Energy Storage

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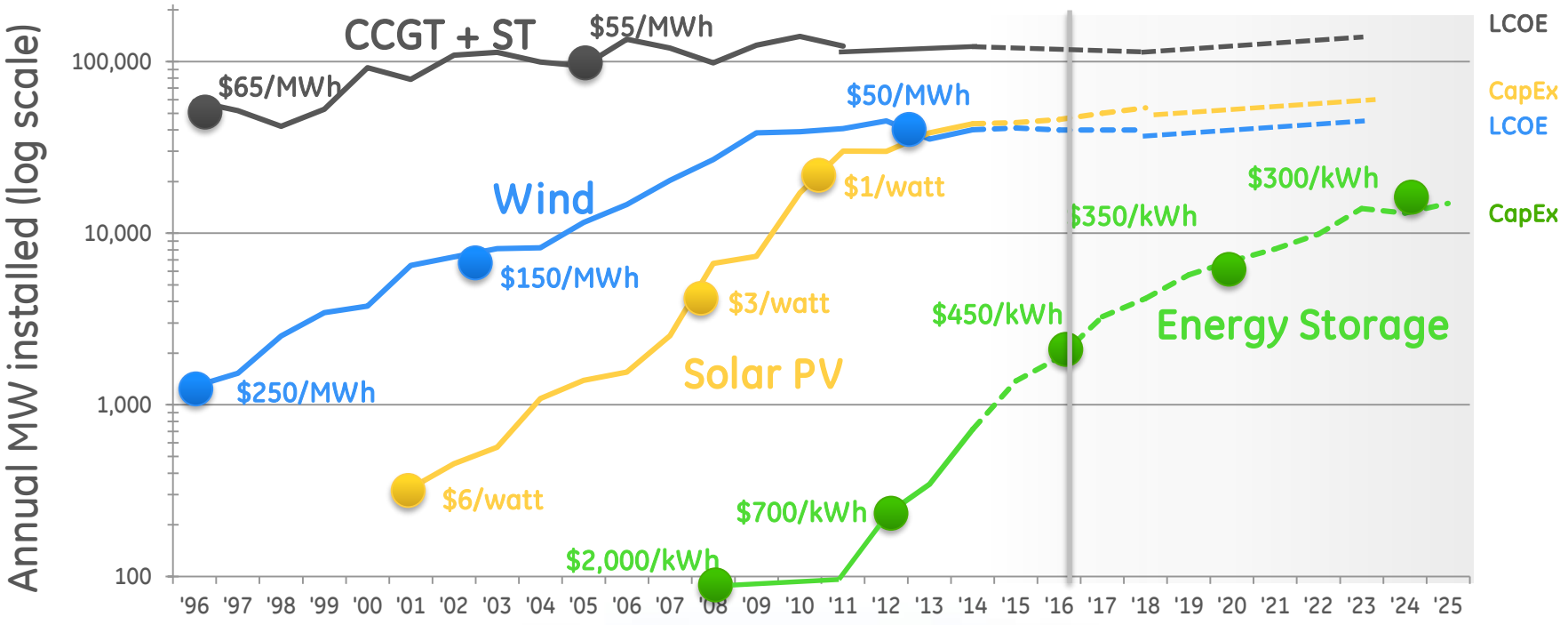
Energy Storage growth has precedent in wind & solar



Sources: EIA, IEA, NREL, GWEC, EPIA, BNEF, Lux, Navigant, HIS CERA, GE Analysis
Solar : PV panel cost

