

CAPACITY

Idaho Power Resource Planning Perspective



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June 14th, 2019

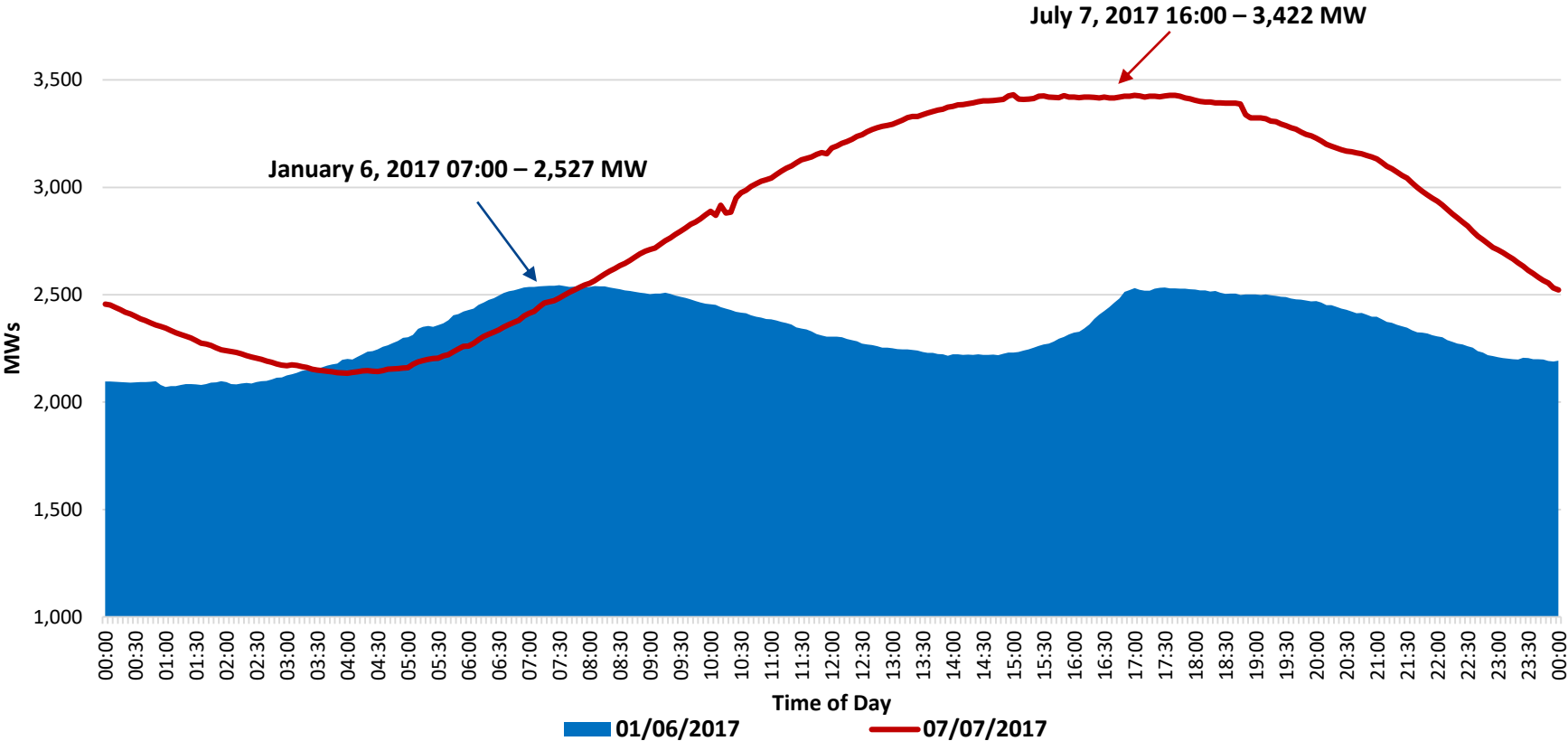
Portland, Oregon

Resource Planning

Plan to meet the following:

