Advancing the Clean, Unbreakable Grid

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About the AES Corporation

Mission: Improving lives through safe, reliable and sustainable energy solutions.

Several of Our Companies

Indiana, US

Chile

AES Gener
energia confiable

AES Eletropaulo
por onde a vida acontece

Sao Paulo, Brazil

6 MARKET-FACING STRATEGIC BUSINESS UNITS

4 CONTINENTS

17 COUNTRIES

$37B TOTAL ASSETS OWNED & MANAGED

$15B TOTAL 2015 REVENUES

36,000 MW GENERATION CAPACITY

AES Serves
11M CUSTOMERS

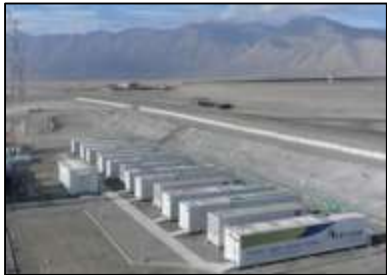**8** UTILITY COMPANIES

18,500 GLOBAL WORKFORCE

AES operates 116MW of advanced battery-based energy storage, the largest grid-connected fleet.

Los Andes
Atacama, Chile
2009

Laurel Mountain
West Virginia, USA
2011

Angamos
Mejillones, Chile
2012

Tait
Ohio, USA
Sep 2013

2015 Additions

**10MW
Warrior Run**
Cumberland,
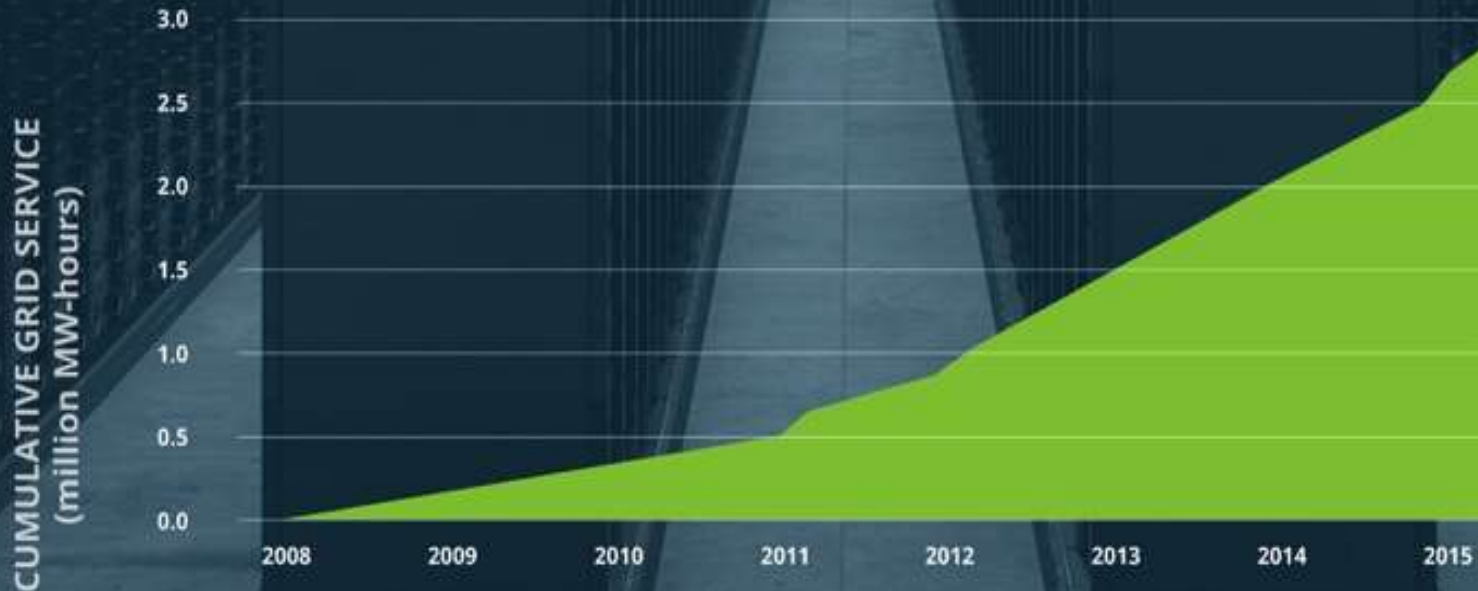Maryland

**10MW
Zeeland**
Vlissingen,
Netherlands

**10MW
Kilroot**
Belfast,
N. Ireland

AES energy storage fleet has more than 3 million megawatt-hours of delivered service.

