GRID FLEXIBLE SOLAR

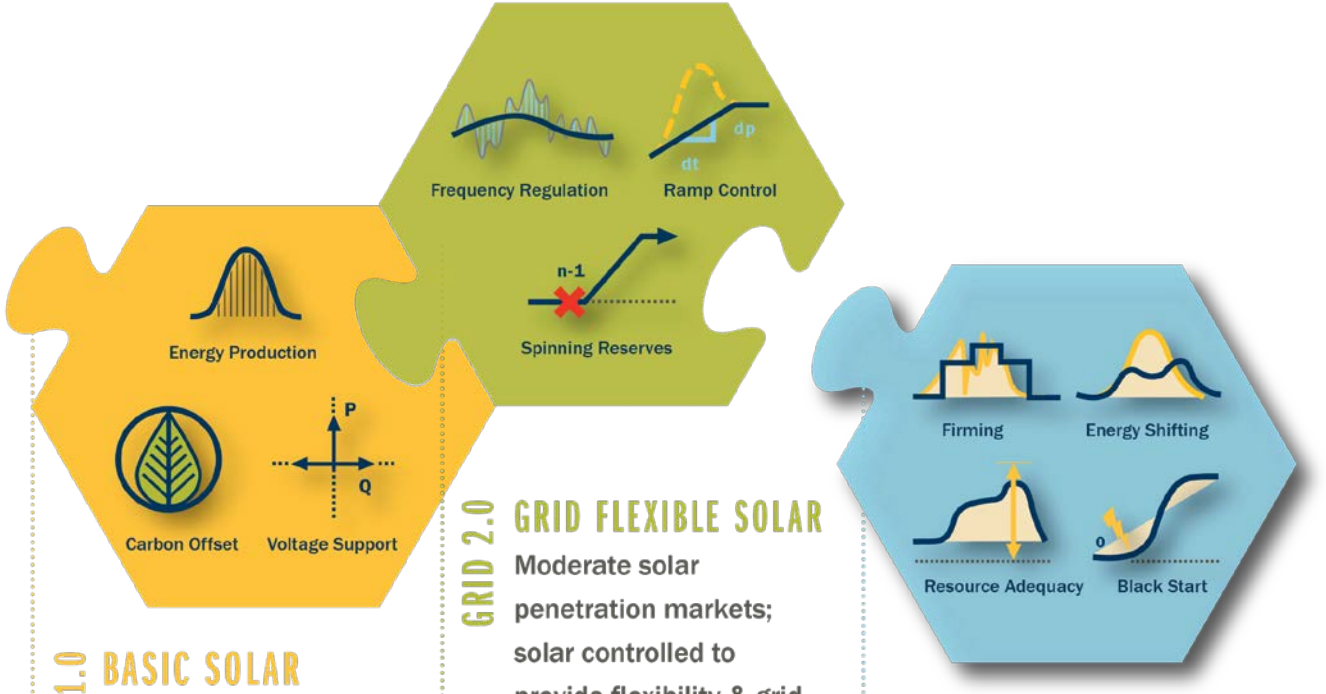
Unleashing the Full Potential of Utility-Scale Solar Generation

Vladimir Chadliev

First Solar

LEADING THE WORLD'S SUSTAINABLE ENERGY FUTURE

UTILITY-SCALE SOLAR PROVIDES GRID FLEXIBILITY



GRID 1.0 **BASIC SOLAR**

Low solar penetration markets; maximizes energy production

GRID 2.0 **GRID FLEXIBLE SOLAR**

Moderate solar penetration markets; solar controlled to provide flexibility & grid reliability services

GRID 3.0 **FIRM DISPATCHABLE SOLAR**

High solar penetration markets; addition of storage provides firm dispatchable capacity