1. Peak-hour demand
2. Energy needs
3. Reserve requirements
4. Flexible capacity needs

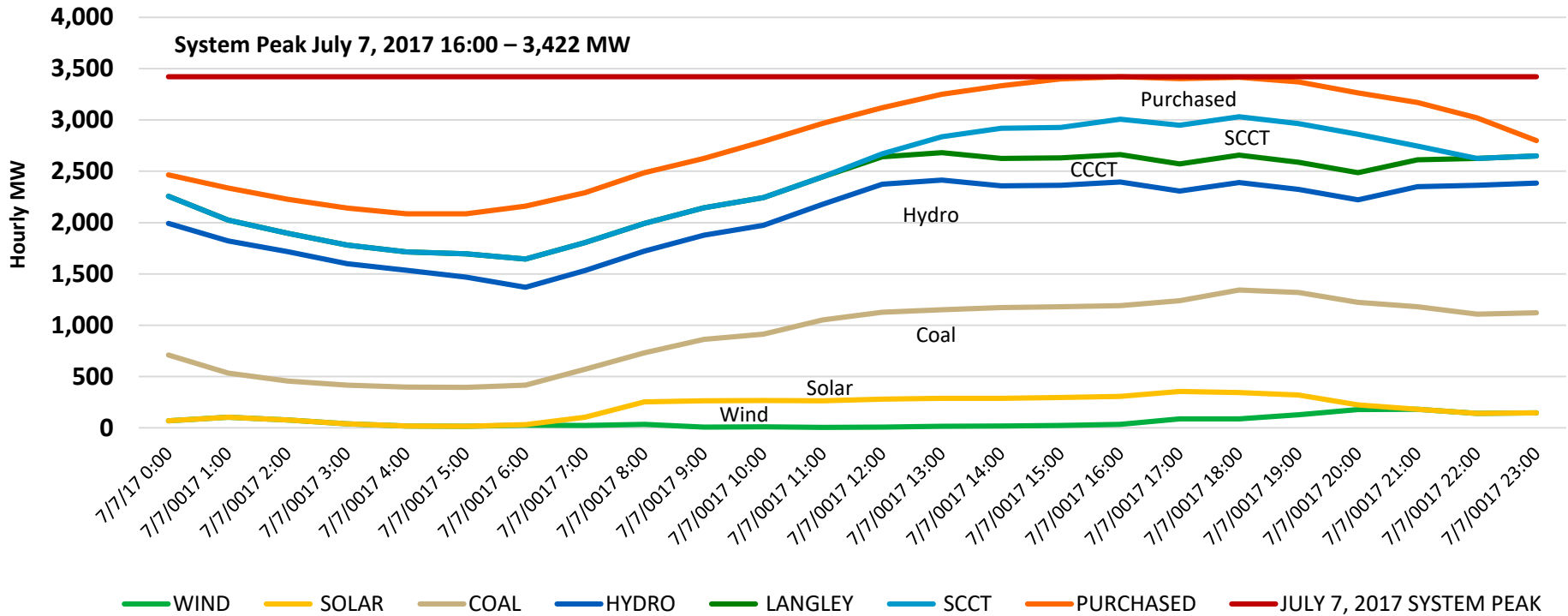
Idaho Power System Peak Demand



2017 Summer Peak

