Energy Storage for Flexible Peaking Capacity

June 2012

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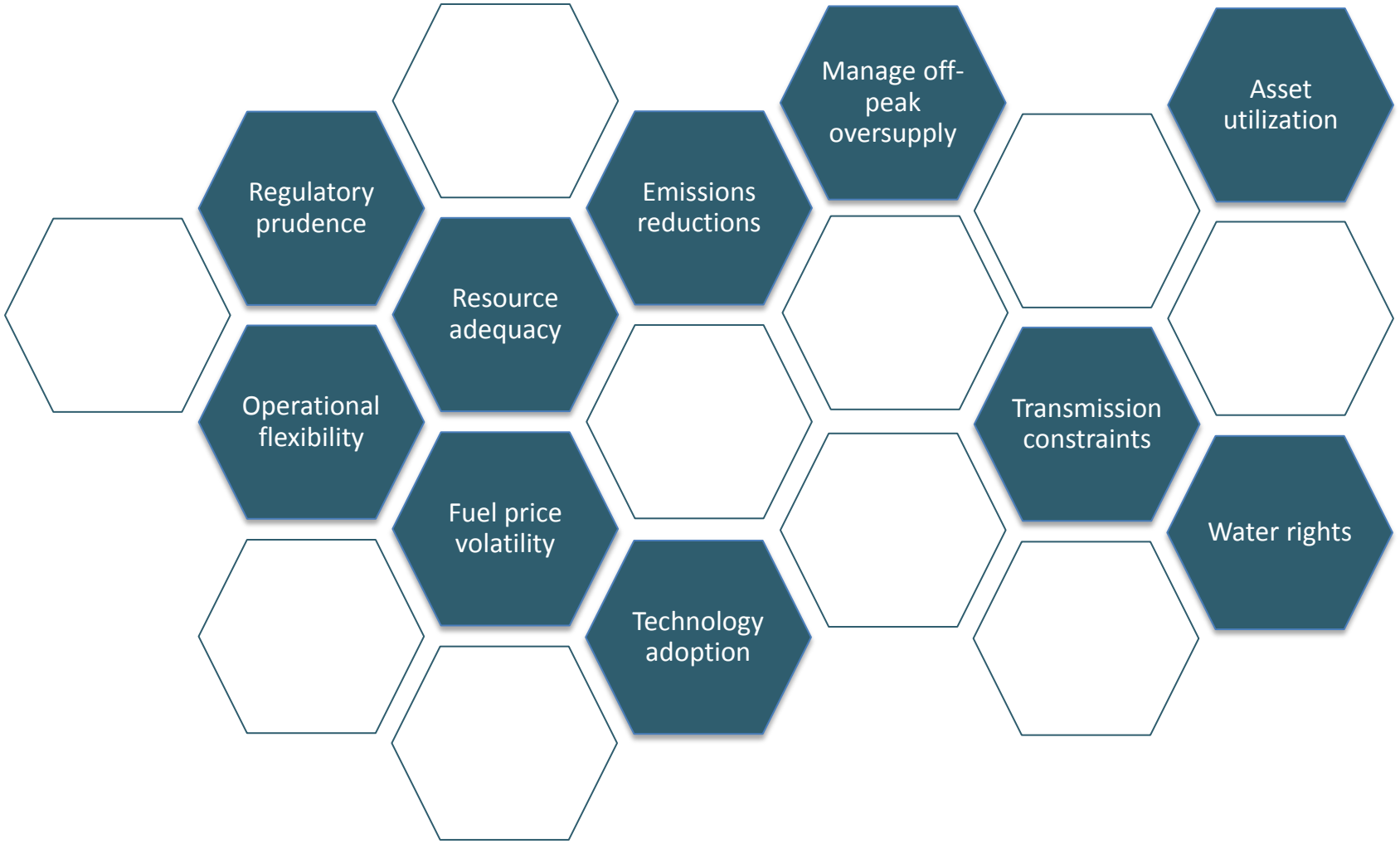
Agenda

- Introduction to AES and our Products
- System Reliability
- Energy Efficiency
- Planning Flexibility

Utility balance many challenges in making resource decisions.