ADVANCION IS BUILT ON EIGHT YEARS OF REAL WORLD EXPERIENCE

AES Grid Storage Fleet Service Record 2008-2015

Storage is a better choice than many traditional power alternatives.

Easier to build, reduces system costs, lowers emissions, & improves reliability

Segment	Typical Customers	Benefit to Alternative
1 Generation alternatives (LMS100 Turbine, Credit: GE)	◉ Utilities ◉ Power project developers (IPP) ◉ System Operators	◉ Reduce system costs by improving efficiency ◉ Increase system reliability & flexibility ◉ Reduce emissions & enhance fuel diversity
2 T&D Alternatives	◉ Transmission & Distribution Utilities	◉ Improve utilization of existing resources ◉ Reduce system costs & better matches yearly growth needs ◉ Easier to site & shorter development
3 Commercial & Industrial	◉ Commercial & Industrial Customers	◉ Deliver additional value to the customer ◉ Solves similar problems from different location

Capacity Release: Improving System Reliability in Chile

Initial project leading to over 50 MW of energy storage in Chile.

Benefits

- Avoided load shedding and emergency curtailment

- Increased energy production and reduced cost

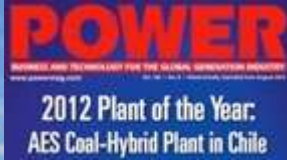- Increased system security

- Inertia-like performance

24 MW Los Andes Resource
Atacama, Chile

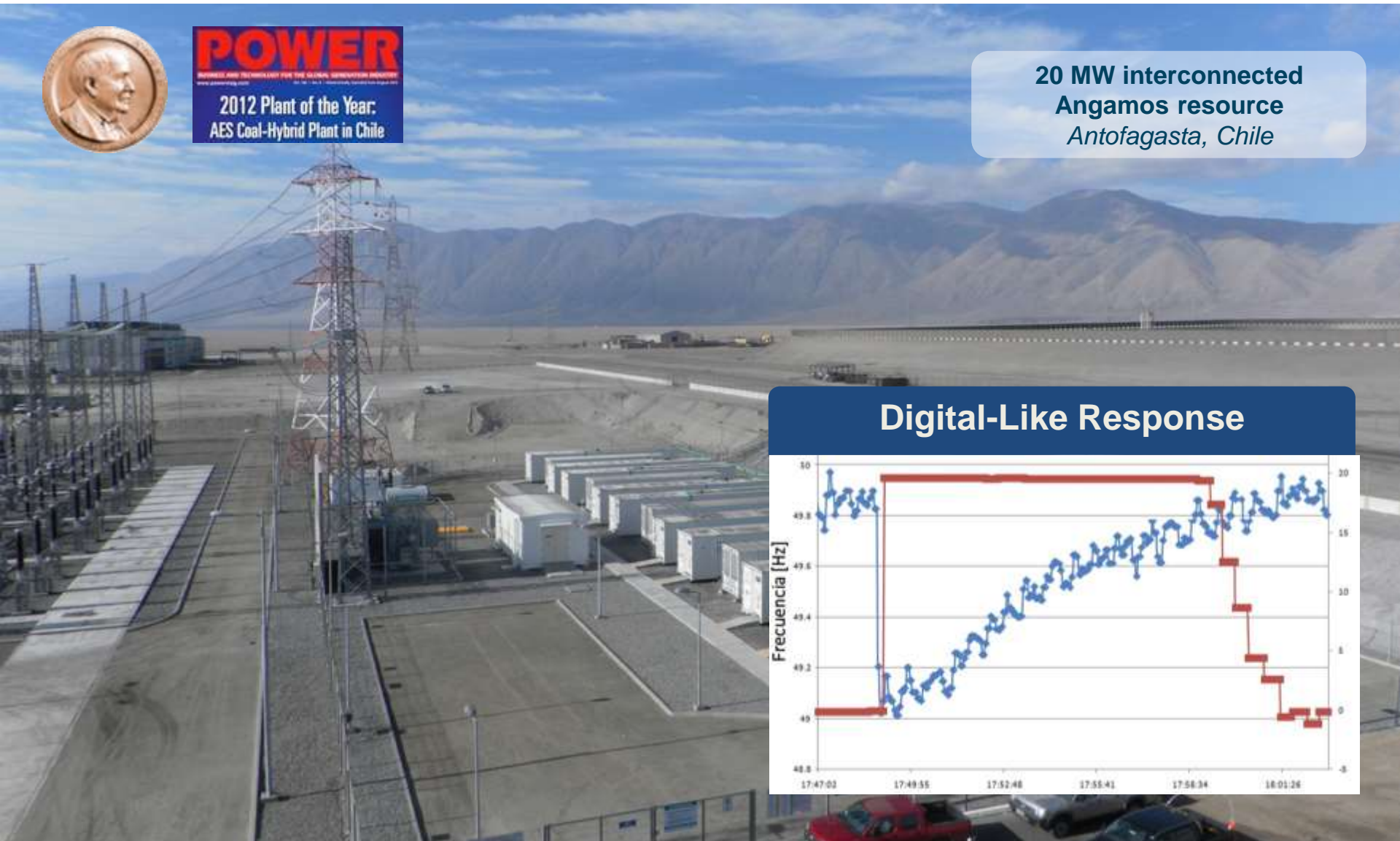# Estimated to Save Customers $37 Million Annually

