Energy Storage Association

Energy Storage for Facilities

2018 Fall FUPWG Seminar

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Vice President, Policy
November 8, 2018

www.energystorage.org

ESA represents a diverse membership

ESA's mission is to accelerate the widespread use of competitive and reliable energy storage systems in North America

Established 28 years ago

Diverse membership—vendors, developers, independent generators, utilities & other power sector stakeholders

Federal, regional, & state policy engagement

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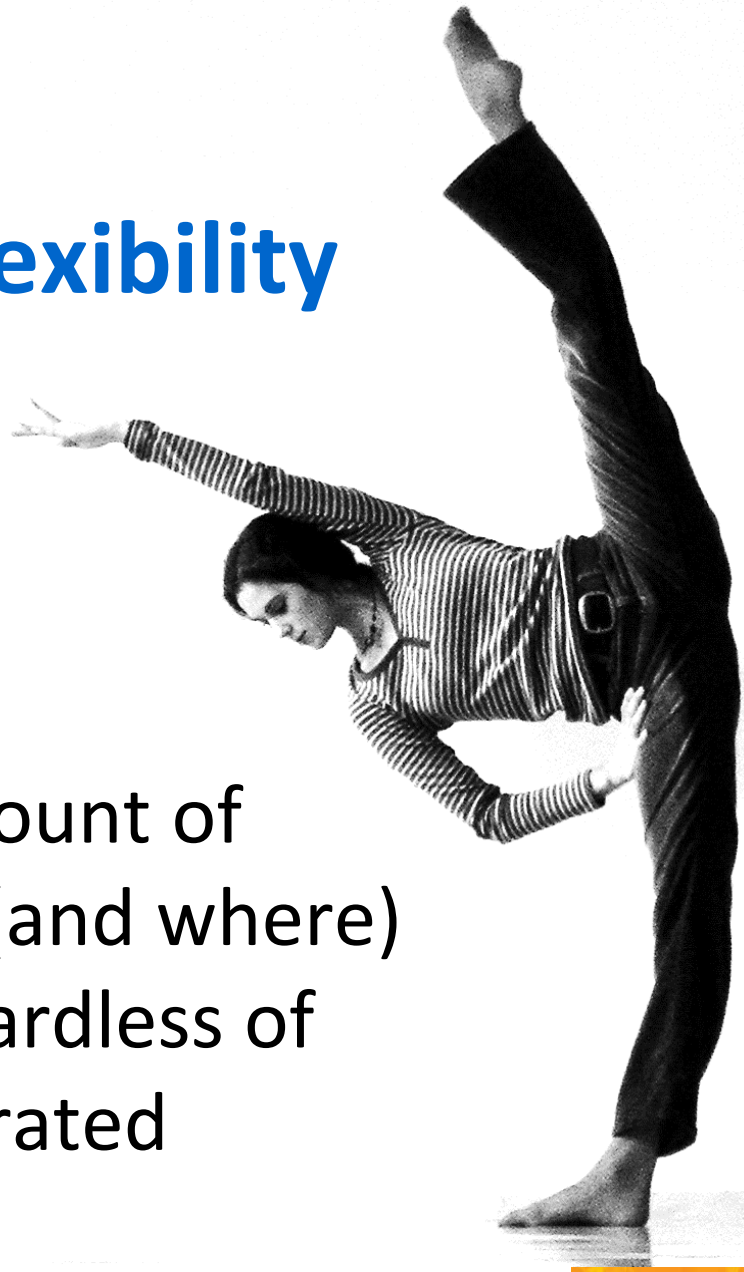
Energy Storage = Flexibility



Supplies precise amount of electricity exactly when (and where) it is most needed, regardless of when it was generated

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Mechanical Storage
Battery Storage
Thermal Storage
342
341

Why all the buzz on battery storage?

- Fastest growing storage type
- Costs declining rapidly
  - 8-10% decline in installed costs year-on-year
- Located on all parts of the grid at any size
  - Utilities, customers, and third-parties all operating
  - Systems from 5 kW to 30,000 kW in use
- Quick to deploy
  - MW-scale deployments <1 year from contract
- Uniquely flexible & expanding performance capabilities
  - Instantaneous response and ramp, bi-directional
- Capable of multiple services
  - Grid balancing, backup, system capacity, network capacity, curtailment avoidance, energy arbitrage