From 2010 to 2020 marks ***a 40X improvement*** in overall ES viability

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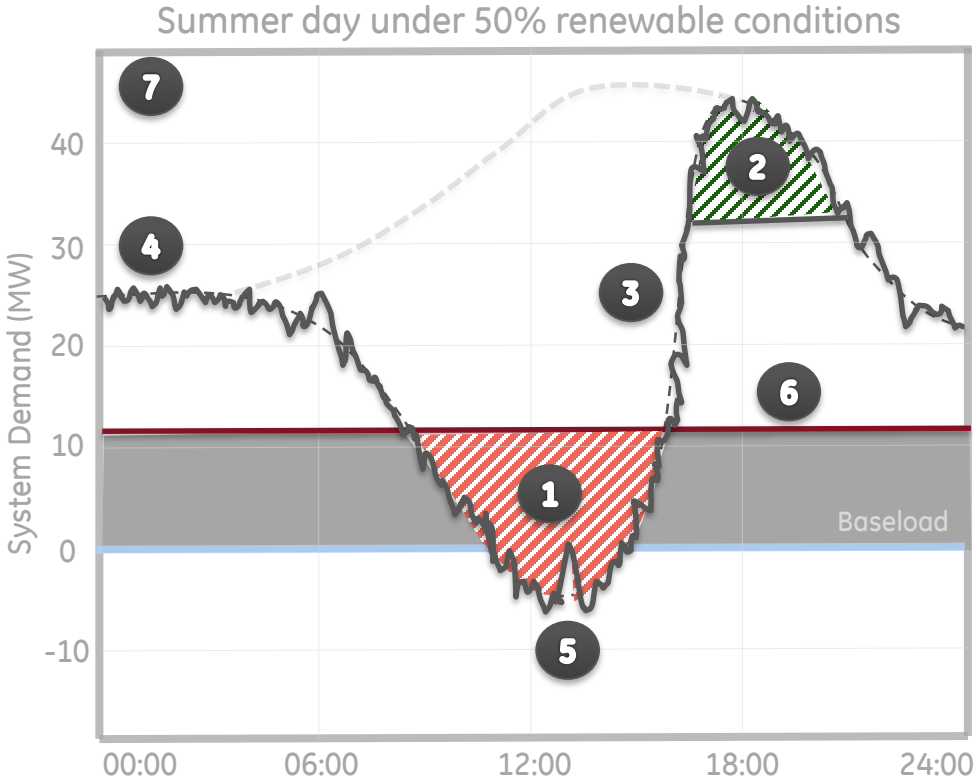
Energy Storage is a unique asset that provides **unprecedented flexibility** in grid optimization.



1. **Curtailed Renewables**
   Baseload causes excess solar to be curtailed
2. **Peak Load**
   Short duration peaks after sunset
3. **Fast Ramping**
   Respond to sunset dynamics
4. **Frequency Regulation**
   Real-time frequency control
5. **Spinning Reserve**
   Dynamic response to events (clouds)
6. **Maximize Baseload**
   Enables high capacity factor baseload
7. **Reduce Emissions**
   From peak capacity and ancillary services

ES provides **instantaneous local capacity**, & **continuous ancillary services** with ***no fuel consumption or emissions***.

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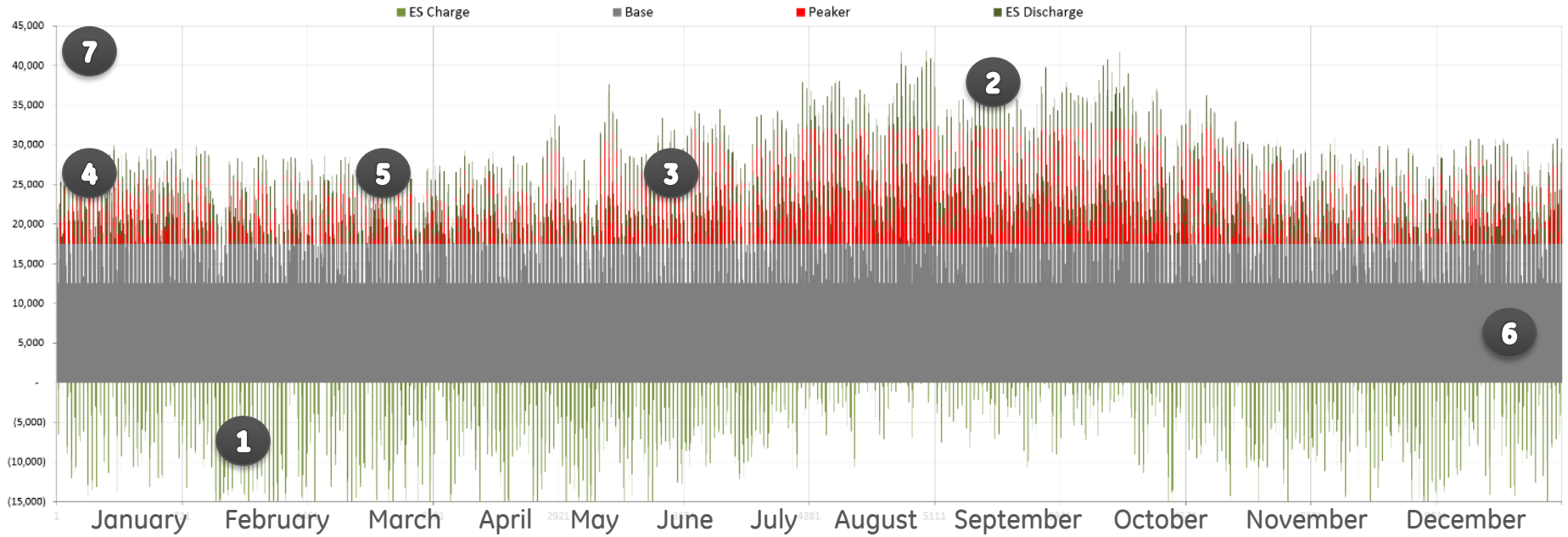
ES provides **instantaneous local capacity**, & **continuous ancillary services** with *no fuel consumption or emissions*.