Energy storage unlocked low-cost generation in the CDEC-SING

POWER
2012 Plant of the Year:
AES Coal-Hybrid Plant in Chile

20 MW interconnected Angamos resource
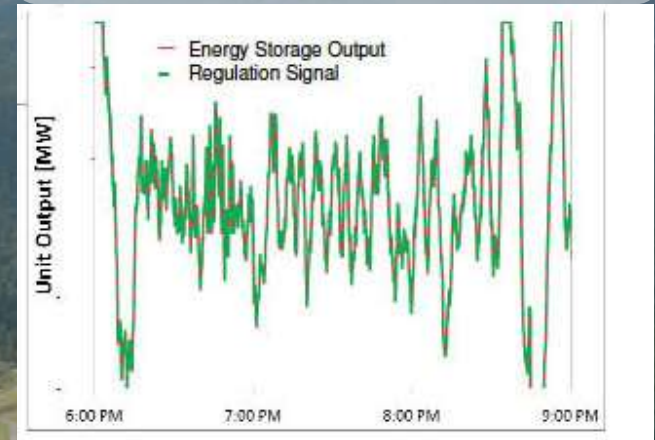*Antofagasta, Chile*

Digital-Like Response

Frequency Regulation: Integrating Renewables in PJM

AES storage resources save PJM customers $20 million per year

98 MW Laurel Mountain Wind Farm with 32 MW interconnected storage
West Virginia, USA

Frequency regulation: Storage to serve TenneT
Initial 10MW storage online at end of 2015, providing 20MW of flexibility

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

Impact:
- ✓ Reduce total reserve cost
- ✓ Fast, accurate reserves
- ✓ Increased system flexibility
- ✓ Opportunity to explore fast resource benefits

20 MW Zeeland Resource
Vlissingen, Netherlands

Flexible Peak Capacity: SCE selects 100MW
Competitive solicitation to meet peak capacity needs and provide flexibility

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

Project Description:
- 2x50 MW advanced battery array
- Provides local capacity reliability
- 4 hour duration
- 24x7 power resource
- No emission or water
- 20-Year Tolling PPA

Regional Focus on Natural Gas Increasing, Solar Capacity Growing

"In East, ISO-NE, NYISO generators most vulnerable to gas shortages..."

