



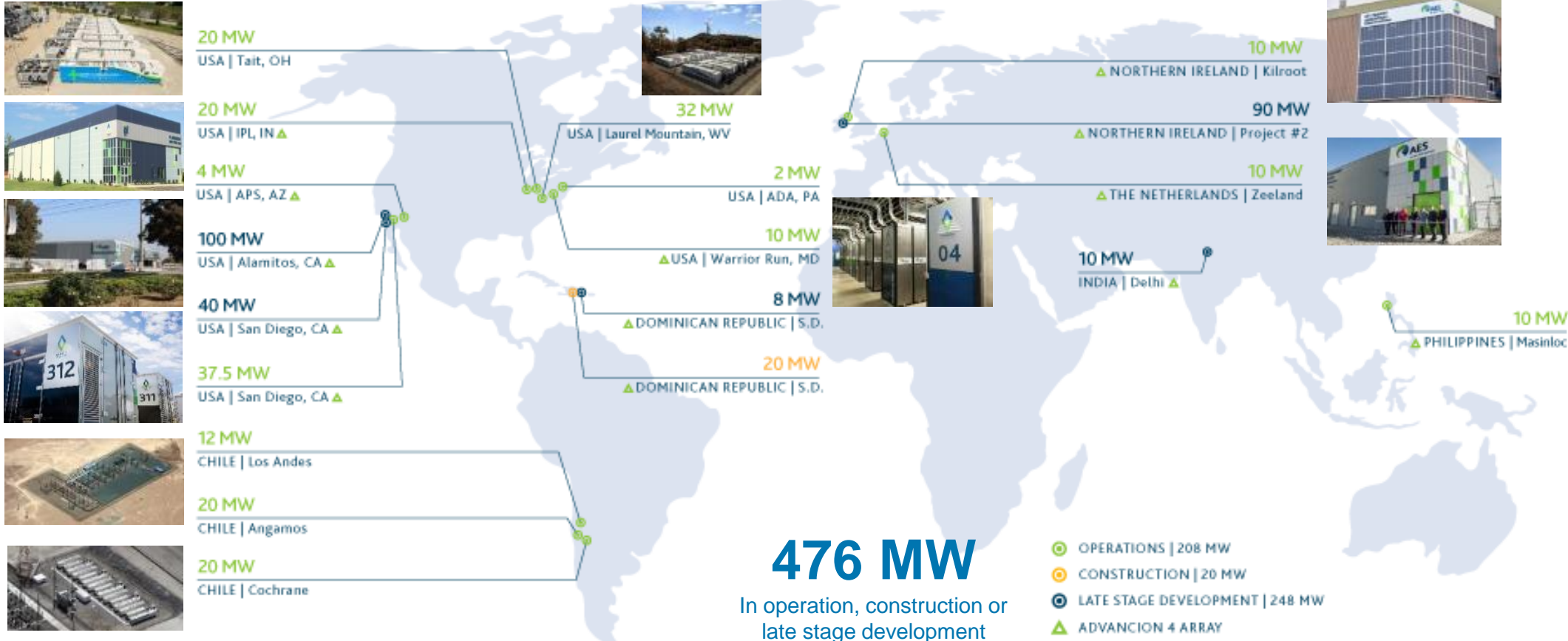
Unlocking the Potential: Energy storage for utility scale applications

Praveen Kathpal, Vice President

AES Energy Storage



Grid-scale energy storage is happening all over the world

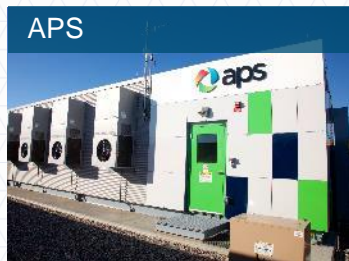
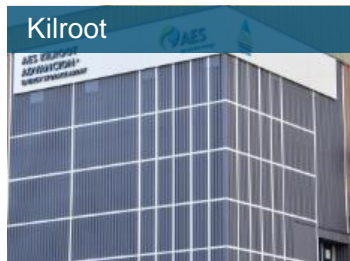