Load and Resources

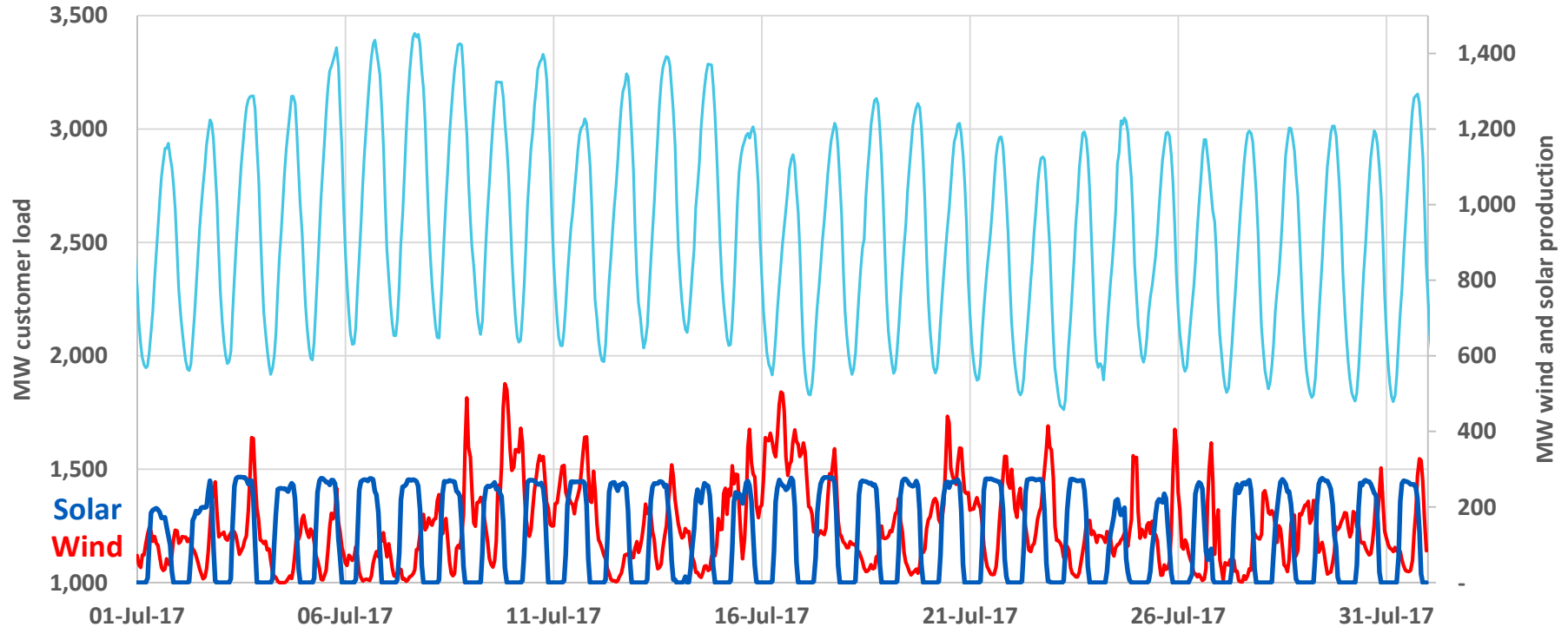
July 7, 2017 3,422 MW



Note: Each resource represents the incremental addition provided to reach the total demand for the system.

