

# Paris Session 2022



## Grid-forming inverters in Agios Efstratios island grid



C4 – Power system technical performance

PS 3 – Challenges and advances in power system dynamics

Question 16: What local- and whole-system considerations shall be applied to optimise the design and mitigate any potential side-effects when using synchronous condensers, grid-forming inverters, or a combination to address emerging system stability issues?

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# Grid-forming sources

## Storage units of high power capacity close to each other

### ❖ **BESS → Grid-forming, RES → Grid-supporting**

- Applied in Ag. Efstratios island grid

### ❖ **High BESS rated power is preferable** in systems aiming for high-RES penetration for effectively managing RES surplus, as well as providing sufficient fault current level & in-rush currents for energizing transformers

- Agios Efstratios: 2x500 kW BESS, providing comparable fault current level to 1-2 diesel units usually synchronized in the grid today

### ❖ Having **grid-forming power sources close to each other** reduces power oscillations between them

- Ag. Efstratios: Both battery systems installed at the same location

# Grid-forming sources

## Power sharing & ROCOF limitation

❖ **Droop-based grid-forming mode** can achieve the desired **power sharing between several** grid-forming units

➤ Results shown for 3 combinations of control modes, **both BESS in droop-based grid-forming in green**

❖ A **maximum admissible ROCOF** can be set in the grid-forming controller, to address stability issues of low-inertia systems

❖ Results shown for limits 0.3-0.8 Hz/s

