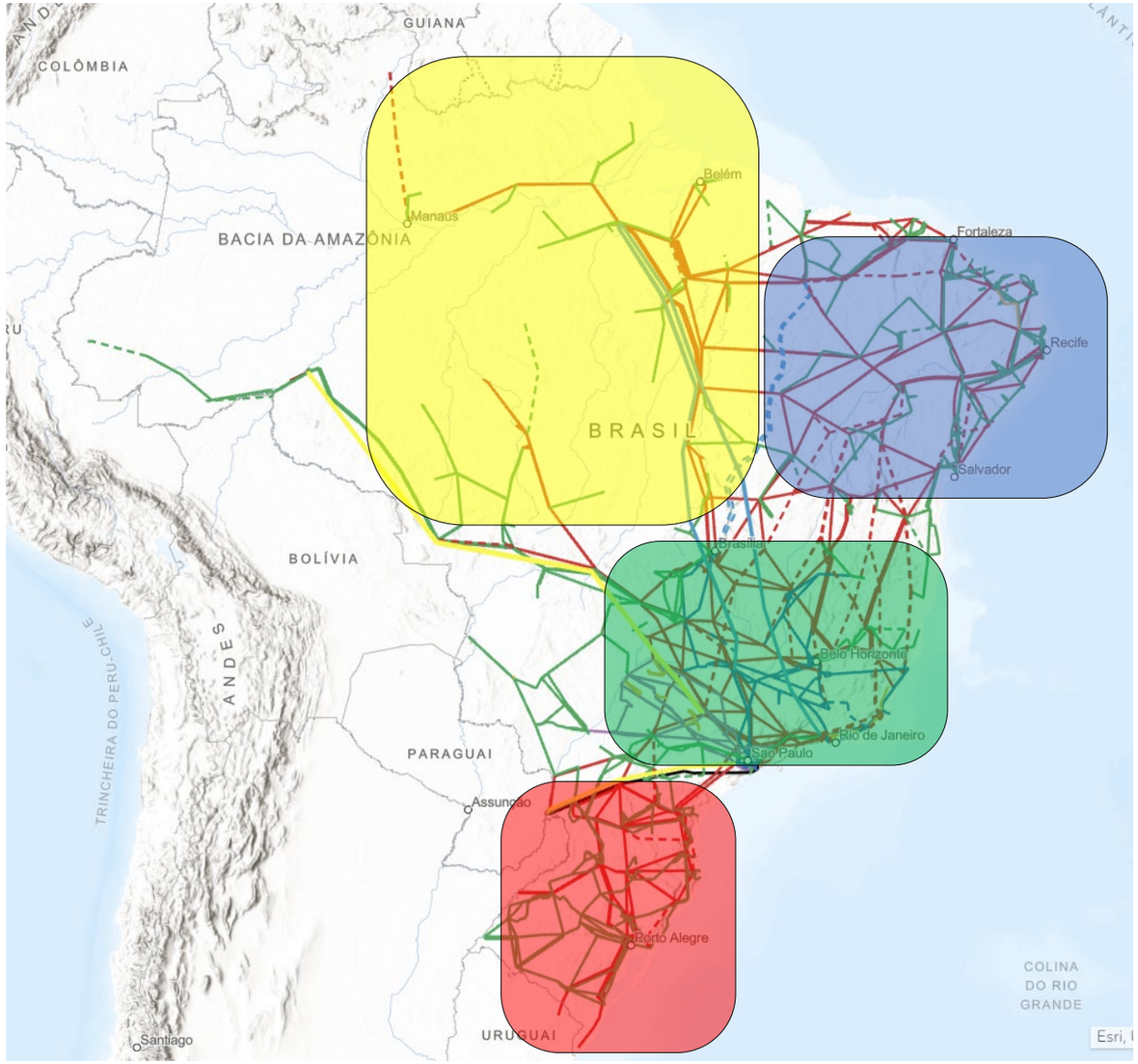
Status

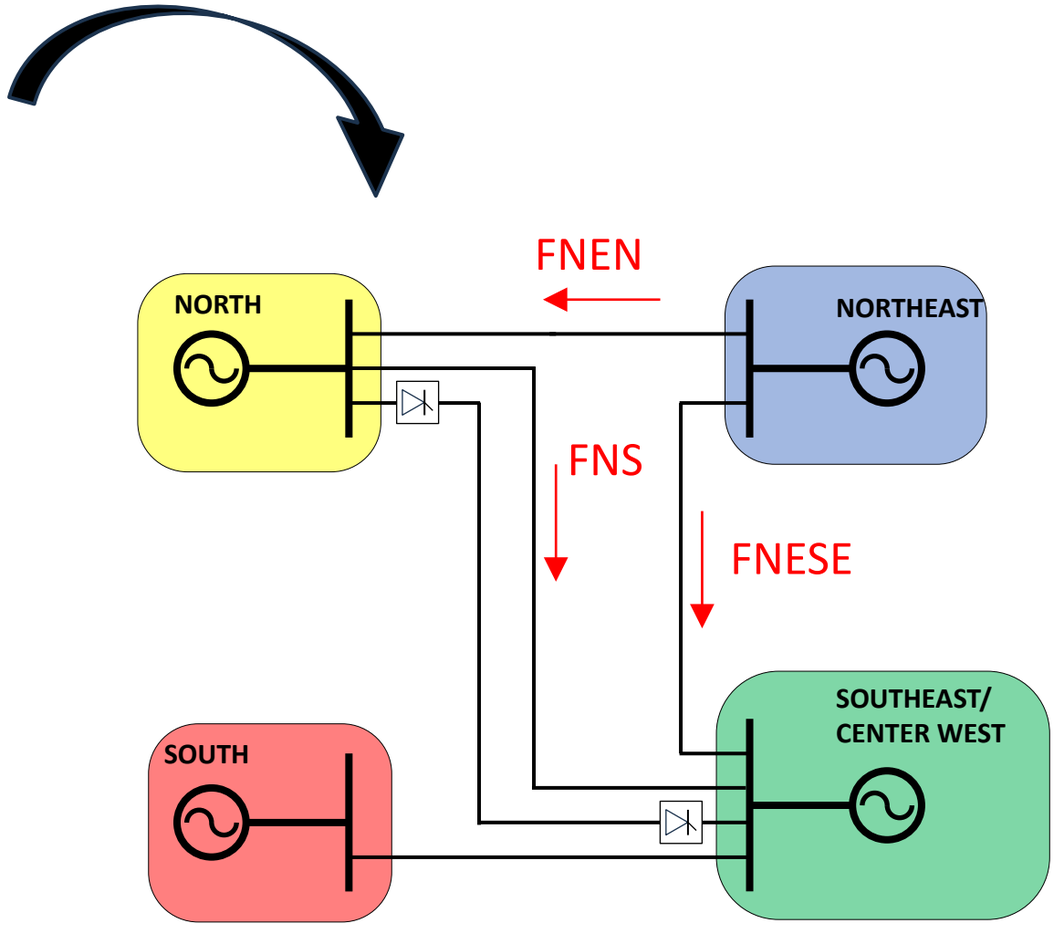
- 600 PMUs in OP
- Data Quality ~ 80 % good
- Data Availability ~ 85 %