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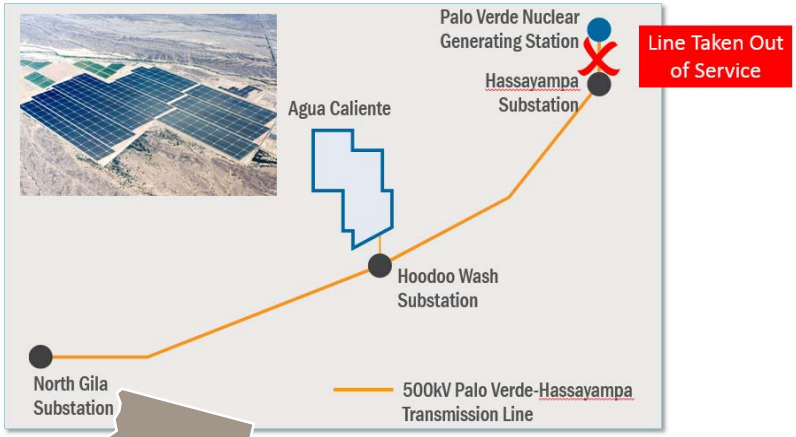
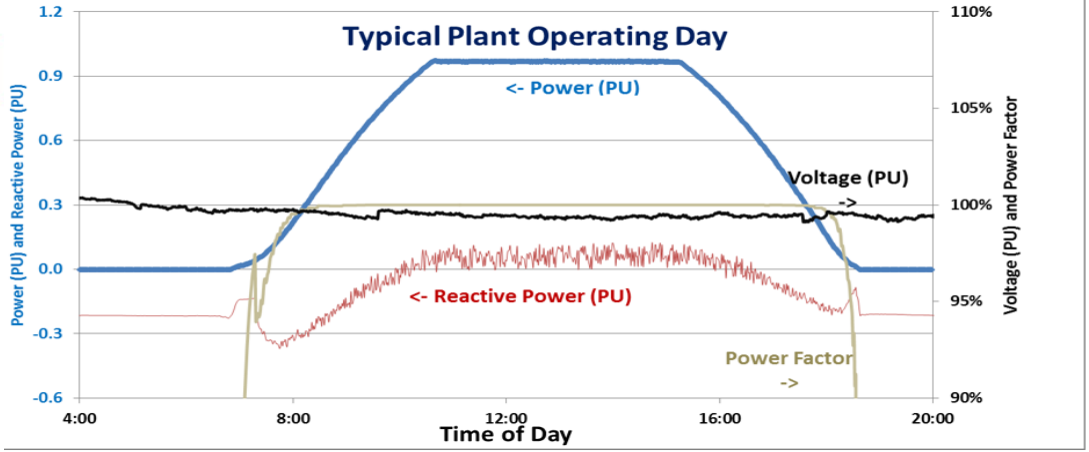
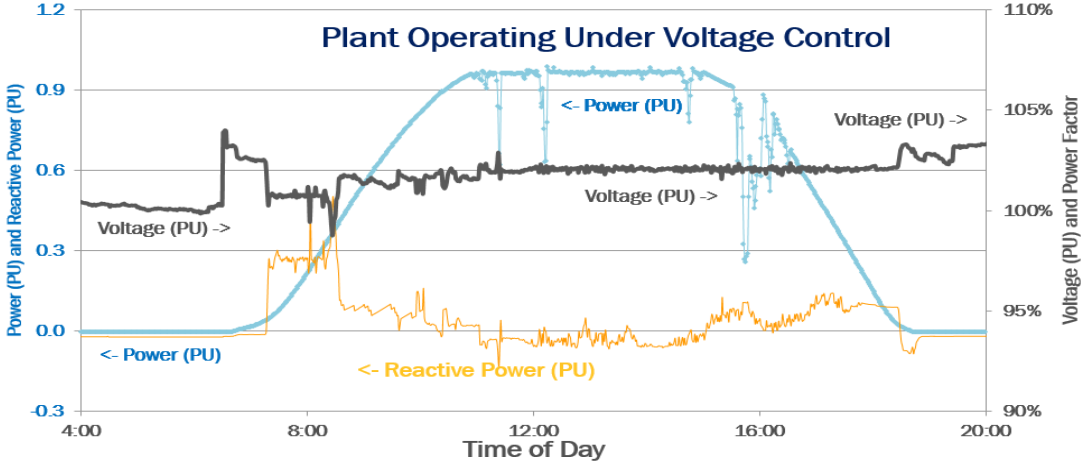
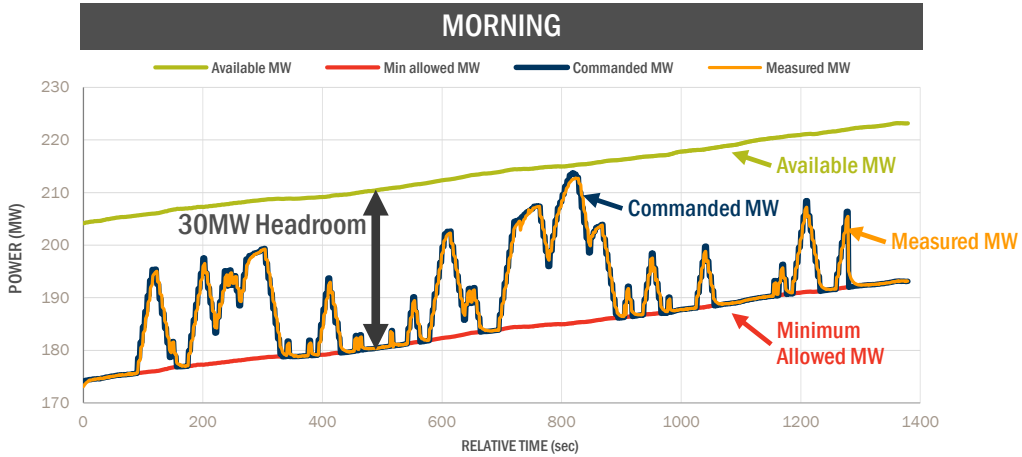
VOLTAGE CONTROL DURING THE MAJOR EVENT