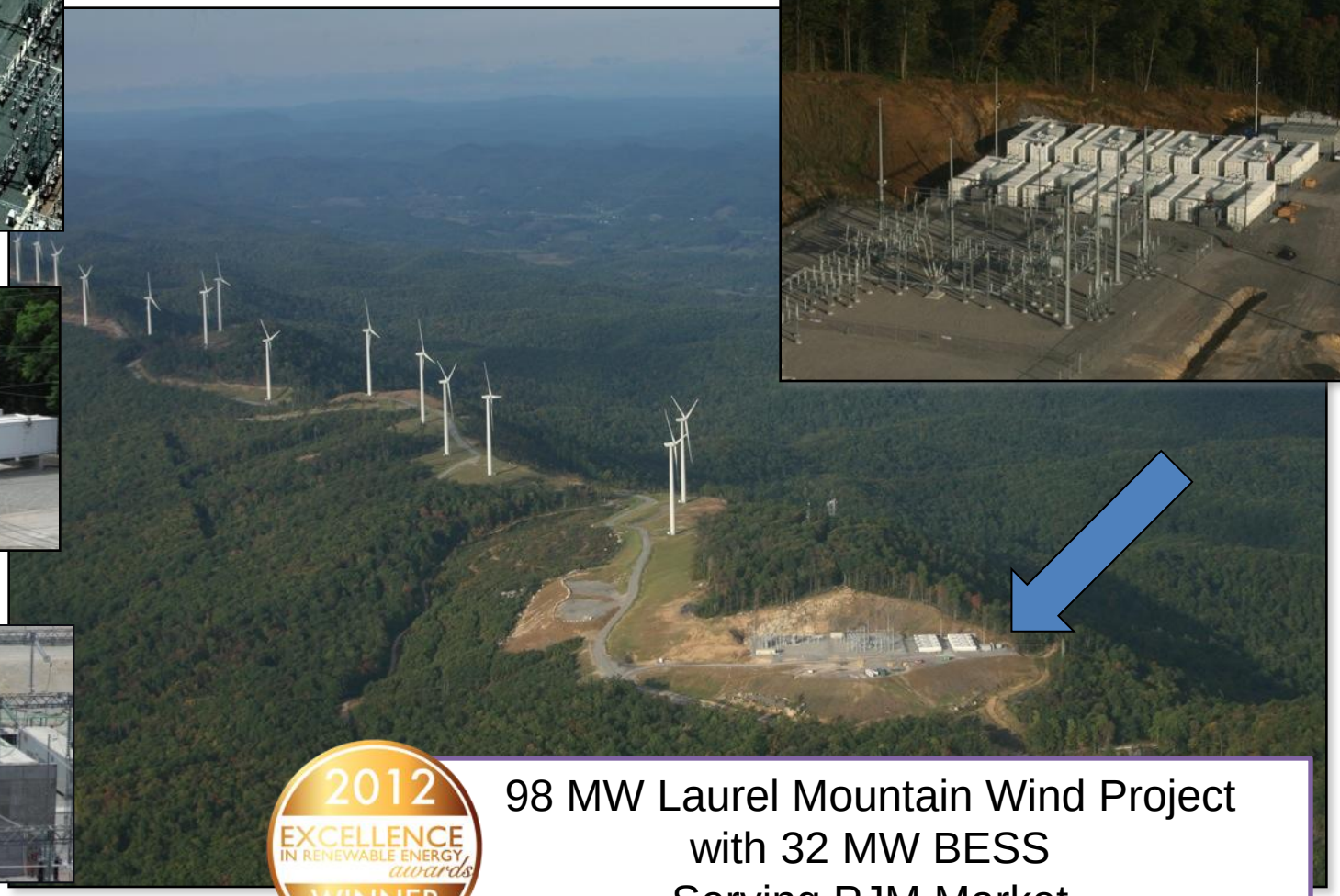
Commercial battery-based storage performing in power markets.

AES Energy Storage

Chile

New York

Chile

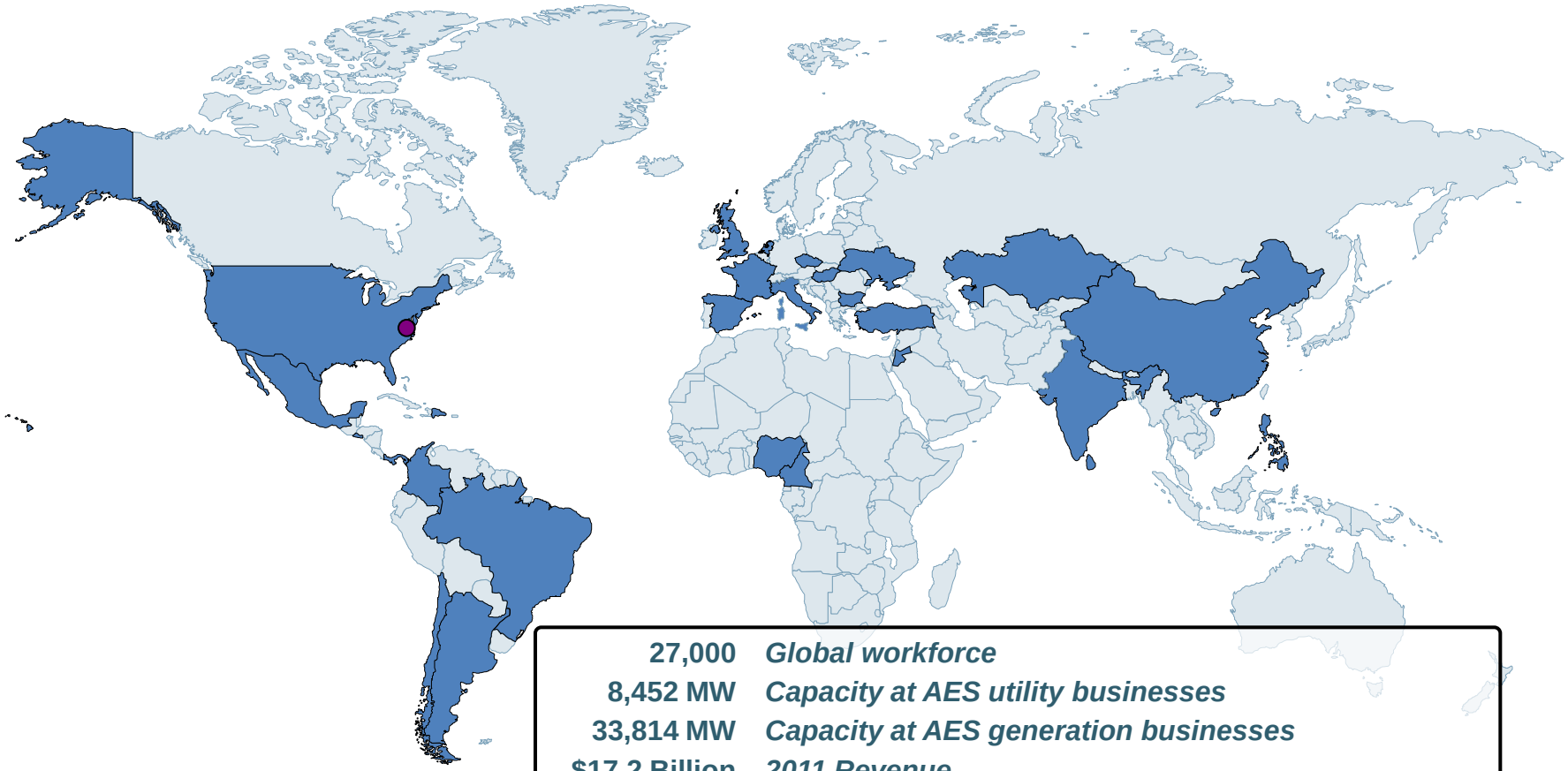


2012 EXCELLENCE IN RENEWABLE ENERGY awards WINNER

98 MW Laurel Mountain Wind Project
with 32 MW BESS
Serving PJM Market

AES operates power facilities in 27 countries.