1. **Curtailed Renewables**
   Additional clean energy into system
2. **Peak Load**
   Reduction in conventional "peakers"
3. **Fast Ramping**
   Enables dynamic capacity
4. **Frequency Regulation**
   Provides 100% of FR with ***no emissions*** or constraints
5. **Spinning Reserve**
   Provides 100% of SR with ***no emissions*** or constraints
6. **Maximize Baseload**
   Enables **high capacity factor** of baseload generation
7. **Reduce Emissions**
   From peak capacity and ancillary services

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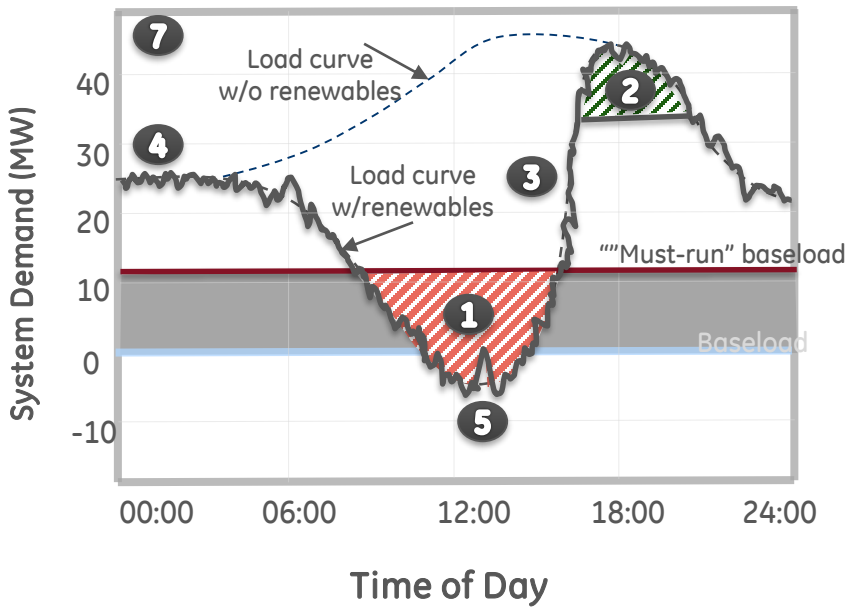
Why Battery ES?... *flexible compared to traditional assets*

High renewables cause daily profile issues
….no longer just about energy



		Storage	CC	Gas Peaker	Transmission	DR
1	Curtailed Renewables	●	○	○	◕	◔
2	Peak Load	●	◕	●	●	◑
3	Fast Ramp	●	◕	◕	◑	◑
4	Frequency Regulation	●	●	◔	◔	○
5	Spinning Reserves	●	●	◔	◑	◑
7	Reduce Emissions	●	◑	○	◑	◑
	Challenge	*Cost*	*Emissions*	*Emissions*	*"NIMBY"*	*Less-dependable*

