



New York - Department of Public Service

Reforming the Energy Vision
Technical Conference on Energy Storage

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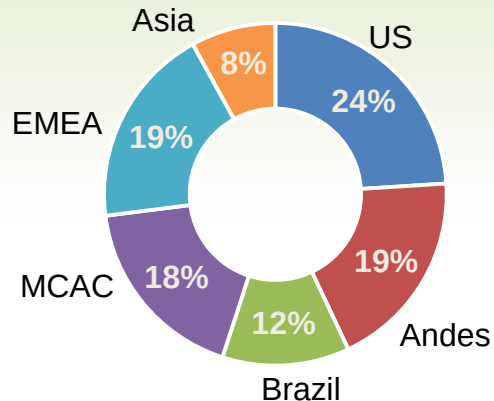


About the AES Corporation

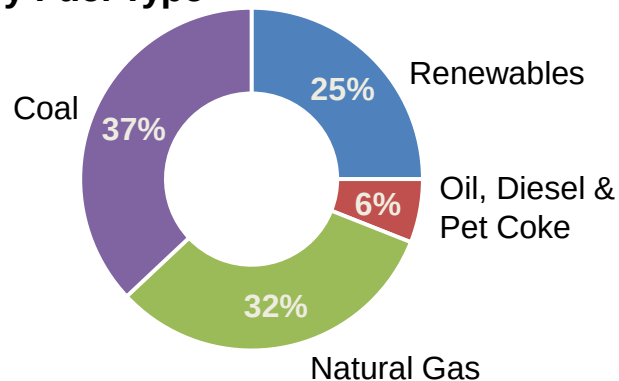
Mission: Improving Lives Through Safe, Reliable and Sustainable Energy Solutions

Diversity Across Markets, Fuels & Technology

Income Sources (2013 adjusted PTC)



By Fuel Type



Dependable Provider to Utilities and Power Systems

- 18 countries
- 35,000 MW generation
- 8 utility companies
- 11 million customers
- \$39 billion assets
- \$17 billion revenues
- 18,500 global workforce

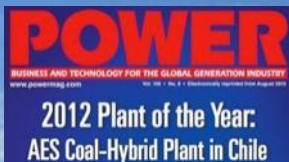
Current AES Energy Storage fleet

Largest fleet of battery-based energy storage, 8 years commercial operating experience



Established, Award-Winning Grid Storage Solutions

More than 500MW of Resource in Operation or Construction Since 2008



“AES Energy Storage has a clear market-leadership position, grid-scale project experience, and the deep financial backing needed to continue to expand at a fast rate in the energy storage industry”

greentechgrid:

#1 Energy Storage
Systems Integrator

NAVIGANT
RESEARCH

40 MW Angamos Resource
Antofagasta, Chile

Energy Storage Addresses Grid Challenges

Battery-based **Energy Storage** Provides Peaking Power in a Way that is *Distinct* from Traditional Thermal Assets

Adding batteries:

- **Improves usage of existing assets**
 - ▶ Improves efficiency of existing resources
 - ▶ Reduces system-wide emissions
- **Supports integration of more renewables**
 - ▶ Instantaneous response to balance supply/demand
 - ▶ Minimize curtailments
- **Improves grid reliability and security of supply**
 - ▶ Digital response adds precision
 - ▶ Locate generation near load

Energy Storage Costs Less and Does More



Storage is a Multi-Solution Technology – Multiple Benefits Derived from one Project

Opportunities for NY to be a Market Leader

A CUSTOMER FOCUSED APPROACH

Segment	Customer	Offered Solutions
 1 Generation alternatives	- Power project developers (IPP) - Utilities - System Operators	① Renewables Integration ② Frequency Regulation/Ancillary Services/ Fast Ramping ③ Flexible Peaking Power ④ Capacity Release
 2 T&D Alternatives	Transmission & Distribution Utilities	⑤ Capacity release & ISO peak demand charge management ⑥ Investment deferral, replacement, reliability
 3 Commercial & Industrial	Commercial & Industrial Customers	⑦ Demand-charge management & Reliability

Adding System Reliability with Wind

Serving PJM Interconnection – World's Largest Power Market



**98 MW Laurel Mountain Wind Farm
with 64 MW Storage Resource
West Virginia, USA**



AES Brings Storage Offering to California

World's Largest Battery

100 MW Interconnection (rendered)
200 MW of flexibility (discharge + charge)

Project Description:

- 2x50 MW advanced battery array - IFM
- Provides local capacity reliability
- 4 hour duration
- 24x7 power resource – can be used for renewables firming
- No emission or water
- Tolling PPA



Recent Market Applications – Transmission and Distribution Reliability

- Activity in the Western US focused on improving the reliability of the distribution network
 - ▶ Relatively small (1 – 5 MW) individual locations, but large volume of locations at a single utility
 - One hour or more duration
 - Typically owned/contracted by the distribution utility
 - Target feeders with high renewables penetration
- Current NY activity focused on “REV style” T&D Alternatives
 - ▶ 10+ MW in front of the meter local peak demand solutions
 - ▶ REV Demo projects

Storage to Serve TenneT and Integrated Reserve Market

Initial 10MW Storage Online at End of 2015, Providing 20MW of Flexibility

- Primary Control Reserve for integrated market (DE, NL, CH, AU)

Impact:

- ✓ Reduce total reserve cost in high % renewables market
- ✓ Fast, accurate reserves
- ✓ Increased system flexibility
- ✓ Opportunity to explore fast resource benefits
- ✓ Scalable



*20 MW Zeeland Resource
Vlissingen, Netherlands
(rendered)*

Energy Storage is a Dependable, Cost-competitive Solution to Support Market Mandates

Increasing Demands from Renewable Targets...



Induced Retirements from Emissions Controls...



Energy Storage Scalable, Dependable, Affordable



**64 MW AES Laurel Mountain Battery Array
Competitively bid into PJM Interconnection**

What is needed for large scale storage development in New York?

- AES is closely following the Clean Energy Standard (“CES”) and NY REV related proceedings
- Policy conclusion that contracting/REC structure changes will lower the overall cost of Large Scale Renewables is valid
- Storage is a cost effective enabler of renewables penetration as outlined in NYBEST and ESA comments in the LSR docket/CES dockets
- Storage is a cost effective solution, but like renewables, meaningful levels of low cost development requires stable predictable revenue streams

Appendix

Industry Leading Battery, Power Conversion, and Control System Technology

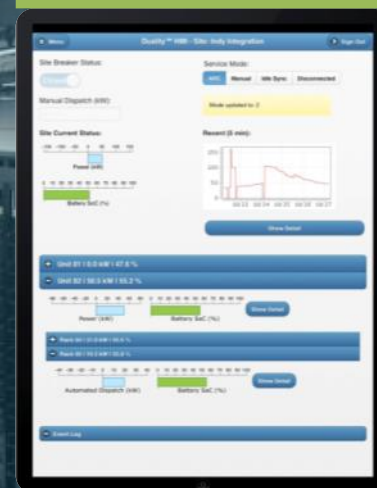
Battery system



Power conversion



Controls



Dependable

Maximizes Dependability Through Advanced Array Architecture

ALWAYS ON

Versus
Average
Peaker
Plant

6.6% vs. 97%
15^x more
service
hours

FLEXIBLE ARRAYS

Parallel
Array
For High
Availability