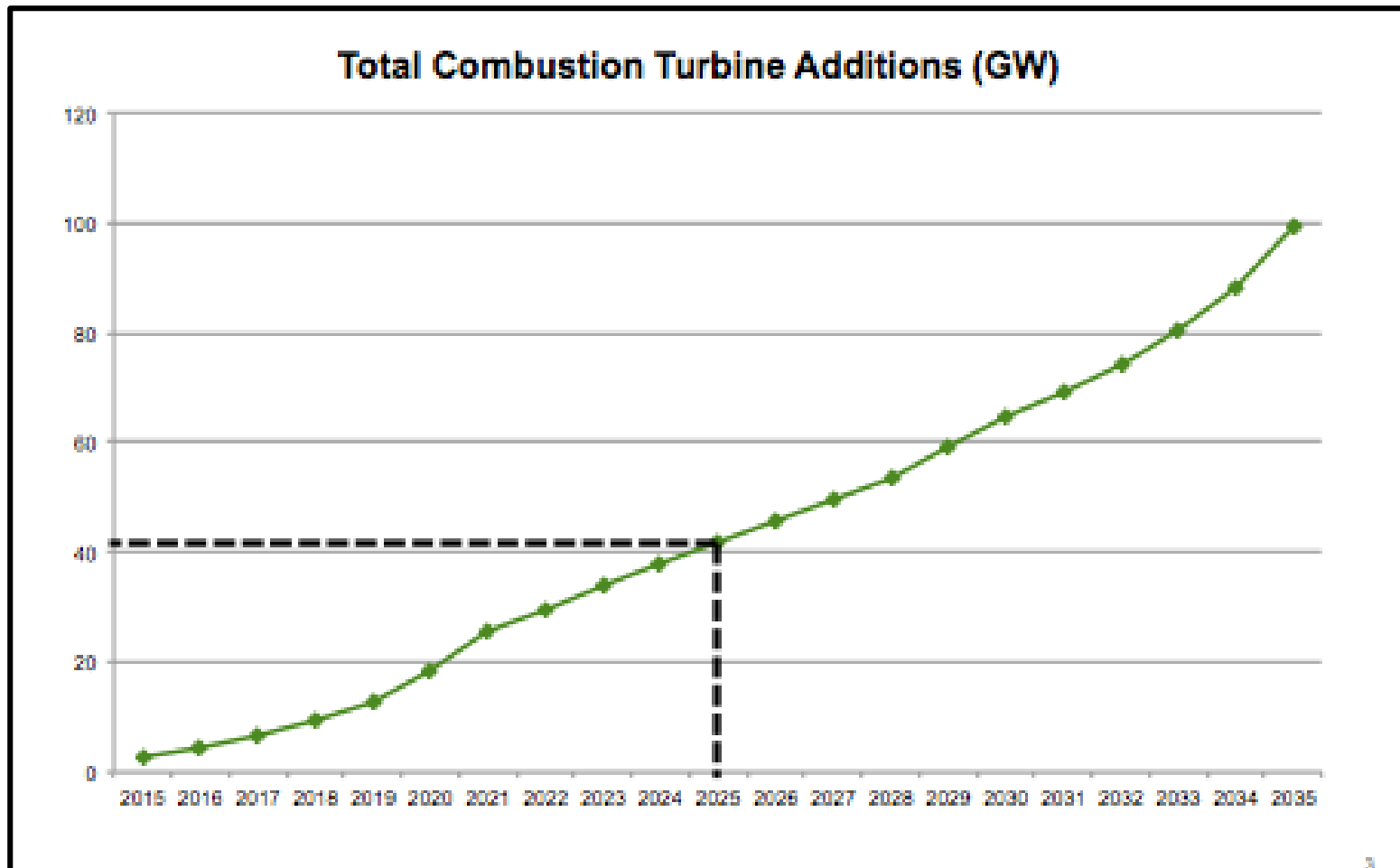*"New England is becoming increasingly dependent on gas-fired generation as coal, oil and nuclear units are retired..."*

"New England seen a significant expansion in the amount of solar capacity online, and more is coming.."

