SMA Large Scale Energy Solutions

ERCOT

Frequency Response

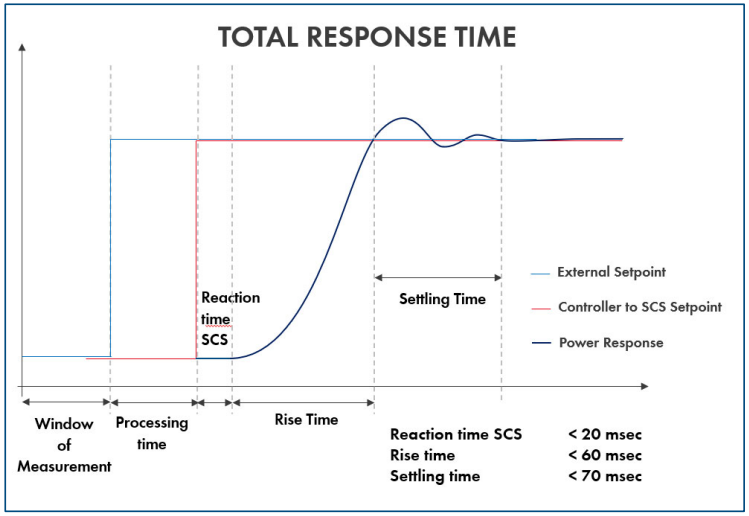
Scott Karpiel, October 11th, 2024

Frequency Response

Although, SMA inverters are capable of responding in less than 150msec the following points must be understood:

- Inverter frequency measurements are for inverter controls only

- Frequency of the Inverter Based Resource (Plant Level) is measured at the Reference Point of Applicability. The processing time of the frequency measurement will be dependent on:
  - Accuracy of the measurement devices
  - The window of measurement. Can be different from relay manufacturer to relay manufacturer and programming of the relay.
  - Processing time of the Plant Controller



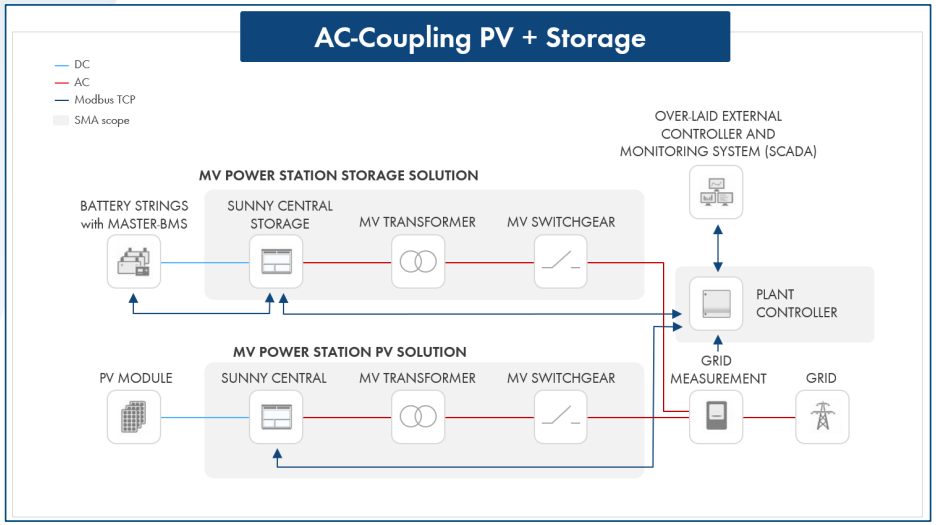
Frequency Response

Inverter Based Resource Units have a couple limitations when it comes to Primary Frequency Response:

- PV resources are operated at the Maximum Power Point to harvest as much energy as possible to maximize their financial return on investment.
- If the plant is operated at less (curtailed) maximum active power, it may not be possible to increase the AC output power as there may not be enough irradiance to support the downward frequency event.
- If the IBR Unit is curtailed to zero, it will not be able to respond to an upward frequency event.
- If there is no irradiance (nighttime) the IBR Unit will not be able to respond to any frequency event.

Frequency Response

Primary Frequency Response and Fast Frequency Response are best supported by a properly designed and managed hybrid or standalone Battery Energy Storage System.



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Questions?

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Thank you