1000	**PMUs**
6000	phasors
2000	Add. Meas.
10000	Digitals

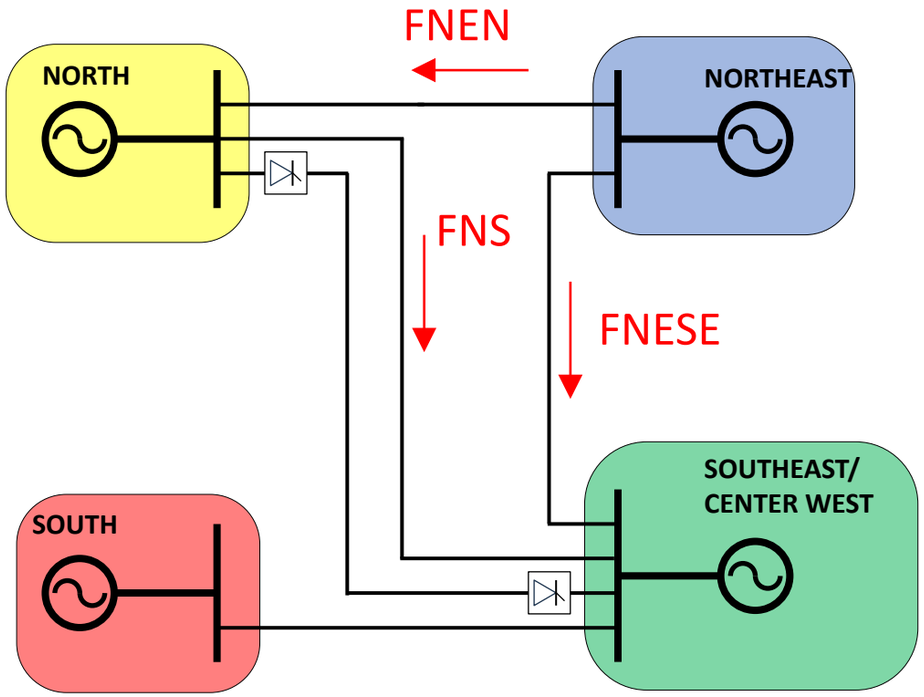
} at 60 fps

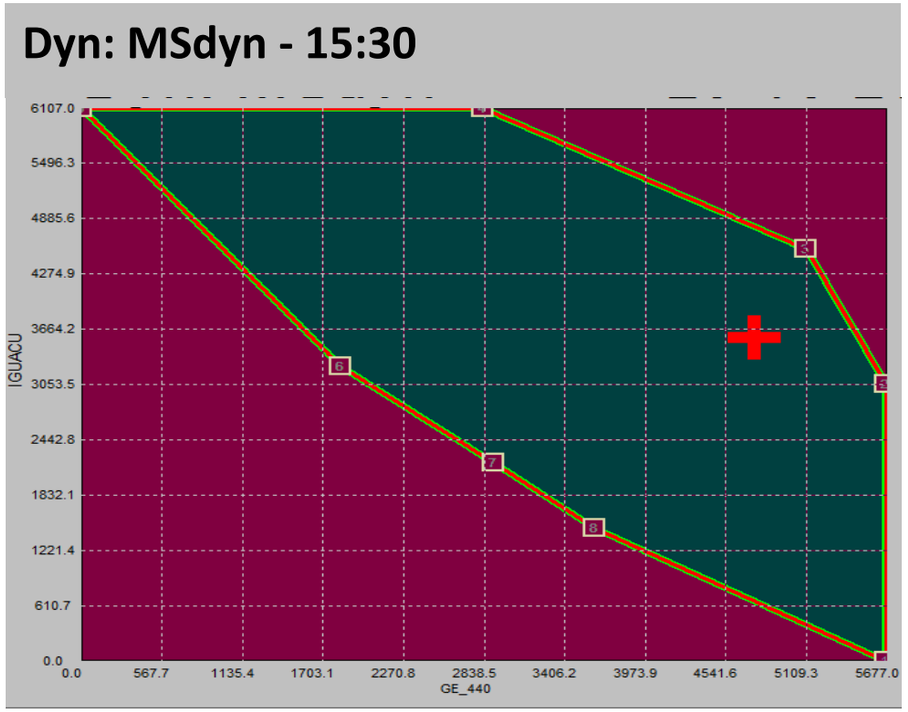