Our mission is to improve lives by providing safe, reliable and sustainable energy solutions in every market we serve.

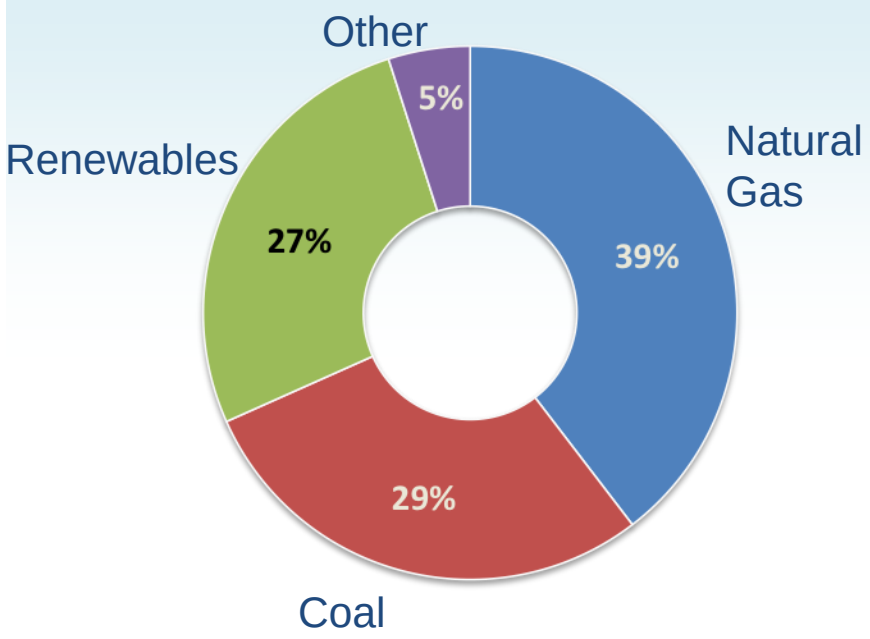


27,000	***Global workforce***
8,452 MW	***Capacity at AES utility businesses***
33,814 MW	***Capacity at AES generation businesses***
$17.2 Billion	***2011 Revenue***

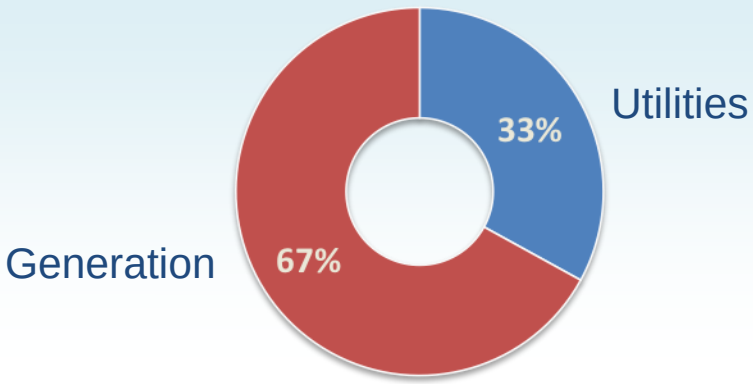
Key ● AES Headquarters ■ AES Operations

AES is a diversified power generation & distribution company.

Generation Portfolio by Fuel Type



2012 Proportional Adjusted Gross Margin[1]: $3.6 Billion



Generation

- 39 Generation businesses
- 36 GW of generating capacity

Utilities

- 13 Utilities companies serving 12 million customers
- Operate 8 GW of generating capacity

AES has been serving U.S. utilities with reliability services for over 30 years.

AES Energy Storage

AES Products	Utility Customers (U.S.)
Energy	PG&E, Xcel Energy, FirstEnergy, delmarva power, SCE, ODEC, OG&E, BPA, Direct Energy, Hawaiian Electric Company, Alliant Energy, AEE
Clean Energy	
Capacity (R. A.)	
Regulation	
Voltage Support	
Spinning Reserve	
Transmission	
Distribution	

AES is introducing energy storage products for reserves and capacity.

Customer/Industry Established Needs:	Current Solutions: *"Build more factories."*	AES ES Products: *"Build warehouses!"*
Efficiently Manage System Reliability	Hold Back Economic Power Plants	Advanced Reserves (Chile – "Capacity Release")
Meet Peak Demand & Manage Off-peak Over-Supply	Build Low Capacity Factor Plants, Curtail Wind, Hydro	Capacity Alternative ("Peaker Replacement")

There is growing interest in the region for storage as a capacity and flexibility alternative.

AES Energy Storage

Northwest Power and Conservation Council

NORTHWEST 6th POWER PLAN

- Technologies such as pumped storage, compressed air storage, batteries, and "smart grid" technologies offer low-carbon approaches to augment system flexibility.
- All potentially cost-effective alternatives… should be considered including… storage… Resource acquisition decisions should recognize the full value of services (e.g. energy, capacity, ancillary services, avoided transmission and distribution costs, cogeneration load) provided by the available alternatives.

Sixth Northwest Conservation and Electric Power Plan, Feb 2010

Pacific Northwest NATIONAL LABORATORY

- This study revealed several insights into the technology ranking under life-cycle cost optimality. First, the reference technology (CT) is not the least expensive option. Both batteries types… were comparatively less expensive to the CT.

Energy Storage for Power Systems Applications: A Regional Assessment for the NWPP, Apr 2010

WASHINGTON UTC UTILITIES AND TRANSPORTATION COMMISSION

- We note that the Company does not include any discussion of the various types of electric storage technologies in its Plan or in the detailed Appendices which examined various fossil and renewable generation technologies… But we believe that the Company's next IRP would be well served by a discussion of electric storage technologies, and why they may or may not fit into the Company's resource portfolio.