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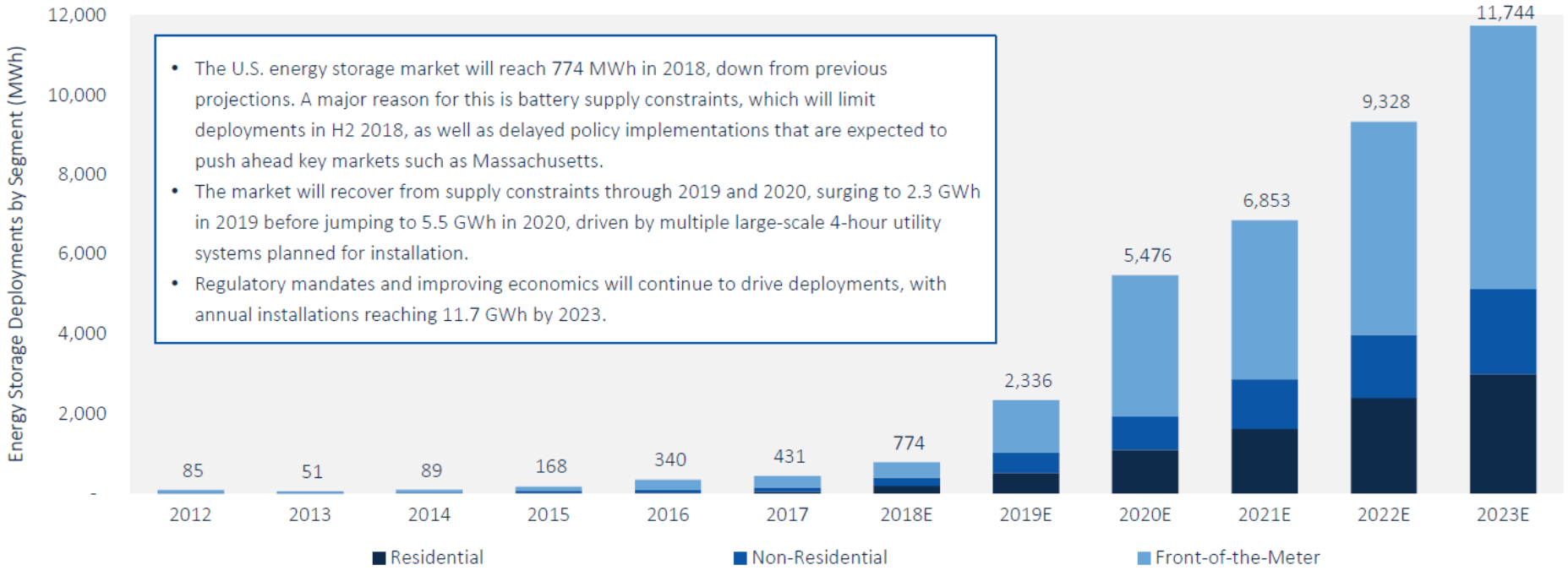
U.S. battery storage deployments increasing

U.S. Annual Energy Storage Deployment Forecast, 2012-2023E (MWh)



Customer-sited storage expected to gain in share of annual installed capacity

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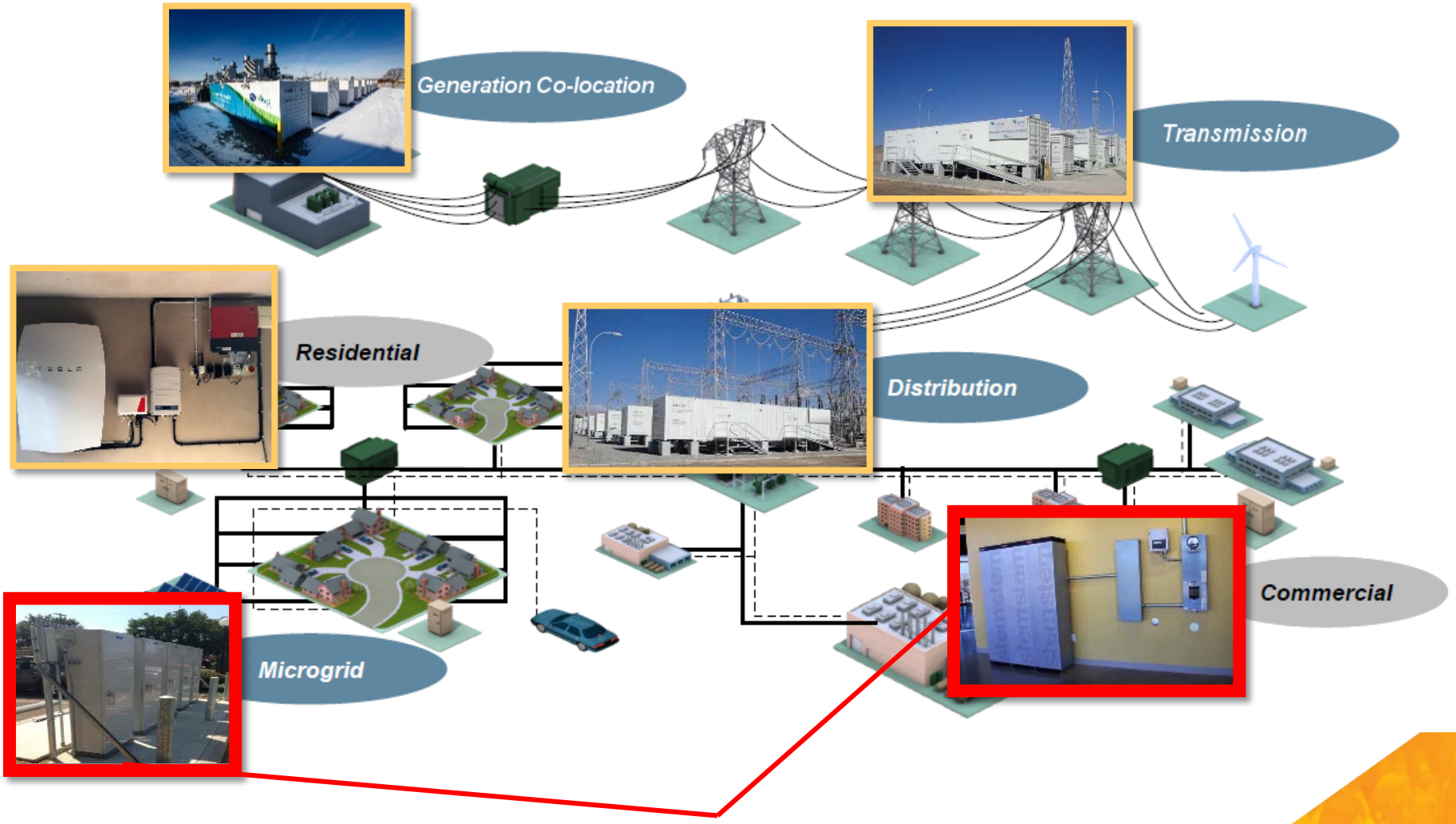
Storage is in all parts of the grid