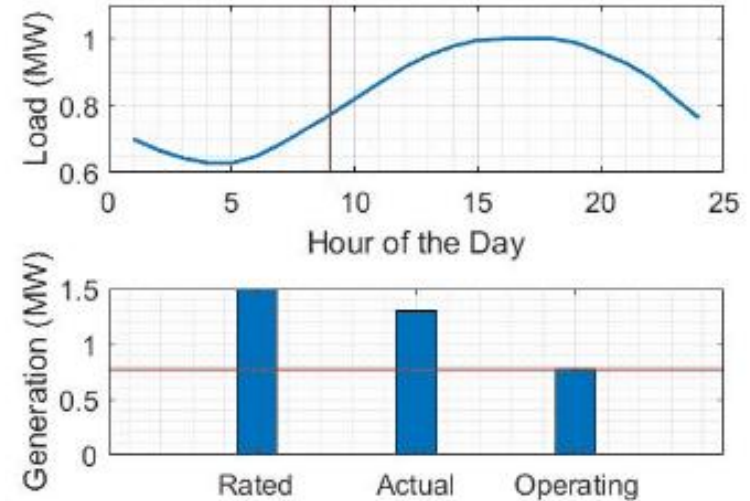
July 2017

Load, Wind, and Solar MW



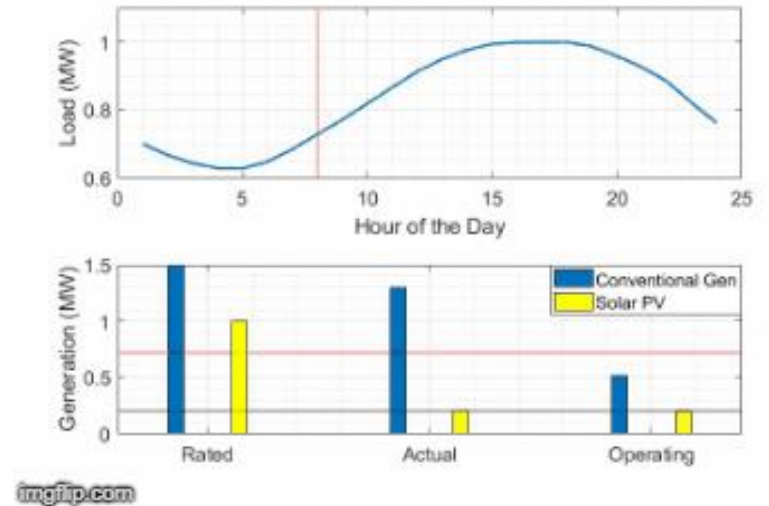
Capacity Value Concept – Conventional Generation Hydro & Thermal Plants

- Capacity Value is the percentage of the nameplate capacity that reliably available during specified hours (i.e. peak demand).
- Aka “peak capacity factor,” or “contribution to peak” or sometimes “effective load carrying capability (ELCC)”



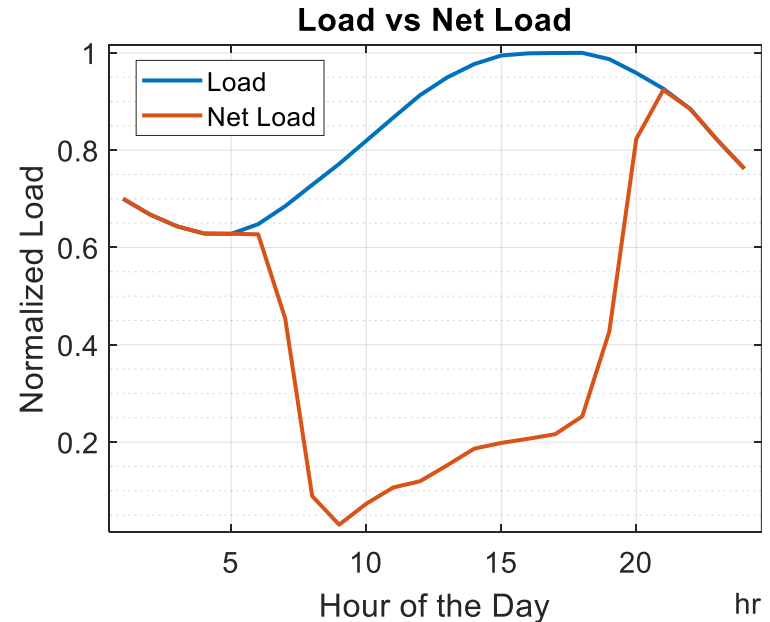
Capacity Value Concept – Solar PV

- **Rated Capacity:** Nameplate capacity
- **Actual Capacity:** Maximum amount of electrical load that the system could serve at moment's notice. Changes with time
- **Operating Capacity:** Capacity at which the generator is currently operating. Changes with time