AES has a decade of real world experience with grid-scale storage

436 MW

In operation, construction or late stage development

Teck



2007

2008

2009

2010

2011

2012

2013

2014

2015

2016

2017



Generation Alternative

World's largest battery providing peak power & capacity

SERVICES

- Capacity, local reliability
- Peak power mitigation
- Ramping / flexibility
- Ancillary services

IMPACT

- ✓ Rapid deployment
- ✓ Competitive & cost effective
- ✓ Meets flexibility (duck curve)

30 MW Advancion® Array
Escondido, San Diego, California

Generation Alternative

World's largest contracted energy storage project for local capacity in California

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)

▶ 100 MW Alamos Energy Center
Long Beach, California

Distribution Alternative

Embedding storage in the distribution network for reliability

▶ 2 MW Advancion® Array
Buckeye, Arizona

SERVICES

- Peak demand management
- Renewable integration

IMPACT

- ✓ Support rooftop solar growth
- ✓ Manage local feeder reliability
- ✓ Alternative to substation upgrades



Renewable Integration

Solving peak energy demand through solar + storage in Hawaii



 Utility **DIVE**

BRIEF

Hawaii co-op signs deal for solar+storage project at 11¢/kWh

Transmission Alternative

20 MW Advancion® Array
Indianapolis, Indiana

Frequency control to meet new regulations for transmission

SERVICES

- Frequency response
- Capacity
- Voltage control

IMPACT

- ✓ Support rooftop solar growth
- ✓ Manage local feeder reliability
- ✓ Alternative to substation upgrades

Grid scale energy storage delivers a clean, unbreakable grid

Latest Li-Ion battery technology used to store and release energy into the electric grid