WA UTC's Comments on PSE's 2011 IRP, Dec 2011

Our products improve system reliability and efficiency.

System Reliability

- Meet resource adequacy needs.
- Achieve operational flexibility in all hours with fast ramping capacity.
- Get double the flexible range of conventional peaking solutions.

Energy Efficiency

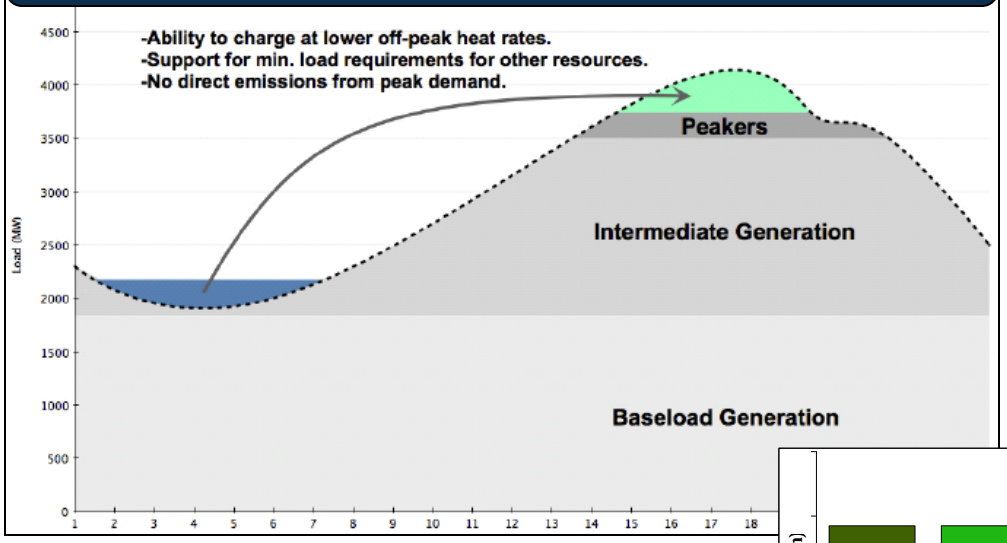
- Use existing clean & efficient resources to serve load in peak hours.
- Improve generation and transmission asset utilization.

Planning Flexibility

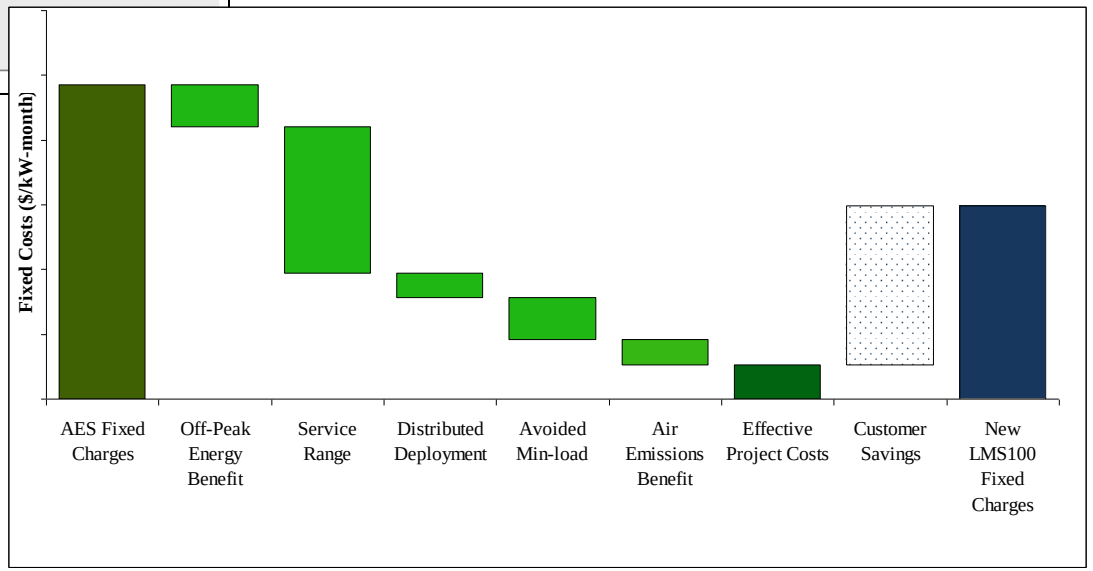
- Rapidly site emissions-free capacity close to load.
- Avoid lengthy transmission siting challenges.

Battery-based capacity has unique benefits which make it a better value.

Flexible Emissions-Free Capacity



- ✓ Provides more than double the flexible range of a CT with no minimum load
- ✓ Provides peak energy at baseload costs
- ✓ Makes use of excess off-peak wind, gas, nuclear or hydro.
- ✓ Has no direct emissions; lowers system emissions
- ✓ Avoids cost of new transmission lines by providing power close to load



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System Reliability

Meet resource adequacy needs without additional generation.

Portland General Electric Co.

REQUEST FOR PROPOSALS

Power Supply Resources

January 25, 2012

PGE

sustainable business oregon

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Date: Wednesday, April 4, 2012, 9:01pm PDT - Last Modified: Thursday, April 5, 2012, 9:44am PDT