+ locational grid benefits
+ no air quality constraints
+ no local fuel requirements
+ defer wires investment
+ modular & movable
+ quick to deploy (6mo to COD)

Energy Storage flexibility allows optimization of all system assets

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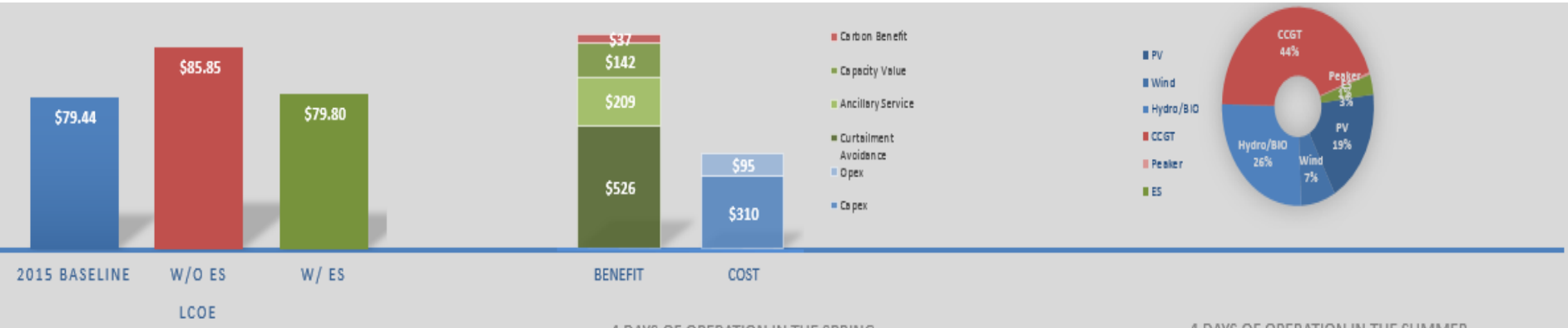
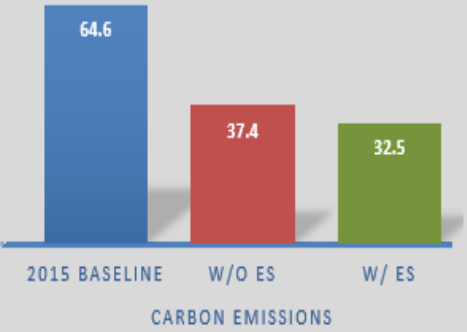
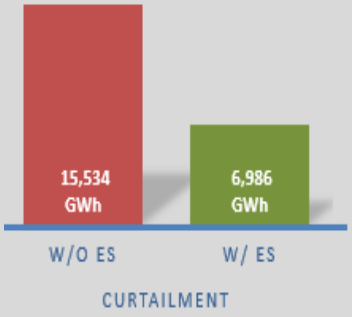
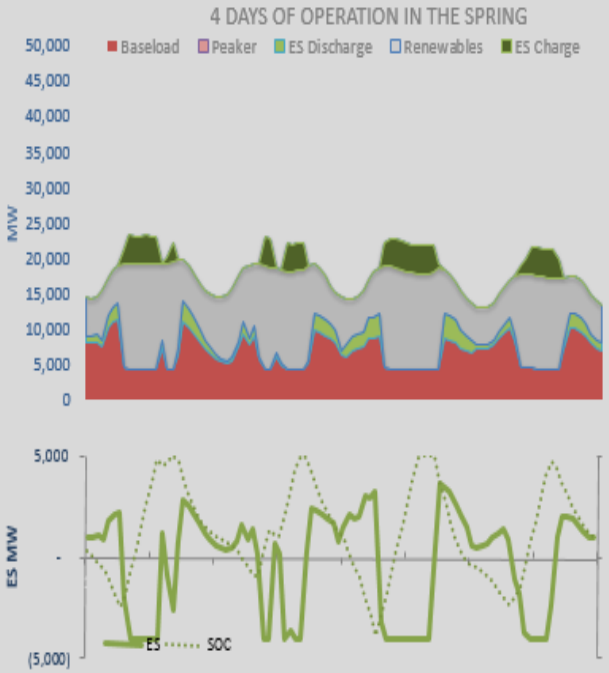
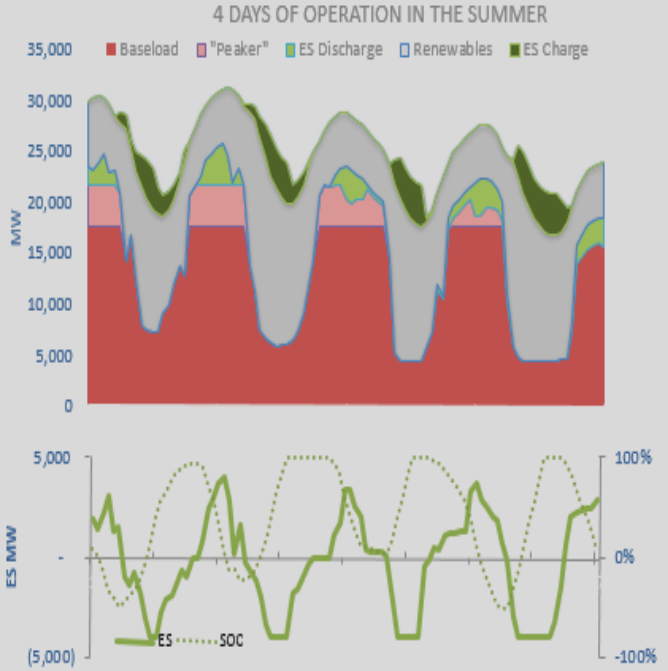
Scenario: NYISO at 50% Renewables w/4GW ES