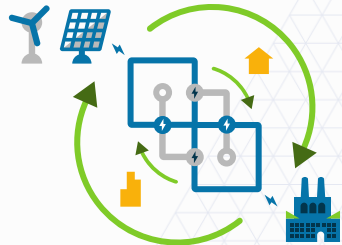


the
benefits

OF ENERGY STORAGE



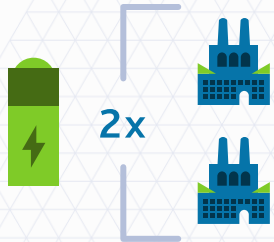
RENEWABLE INTEGRATION



GRID EFFICIENCY



CLEAN ENERGY



TWICE THE RESOURCE

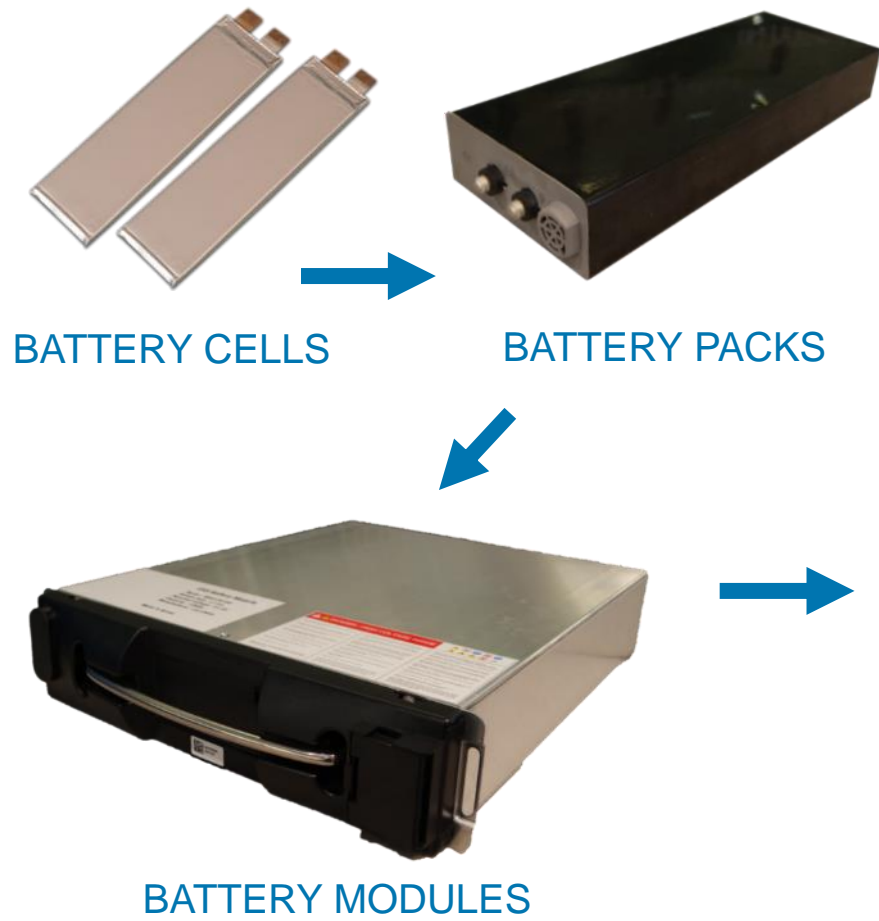


INCREASED RELIABILITY

Appendix



Core components & systems available today; ready to scale



ADVANCION NODES



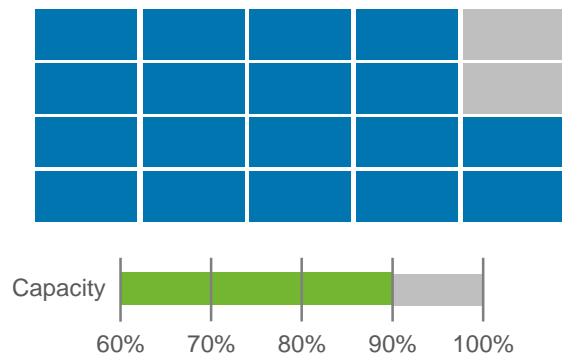
ADVANCION ARRAY

Advancion® 4 provides industry leading serviceability and reliability

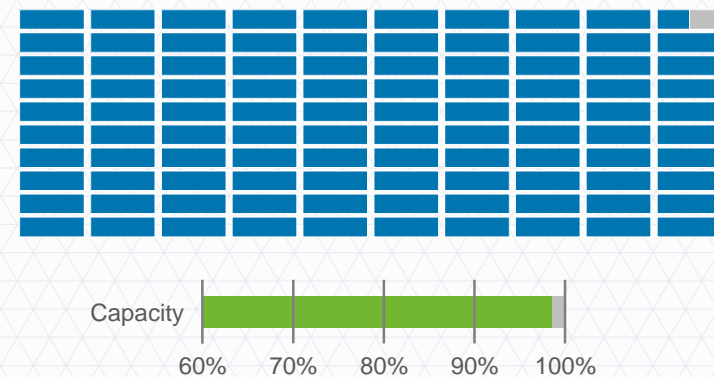
Conventional battery string versus Advancion Array



4MW CONVENTIONAL BATTERY STRING:
Impact on a 40MW Resource



80KW ADVANCION NODE:
Impact on a 40MW resource



Advancion® nodal architecture solves the problem of technical obsolescence

- ▶ Advancion arrays are built with space to grow.
- ▶ When the need arises, the latest battery technology can be incorporated into the array, and function seamlessly with existing components.



Proven solution for multiple applications

Enhancing grid efficiency and reliability

SEGMENT

OFFERED SOLUTIONS



LMS100 Turbine
Credit: GE

1. Generation Alternatives

- 1. Capacity Release
- 2. Frequency Regulation/Ancillary Services
- 3. Flexible Peaking Power
- 4. Renewables Integration



2. T&D Alternatives

- 5. Capacity Release
- 6. Investment Deferral, Replacement



3. Commercial & Industrial

- 7. Demand-charge Management & Reliability