AES plans to bring big batteries to Oregon's grid

By Lee van der Voo

Sustainable Business Oregon contributing writer

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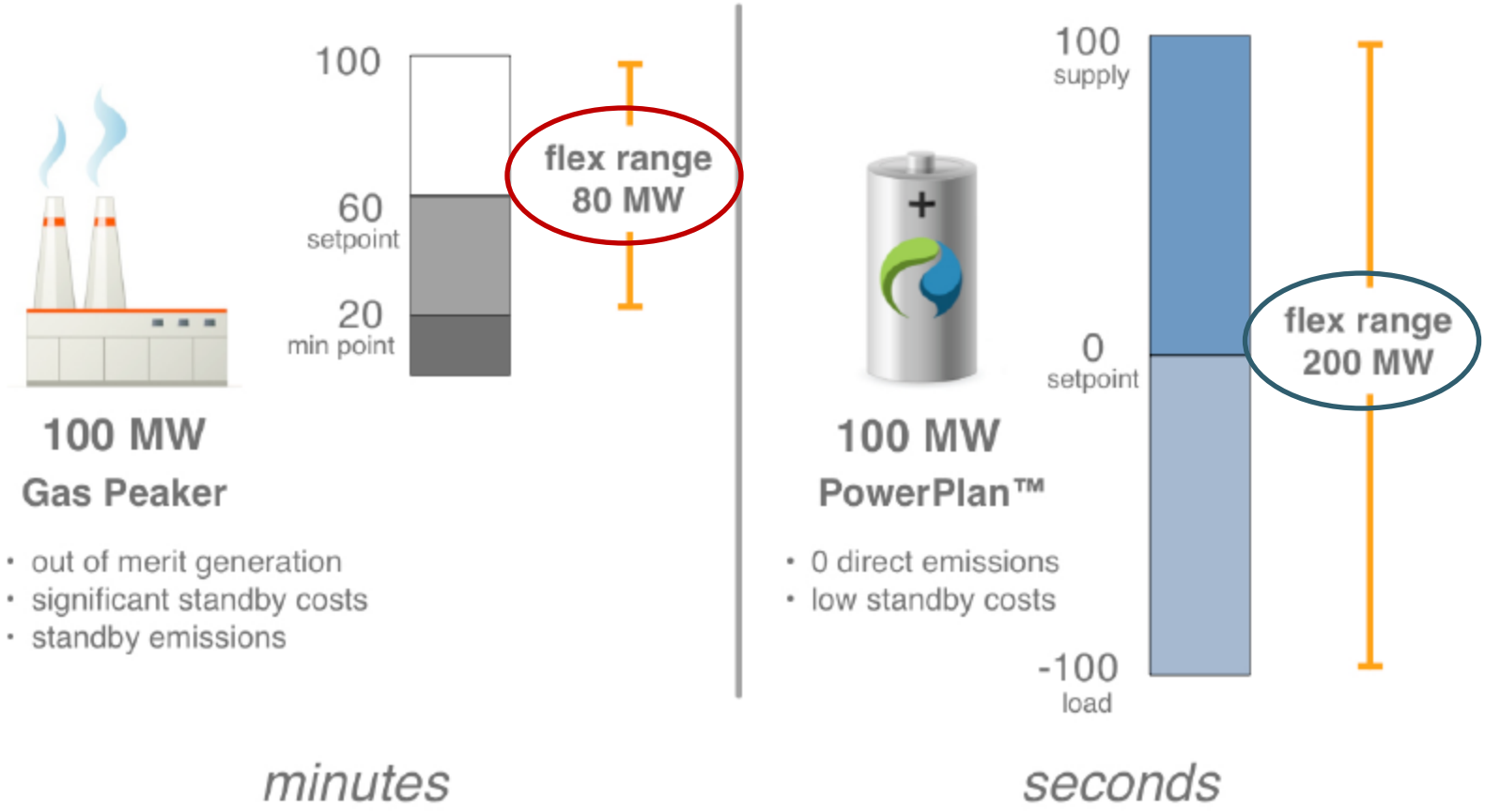
AES Energy Storage, the Virginia-based subsidiary of $17 billion global power giant The AES Corporation, intends to offer its battery storage technology to Portland General Electric to help the utility bridge resource gaps and incorporate more renewable energy into its mix.

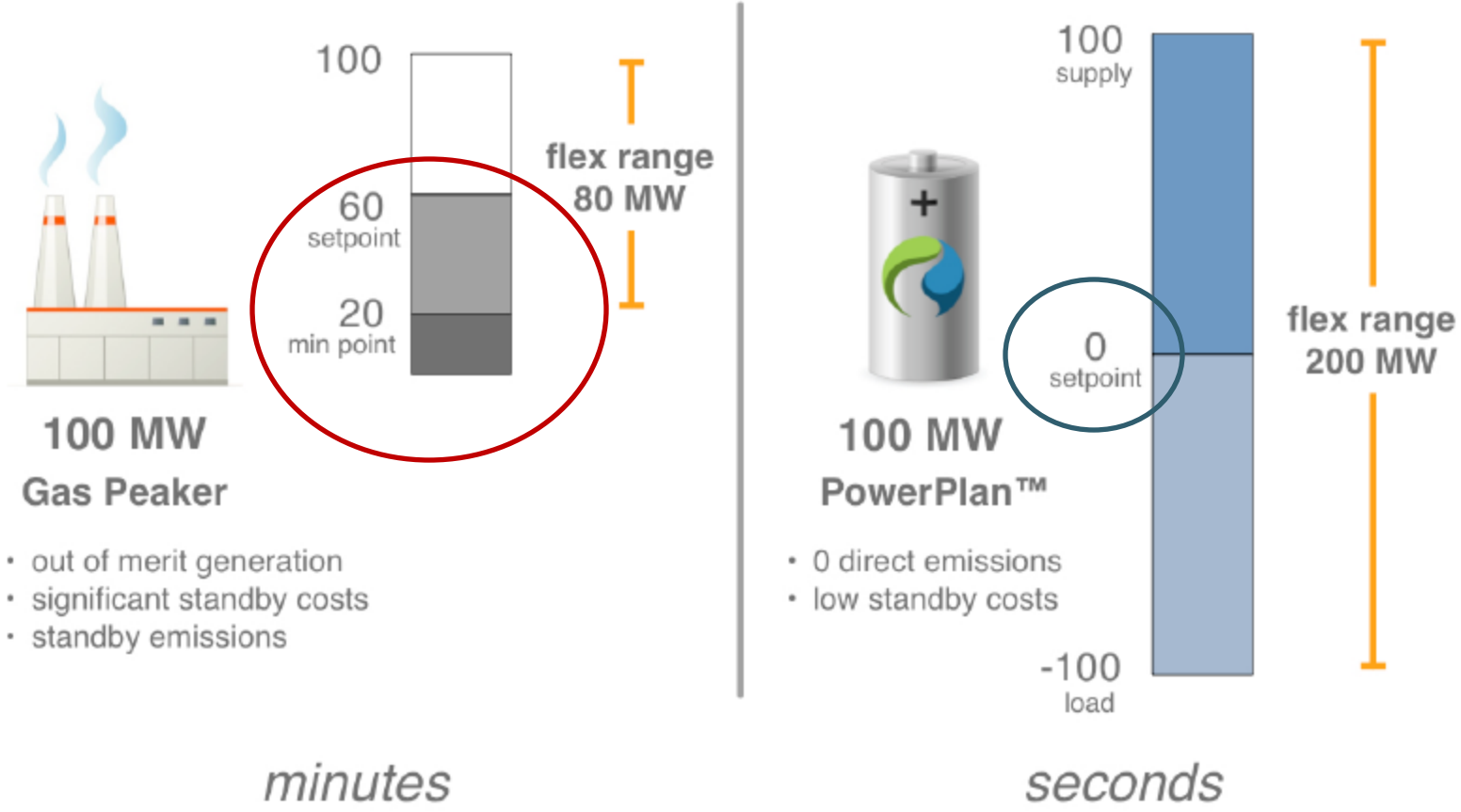
Should AES dive in, the company could be the first to propose a commercial-scale battery project in Oregon, which, if built, would be among the first in the nation. Battery-powered energy storage is a good fit for Oregon's energy mix and could solve some of the most pressing problems plaguing the grid as more renewable