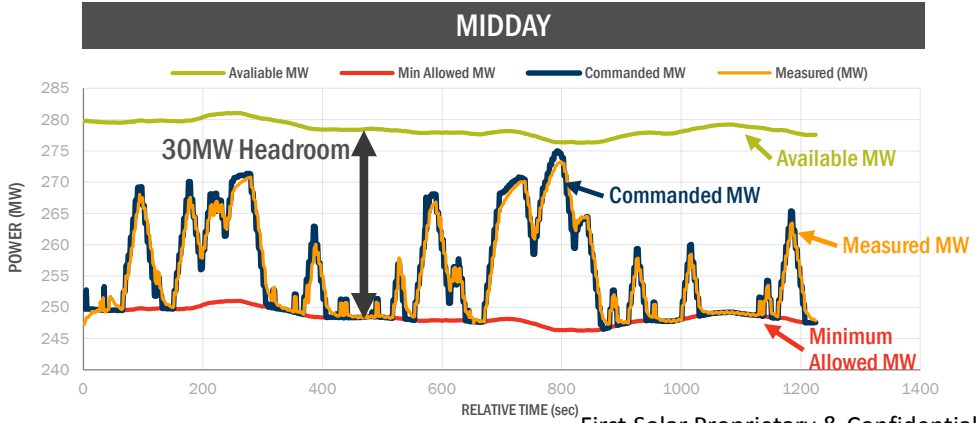






AGC Participation Tests: 300 MW Utility-Scale PV Plant





- 30MW headroom
- 4-sec AGC signal provided to Plant Controller
- Tests were conducted for
  - Sunrise
  - Middle of the day
  - Sunset

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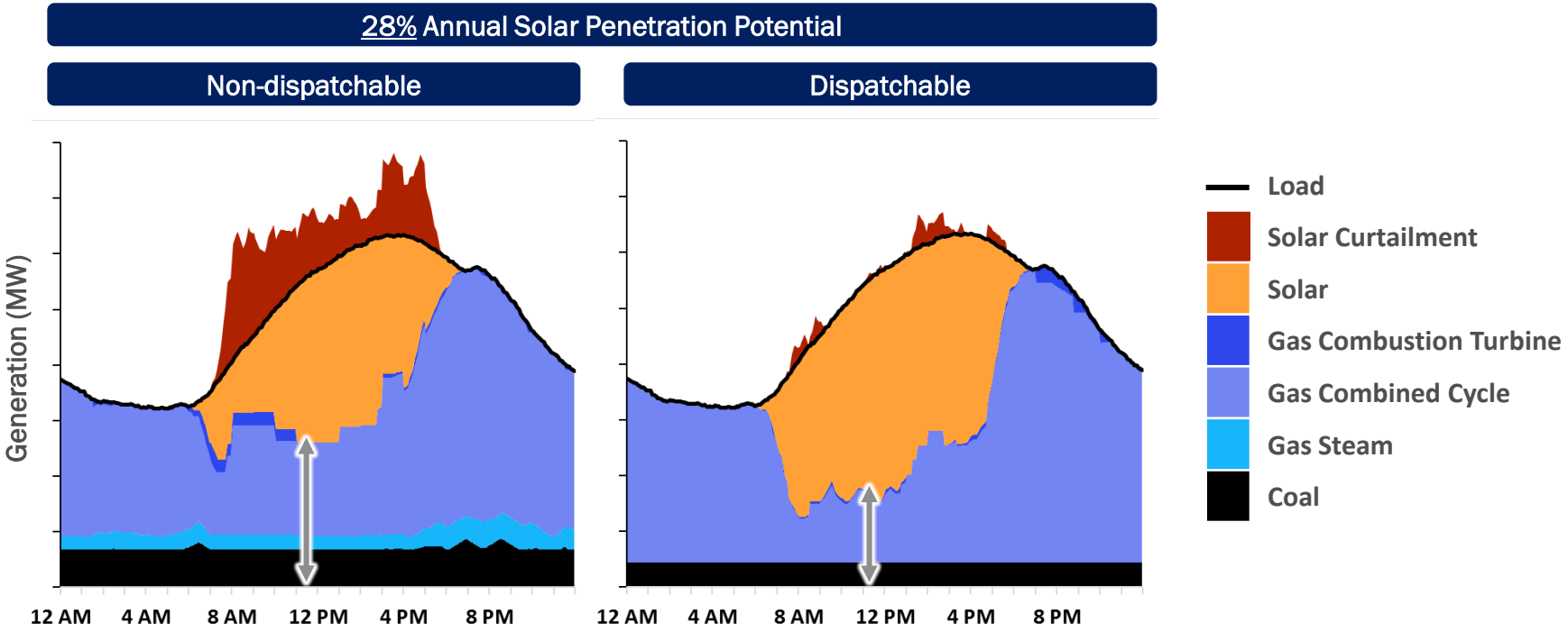
KEY FINDING #1: DISPATCHABILITY REDUCES THERMAL COMMITMENTS



Midday minimum generation levels much lower with dispatchable solar

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