Over 40 GW of simple cycle gas turbines expected in next 10 years in the US (Source: IHS Analysis)

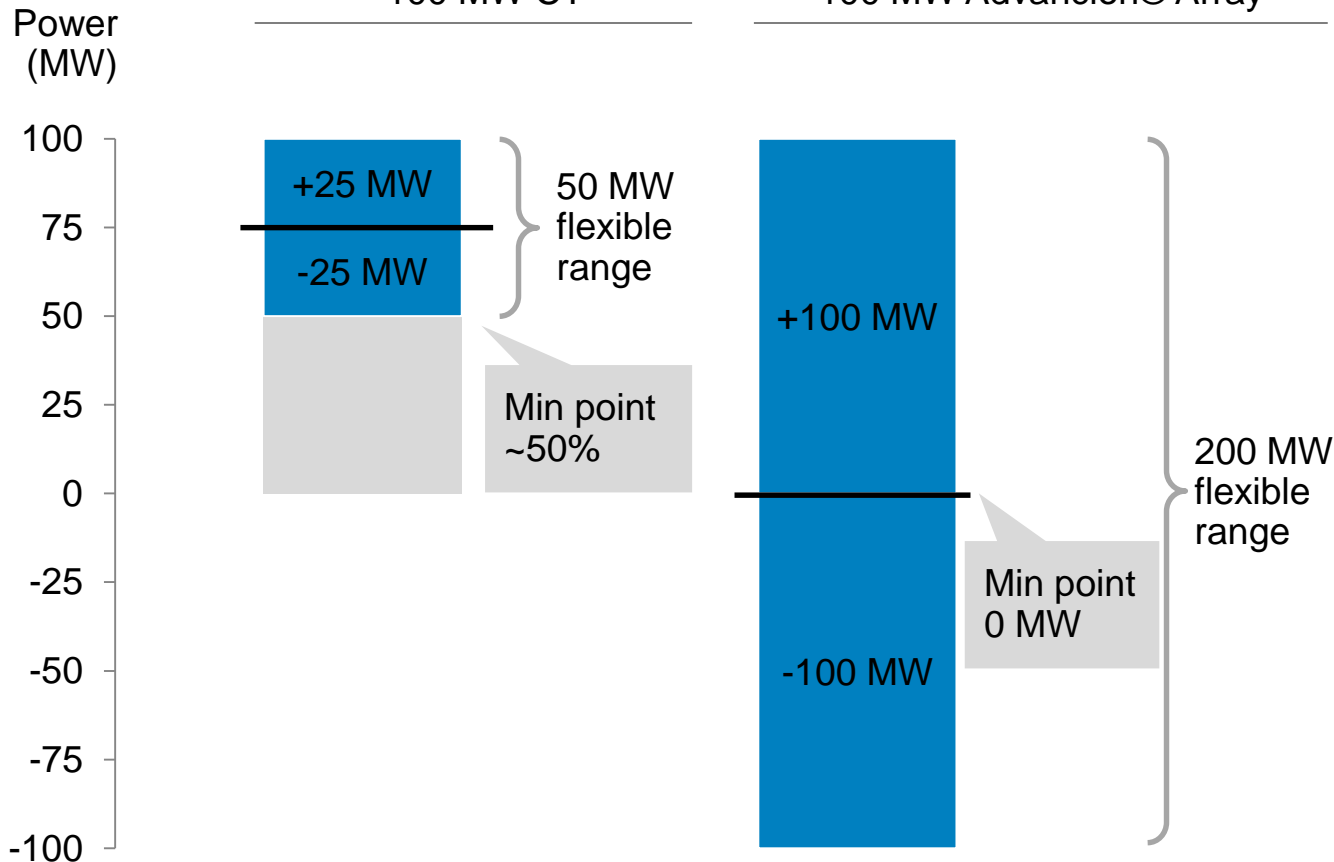**Yet the existing gas turbine fleet operates at a 5% capacity factor**

Total Combustion Turbine Additions (GW)

Storage provides up to 4 x the effective resources and unique flexibility compared to traditional peakers

100 MW CT

100 MW Advancion® Array

Power (MW)

100 MW CT (left chart):
- +25 MW
- 75 (center line)
- -25 MW
- 50 MW flexible range
- Min point ~50%

100 MW Advancion® Array (right chart):
- +100 MW
- 0 (center line)
- -100 MW
- 200 MW flexible range
- Min point 0 MW

Power (MW) axis values: 100, 75, 50, 25, 0, -25, -50, -75, -100

Unique capabilities of battery storage
- Fast ramp (<250 msec)
- Always synchronized
- Unlimited starts / stops (no cost)
- Broader operating range

4th Generation Grid Storage from AES

Industry leading platform is available under several ownership models

Questions?