View photo gallery (2 photos)

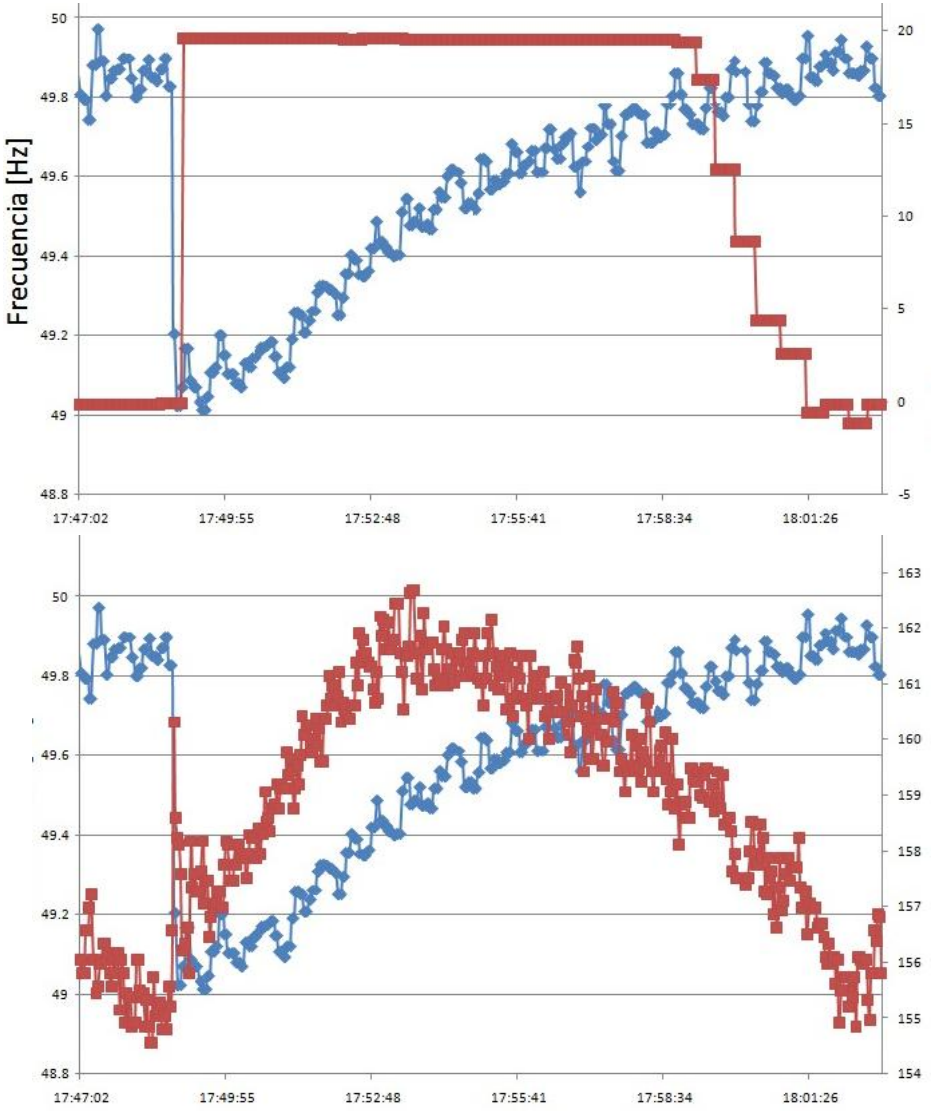
Replace more than 2x generation nameplate when planning for flexibility.



Around-the-clock service factor without any minimum generation.



Ramp quickly to manage net load variability and contingencies in seconds.



