DOCKETED

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First Solar

CPUC RETI 2.0 WORKSHOP

March 16, 2016

Technology and Flexibility

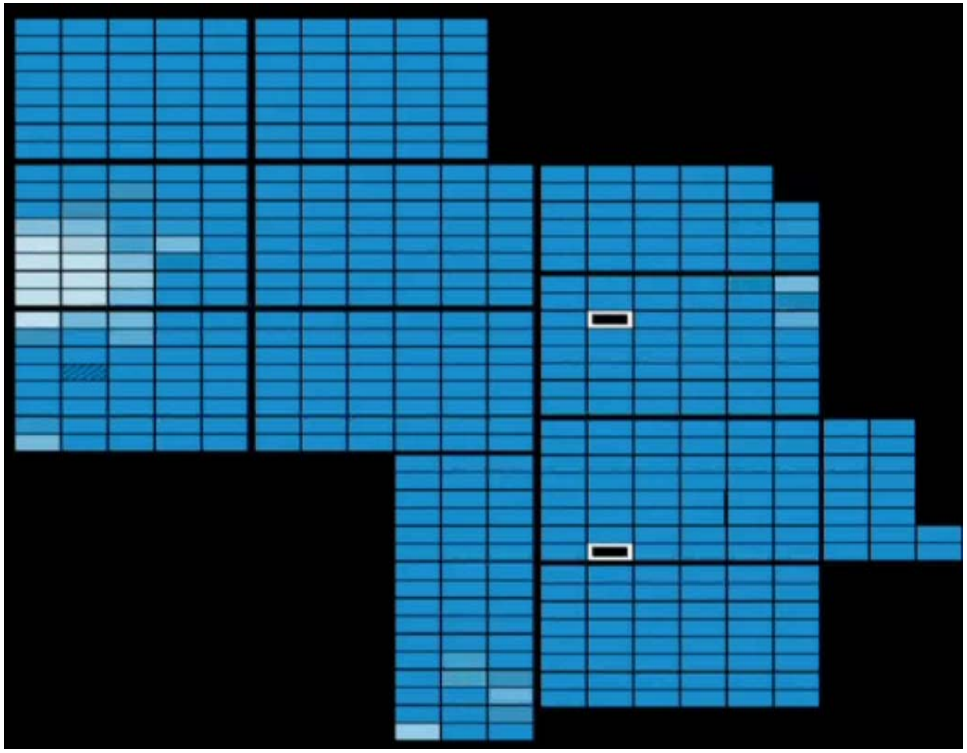
- If LSE's want Variable resources to act similar to a conventional turbines and desire PV to be flexible, we will need new mechanisms in the PPA to compensate for ancillary services
  - We are not scheduling coordinators, nor are we interested in the being dependent on the CAISO market for compensation.
  - We are compensated through the PPAs. Today, we are compensated only to deliver energy (kWh).
- To achieve 50% RPS, a lot of new resources will have to be added and these financial mechanisms or incentives don't exist today.
- FERC Workshop, April 22, 2014, Ancillary services by PV Generators
  - Analysis of First Solar Barilla Project

