Meeting Peak Demand through Energy Storage

2018 Advanced Energy Conference

March 28, 2018
Fluence is the global leader in energy storage with nearly 500 MW in 15 countries

485
TOTAL MW

15
COUNTRIES

56
PROJECTS*

*Deployed or Awarded
Fluence brings unmatched experience at scale from the partner you can trust

**EXPERIENCE**
10+ years of experience in energy storage from two proven industry pioneers
- World’s leading storage provider
- Deployed or been awarded 56 projects, in 15 countries, 486 MW

**SCALE**
Complete technology and service offerings delivered worldwide
- Proven technology platforms that address full spectrum of applications
- Delivery & integration in 160 countries
- Comprehensive services including financing

**THE RIGHT PARTNER**
Deep understanding of modern power markets, customer needs, and local market challenges
- Collaborate with customers to solve their energy challenges
- Avoid pitfalls of inexperienced packagers and integrators
- Strong financial backing and industry staying power

Created and backed by two industry powerhouses

SIEMENS
*Ingenuity for life*

AES
*we are the energy*
Unique capabilities vs. traditional resources

**ALWAYS ON**

Versus Average Peaker Plant

6.6% vs. 97%

15x more service hours

**HIGHLY RELIABLE**

Parallel Array For High Availability

**UNIQUELY FLEXIBLE**

2x
Storage is “always on” to provide multiple services

**Composite Dispatch Profile:**
- 100 MW storage array for load following / ramping
- 10 MW RegUp and RegDown except HE18-20

(based on possible California 2020 net load expectations)
Storage provides up to 4x the effective resource of a thermal peaker.

Advantages of battery storage:
- Fast ramp (<2 sec)
- Unlimited starts / stops (no cost)
- No emissions or water use
- Ease of permitting
- Rapid deployment
- Always synchronized
Storage provides better system flexibility at lower cost than gas peakers

Example: Public Service New Mexico 2017 IRP Preliminary Reliability Analysis

<table>
<thead>
<tr>
<th></th>
<th>Renewable Penetration</th>
<th>LF Target % of Load</th>
<th>Curtailment %</th>
<th>Curtailment MWh</th>
<th>LOLE_CAP Events Per Year</th>
<th>LOLE_FLEX Events Per Year</th>
<th>Production Costs M$</th>
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</thead>
<tbody>
<tr>
<td>Base Case 40% RPS (66.7% Wind)</td>
<td>40.6%</td>
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<td>9.4%</td>
<td>541,689</td>
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</table>

Higher reliability and lower cost with energy storage vs. flexible thermal resources (e.g., aero-derivatives)

Source: Astrape Consulting, PNM 2017 IRP – Initial draft results of 2024 RPS Scenarios adding Flexible Generation or Battery
The peak need changes as renewable penetration increases

The value of storage also increases as renewable penetration increases.

30 MW of energy storage for San Diego Gas & Electric, California, United States

Largest energy storage project in the western hemisphere
Contract to online in 6 months
Sited on 1 acre, where a power plant could not be permitted
World’s largest contracted energy storage project

Generation Enhancement

Long Beach, California, United States
100 MW, 4-hour (400 MWh)
AES Alamitos, COD Jan 1, 2021

SERVICES

• Capacity, local reliability
• Peak power/off peak mitigation
• Ancillary services

IMPACT

• Competitive bid vs thermal peaker, cost effective
• Replaces environmental retired units
• Meets flexibility (duck curve)
Transmission & Distribution Enhancement

Arizona, United States
2 MW / 8MWh
Arizona Public Service (APS), Punkin Center (under construction)

SERVICES
• Transmission upgrade deferral
• Peak management

IMPACT
• Power reliability at half the cost of a transmission
Thank You