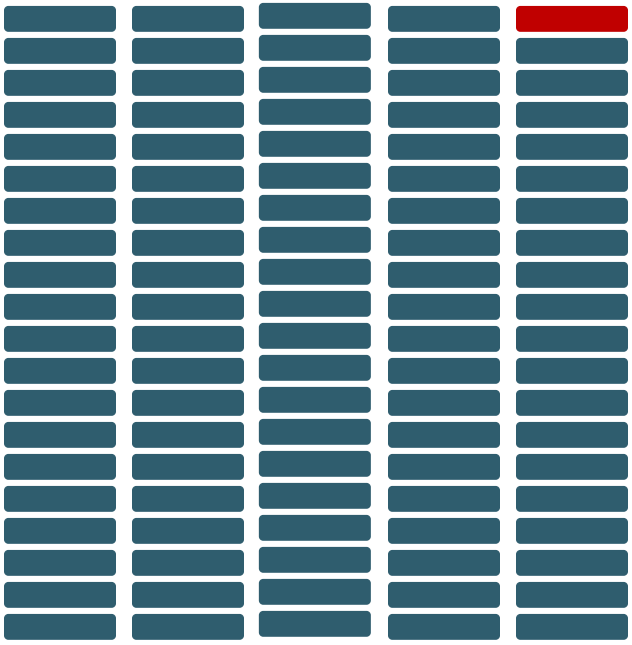
Source: CDEC-SING, AES

Disturbance Event on 4/9/12

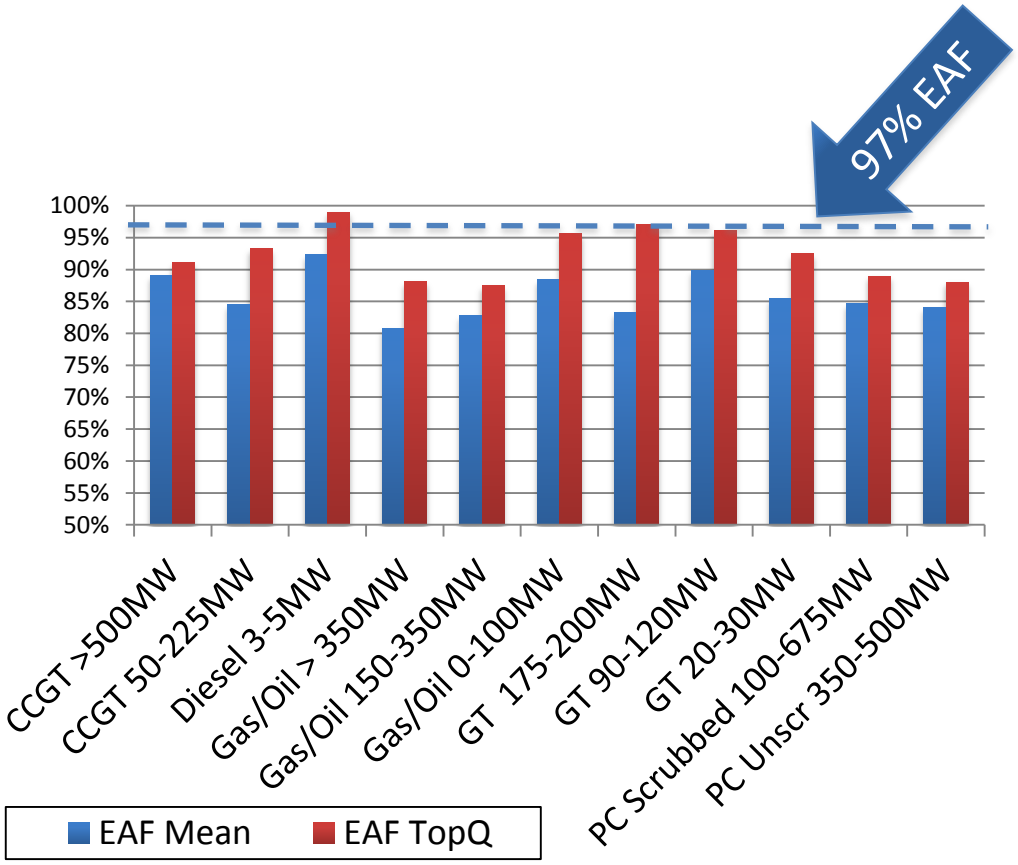
- Angamos BESS responds with rapid increase of output from 0MW to 20MW
- Autonomous response according to programmed profile
- Output sustained until stability restored

- Thermal unit responds with 4MW burst, then output drops off
- Gradually ramps up in oscillating manner to 7MW output increase over 4 minutes

Modular design drives high availability.