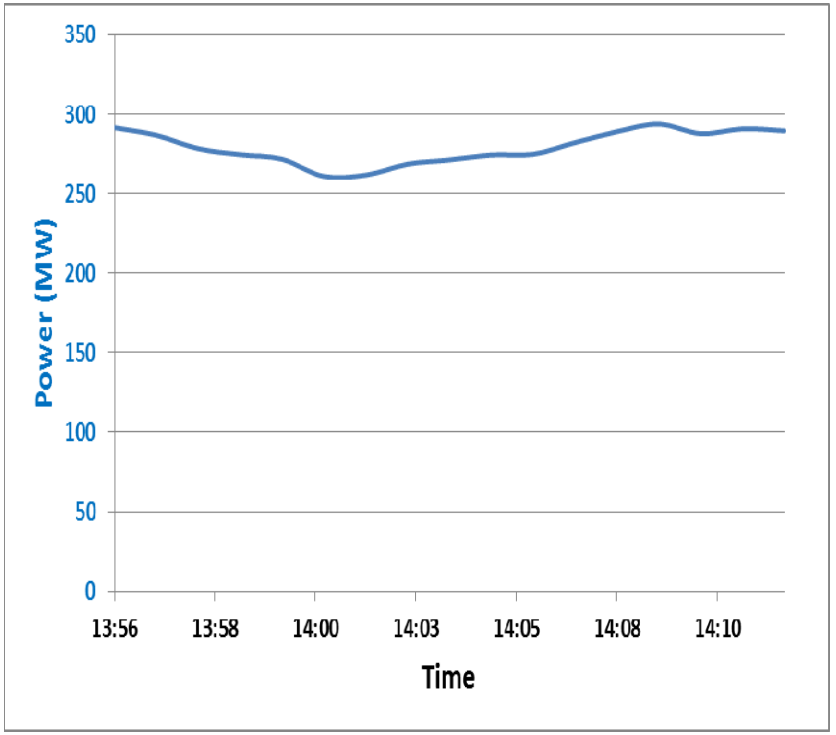
Flexible Resource and Grid Stability

Modern solar PV plants can contribute to the reliability and efficiency of grid operation by offering the following capabilities:

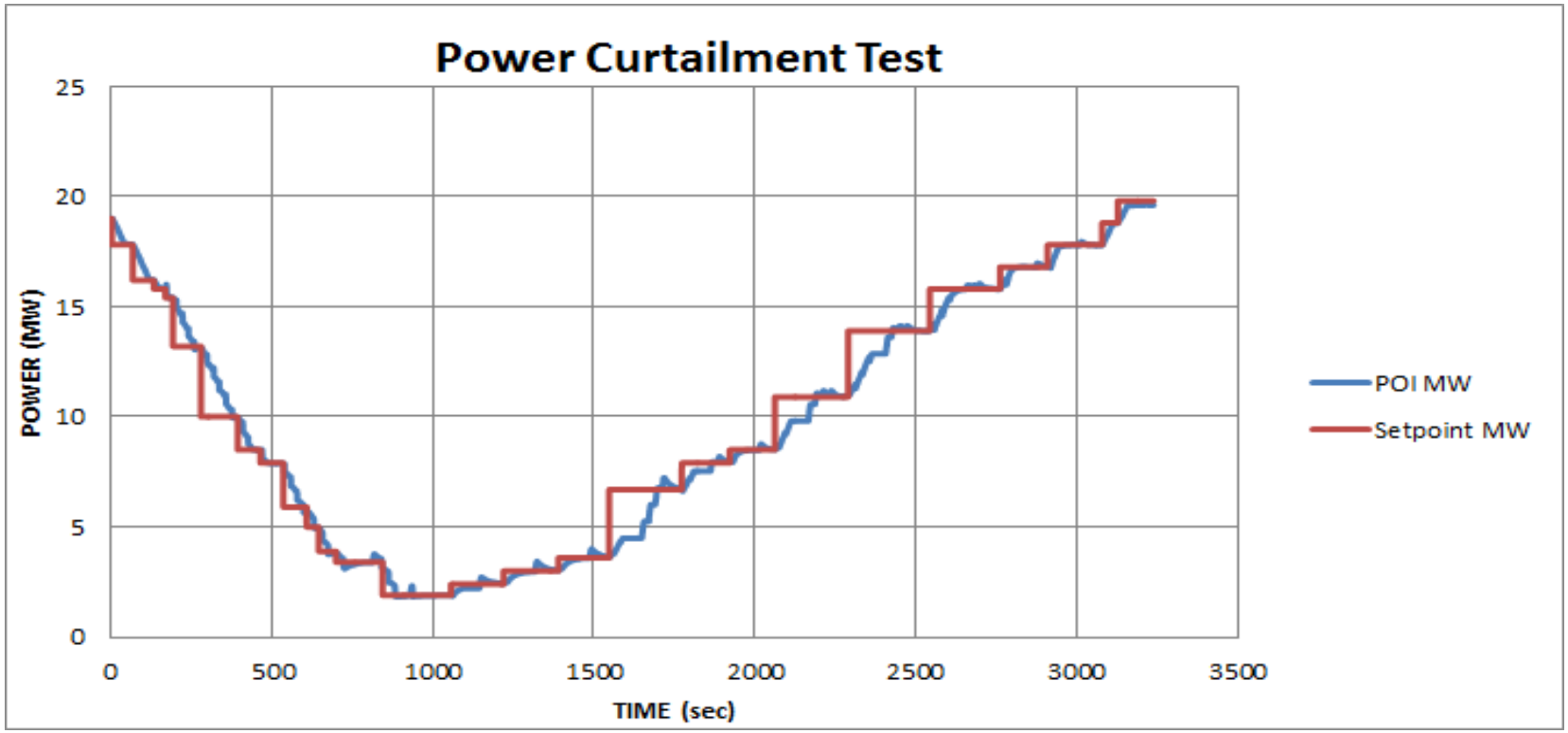
- Voltage / VAR control and/or Power Factor regulation
- Fault ride-through
- Real power control, ramping, and curtailment
- Primary frequency regulation
- Frequency Droop Response
- With Storage potential for black start capability