BIPS – Power Flow Scenario





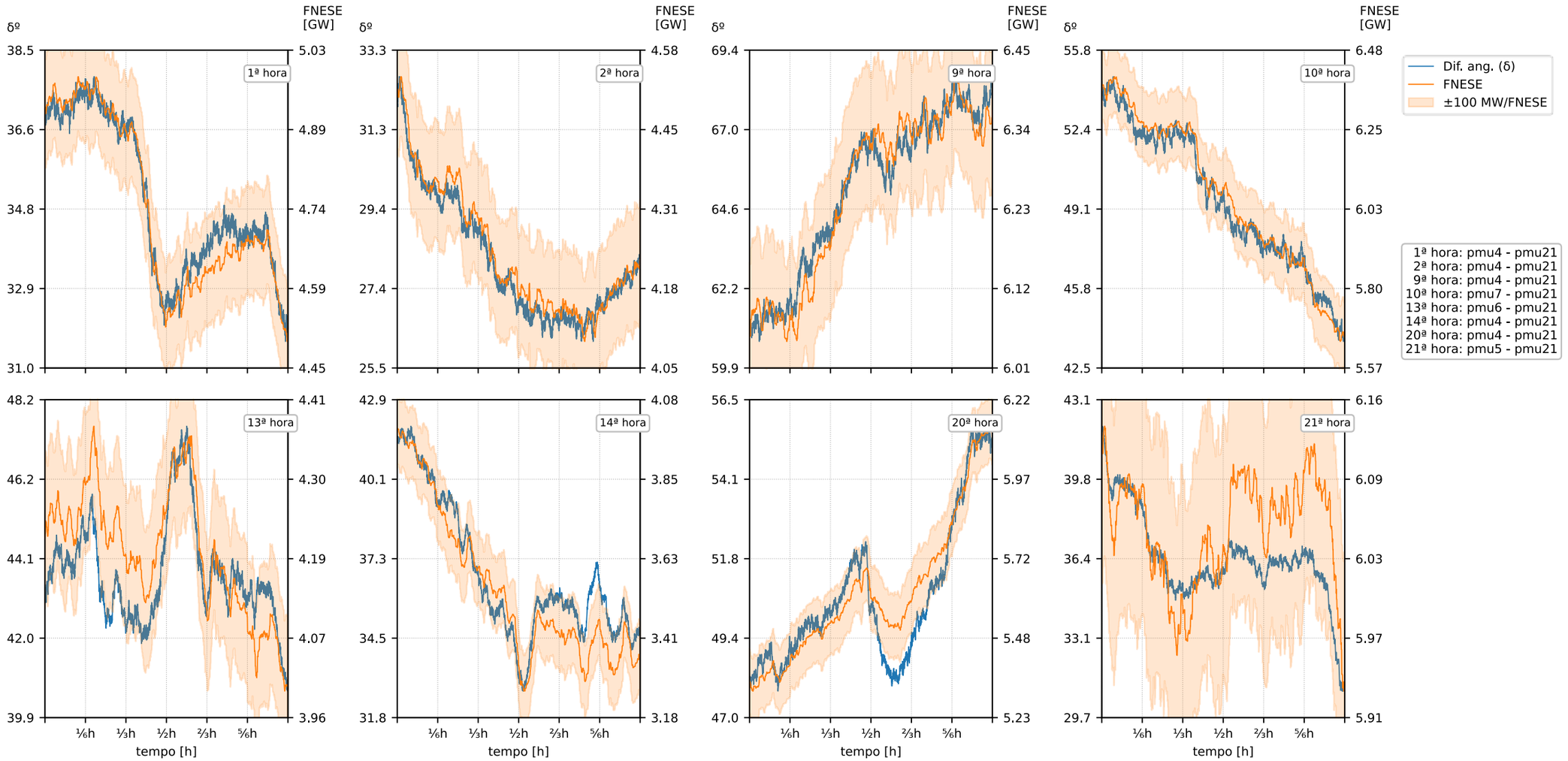
Dynamic Security Assessment



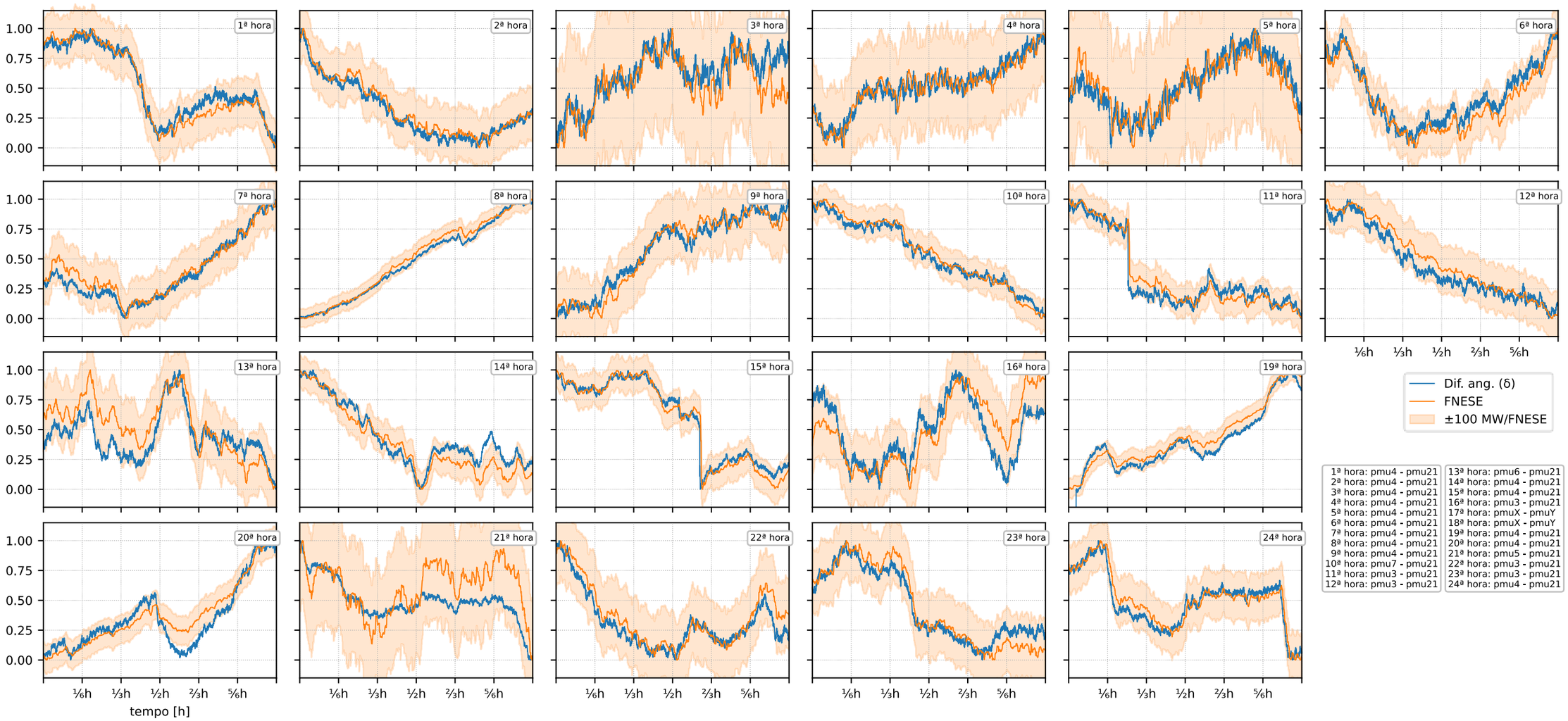


Power Flow vs Angle Difference

Power Flow vs Angle Difference



Power Flow vs Angle Difference



Team

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Thank You!

Questions?