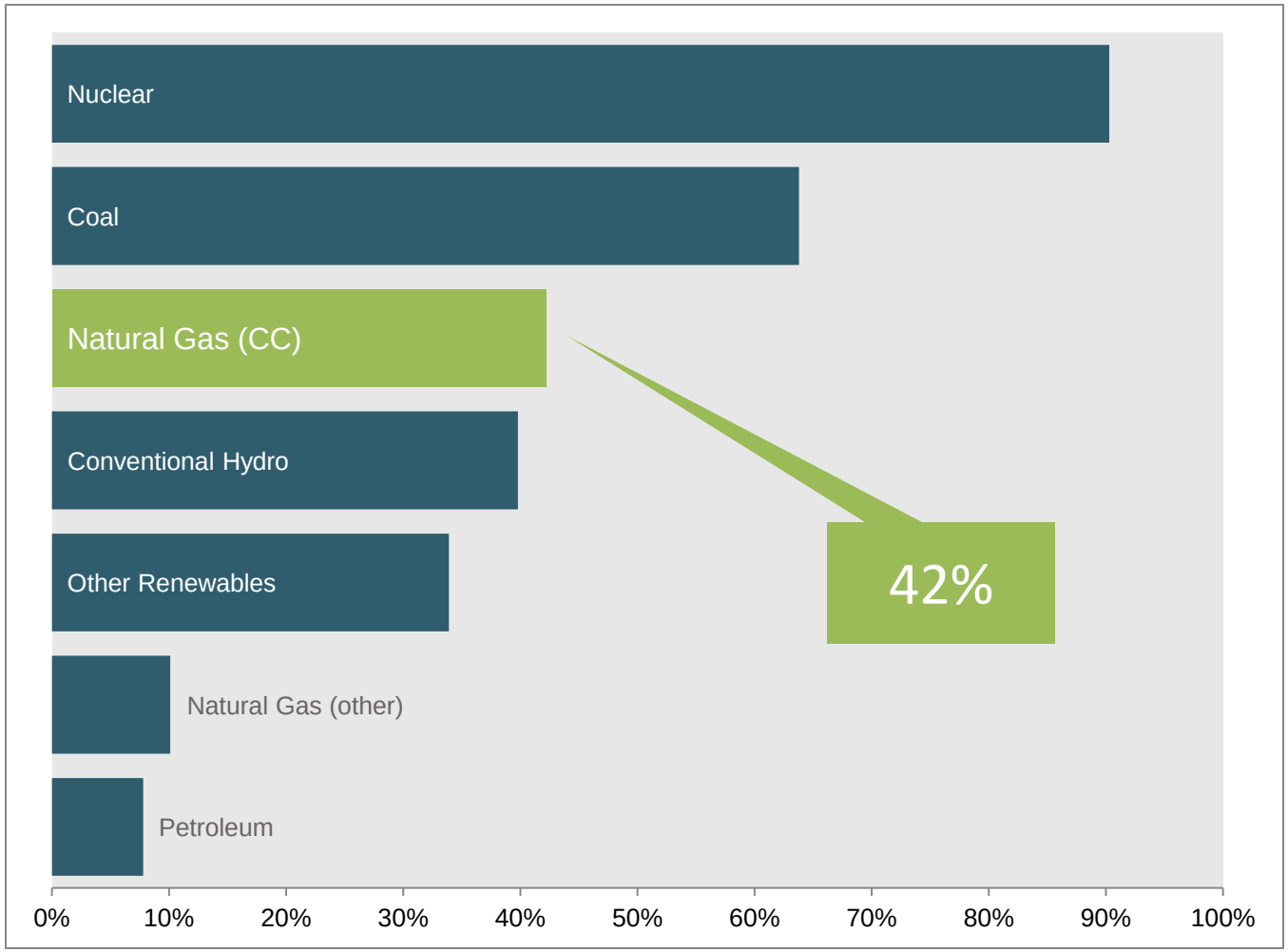
100MW unit with 1MW outage



Source: Navigant, AES,

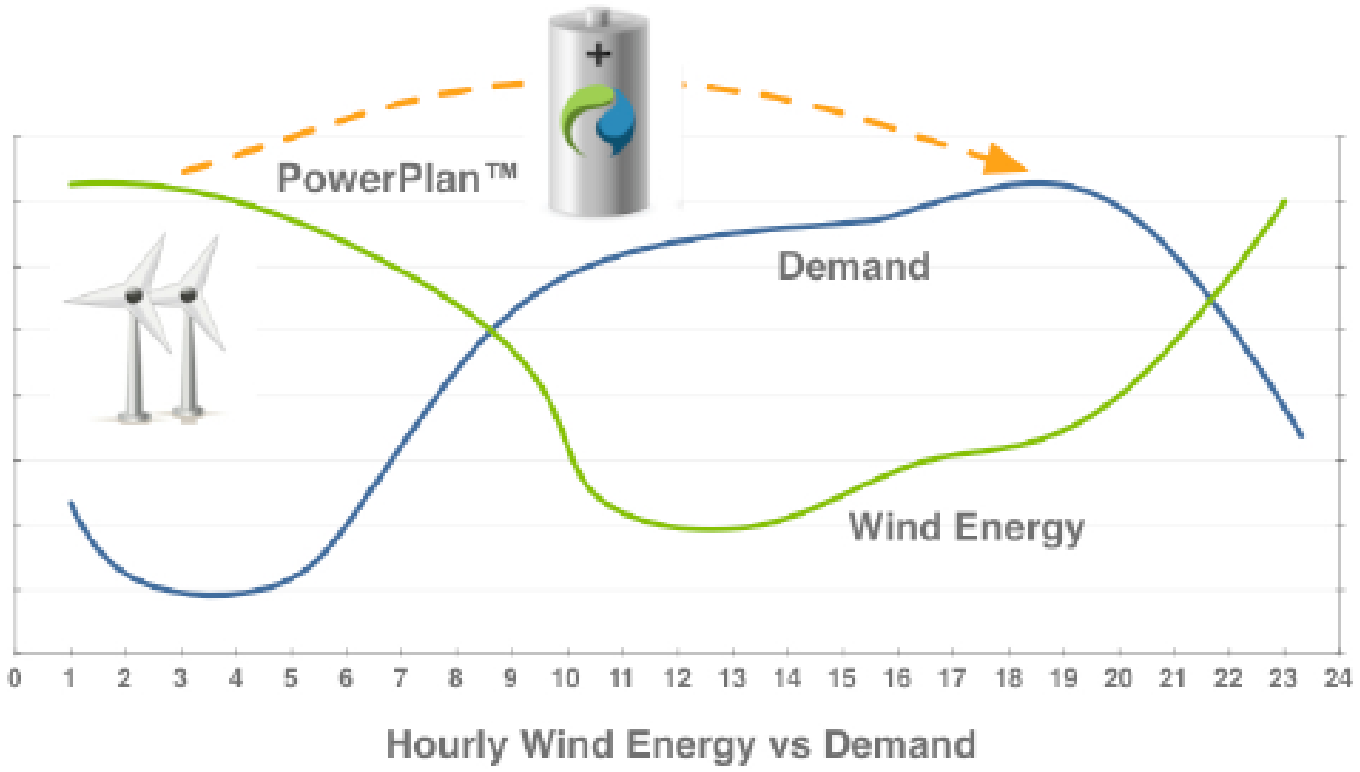
Energy Efficiency

Improve the utilization and performance of your most efficient conventional generation.



2009 U.S. Capacity Factors. Source: EIA.

Mitigate peak fuel price volatility risk and lower system emissions.



Planning Flexibility

Site close to load without local emissions or water use.

✓ Peak capacity

Gas Peaker

✓ Peak capacity

✓ Placed for value

✓ Load for wind

✓ Voltage support

✓ T&D deferral

✓ Customer specific

PowerPlan™

Fast deployment allows planners to match resources to load.