Passage of Clouds at a 290 MW PV Plant (SCADA Heat Map)





NREL- Barilla PV Plant Controls Demonstration Project



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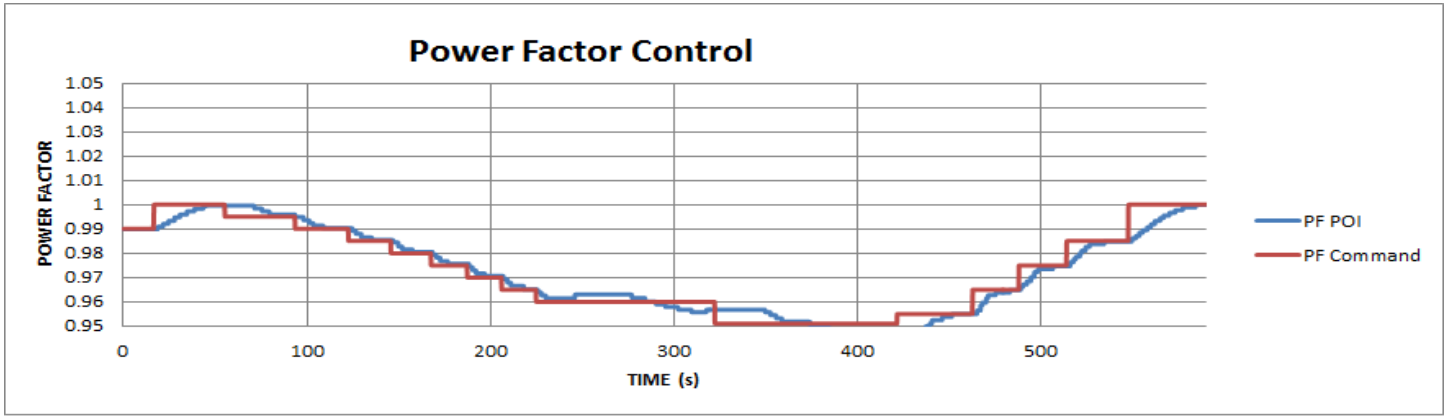