Likely focus for federal facilities

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Primary applications for federal facilities

- Resilience / mission assurance
  - Backup power to critical loads
  - Microgrid enhancement
- Savings / cost reduction
  - Improved power quality
  - Electric bill management
  - Increase CHP / generator efficiency
  - Mitigate EV fleet charging infrastructure costs
- Meet sustainability criteria
  - Increase demand flexibility as grid service
  - Increase self-consumption of onsite renewables
  - Avoid pollutants from onsite generation

UESC / ESPC model can facilitate – but needs to assign $ value

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Storage flexibility addresses both reliability and resilience

Short-term uncertainty

Seconds / Minutes / Hours

RELIABILITY

- Maintaining power quality
- Frequency regulation
- Load-following
- Ramping
- Spinning reserve
- Curtailment avoidance
- Congestion mitigation

RESILIENCE

- Frequency response
- Microgrid islanding
- Backup power

Longer-term uncertainty

Days / Seasons / Years

RELIABILITY

- Resource adequacy
- Transmission & distribution upgrade replacement
- Operation independent of environmental restrictions

RESILIENCE

- Black start service
- Microgrid islanding
- Emergency capacity for lost infrastructure

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Examples of storage providing resilience

Example: LBA Park Place, Irvine CA

LBA Realty installed the world's largest indoor energy storage system at Park Place to reduce operating costs and to support sustainability efforts. In addition to providing value for the owners and tenants, this system participates in Stem Grid Rewards with Southern California Edison to help relieve grid congestion in the West LA Basin.

System size: **1.3 MW / 2.6 MWh**

Offering: **storage-as-a-service subscription**

Company**: Stem**

"We continue to demonstrate leadership in enhancing our properties with smart building technologies that increase sustainability, strengthen the local power grid, and reduce costs for our tenants. The installation of Stem's cutting-edge technology is the most recent demonstration of this commitment."

Perry Schonfeld, Principal and COO, LBA Realty

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Example: University of Hawaii

UH Maui College:
- 2.8 MW of solar PV and 13.2 MWh distributed energy storage

Four UH Community Colleges:
- 7.7 MW of solar PV and 28.6 MWh distributed energy storage

Applications:
- Renewable energy support
- Integration with other energy efficiency measures

Value:
- $79 million in energy savings over 20 years
- UH Maui College: 100% renewables in 2019
- Four UH Community College campuses also reducing fossil fuel use

Offering: solar + storage power purchase agreement

Company: Johnson Controls

Example: Moakley Courthouse, Boston

Boston, MA

Over 20 years of continuous operation

7.8 MWh of energy storage 1.3 MW at peak

Building: 675,000 sq. ft (62,700 sq. m)
$170 million ($260 / sq.ft)