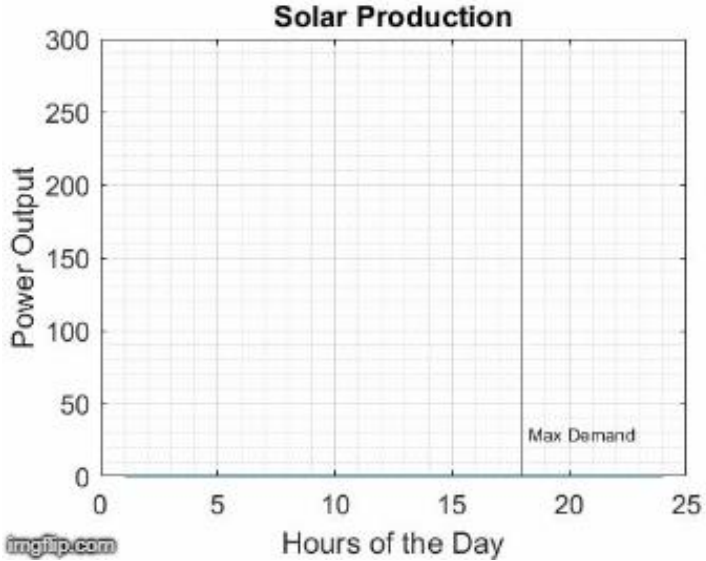
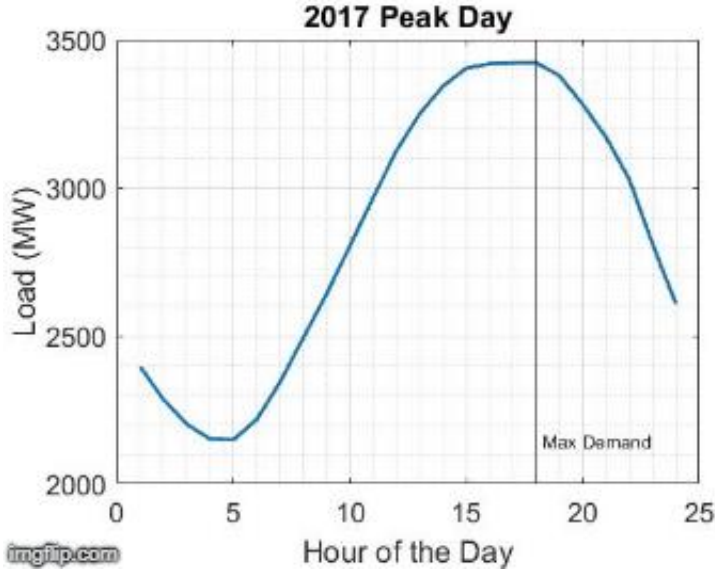


Capacity Value Concept – Solar PV

- Increased solar generation on the grid changes the load-net solar patterns and can shift the peak-net solar.
- High penetration levels of solar result in what is known as the “Duck Curve”.



Peak Demand vs. Solar Output

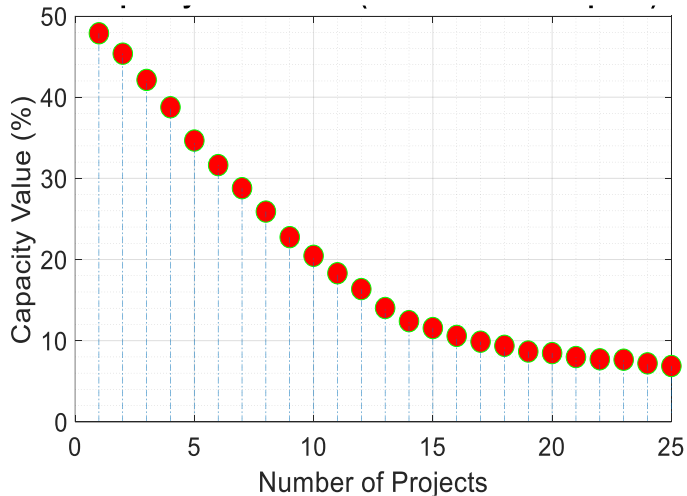


Solar Capacity Value – IPC System (Summer)

Existing:

	Capacity Value (% of Nameplate Capacity)
Existing Solar PV (289.5 MW)	61.86%
Projects in Construction (26.5 MW)	47.92%

Future:



Peak Capacity Factors – Planning View (Summer)

- Hydro – 100% (energy limited)
- Natural gas – 100%
- Battery storage – 100% (energy limited)
- Wind – 5%
- Solar – Depends

Summary – Planning Perspective

1. Peak-hour demand

- Plan to meet by combining expected peak-hour output of resources

2. Energy needs

- Plan to meet by combining expected monthly energy contributions of resources

3. Reserve requirements

- Incremental above expected peak-hour demand

- Reliability driven

4. Flexible capacity

- Needed for ramping & variability (i.e. intermittent resources)

- Amount needed depends on resource mix