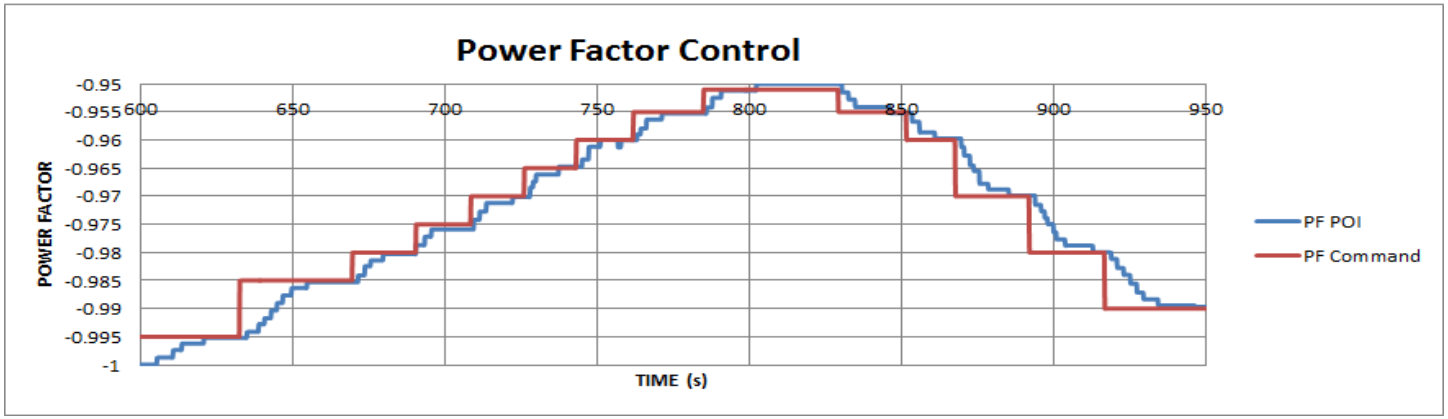

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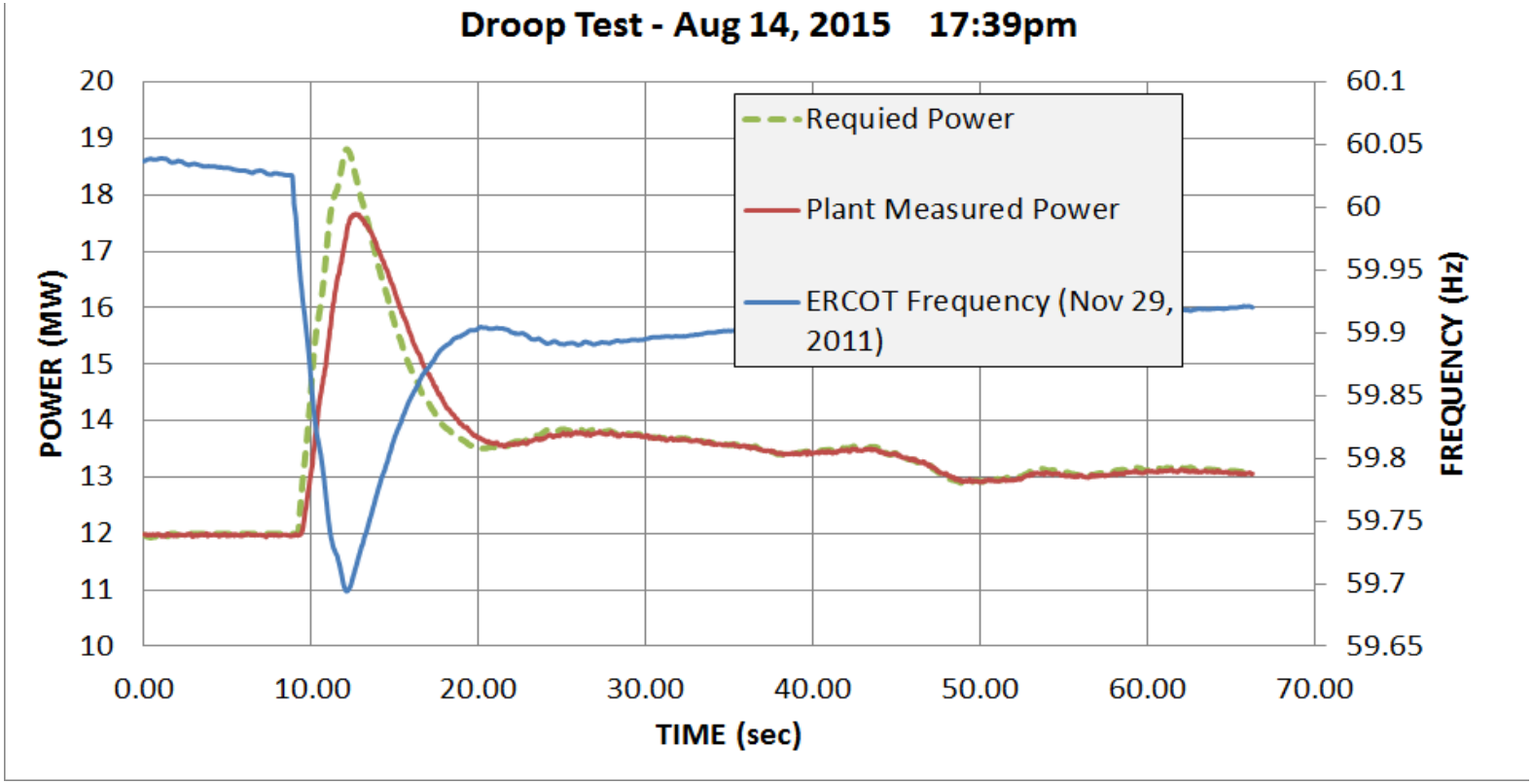
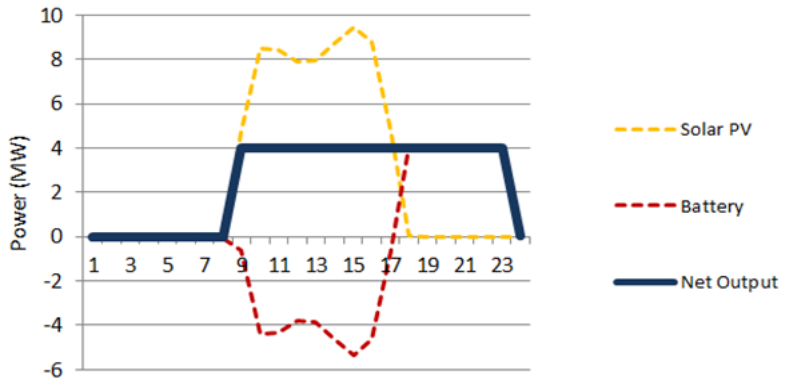