CALMAC Corp. 2017 ©

Value: **Reduces peak demand cooling costs**

Company: **CALMAC (Ingersoll Rand)**

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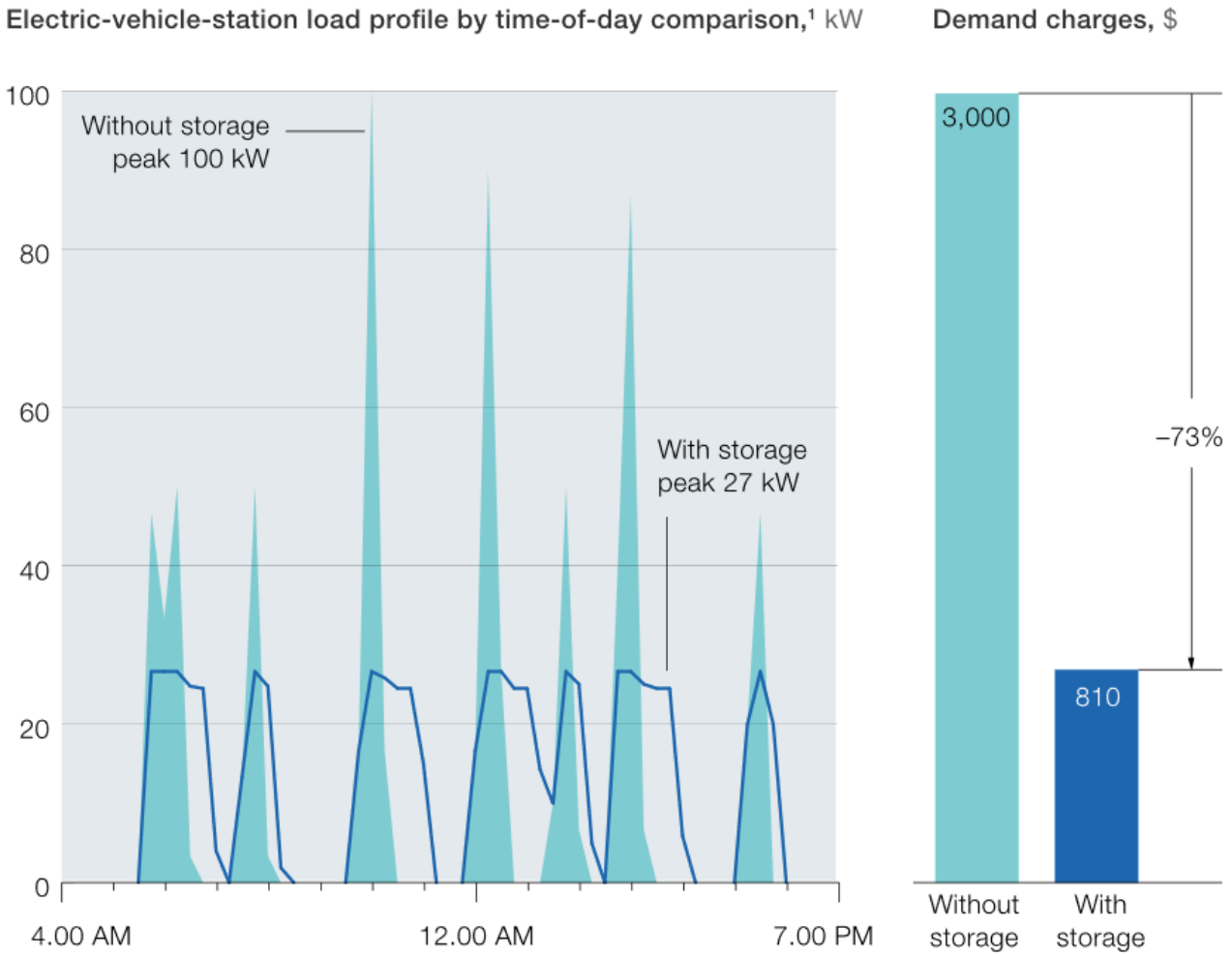
Example: Enabling EV fast charging

Batteries can mitigate distribution system impacts of EV fast charging

Potential application for "2nd life" EV batteries



[1]This assumes (i) the station has four direct-current fast-charging 50 kW chargers; (ii) 11 charging sessions occur during the time period profiled (4 AM to 6 PM); (iii) there is at least one instance where two cars charge simultaneously; (iv) the demand charge rate is $30 per kW; and (v) the battery-storage system is 150 kWh and can discharge at up to 75 kW.

McKinsey&Company

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Relevant policy considerations

- Federal
  - 30% ITC for solar-paired storage
  - DOE Building Technologies R&D
- Wholesale Markets
  - Order 841 / rules enabling customer-sited storage participation
- State
  - Disaster planning / resilience programs
  - Incentive programs
  - Distribution interconnection processes
  - Rate design
  - Building codes

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Thank you

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