http://www.nrel.gov/docs/fy16osti/65368.pdf

PV & STORAGE Benefits – Forward looking



Co-located PV & Storage will always have a cost advantage over separate installations:

- -Shared fixed costs (site, inverter, interconnect)
- -Shared soft costs (Development, EPC)
- -ITC applies to storage (in US)
- -Shared O&M costs (same truck rolls)

- PV + Storage ("PVS") allows the output profile of PV to be tailored to the customer's needs ("dispatchable PV"), reducing costs and improving reliability
- Storage costs have dropped 50% over last 12-24 months, (varies strongly with desired output profile, local irradiance, subsidy environment, etc.)
- Cost savings resulting in lower LCOE

TRANSMISSION RESOURCE PLANNING

We need to know where to place new resources on the transmission grid, and therefore need to have studies that push the envelope on transmission to identify what transmission expansion is needed to access desirable resource areas.

- There may be lesser cost resources that are only available with more expensive transmission additions, or
- more expensive resources that would be least cost overall because they require little new transmission.

The question of where to look for the next resources?

- That data is available today in the CAISO Queue Cluster process. QC9, in a couple months, along with all previous queue clusters including the withdrawn project lists, will provide your with where resources are being developed to serve the CAISO markets. The work has been done already, along with proposed CAISO upgrades, in the interconnection process, in all those areas to serve that additional generation.
- From a planning perspective we need to expand the transmission capacity envelope to determine where the constraints exists, assess the mitigation alternatives, and determine what transmission expansion should be undertaken as Policy Driven Upgrades. This would give clear price signals to generator developers so they can determine where to build. There used to be something we called the “Phone Book” or Transmission Ranking Cost Report.

The challenges of the current process:

Energy Only Planning

- Buyer's want to know that all generators can deliver at their full capacity to qualify for Resource Adequacy (RA). Therefore during contingency analysis in the planning studies major transmission network upgrades are required. This paradigm doesn't work for resources that are now being looked at being flexible and to a generation fleet to provide ancillary services.
- There is discussion about procuring more Energy Only resources. But the current interconnection studies do not perform this kind analysis. Instead the interconnection studies perform analysis of each project, and each queue, layered upon layer of generation. What we need is interconnection cost estimates that reflect the amount of resources that can be procured from each location, and where additional transmission expansion is cost effective.