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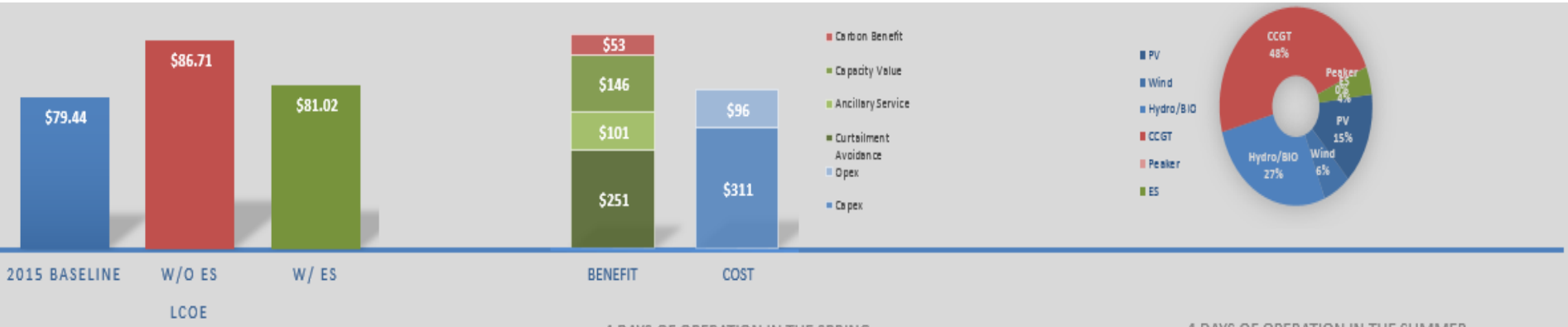
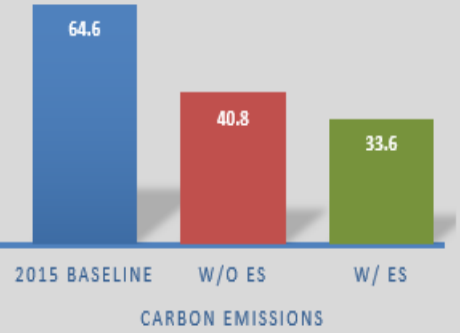
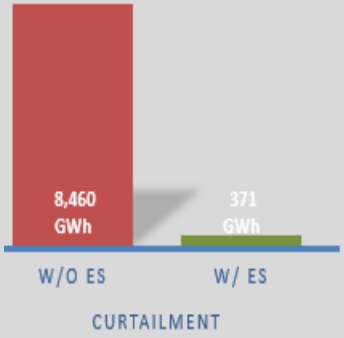
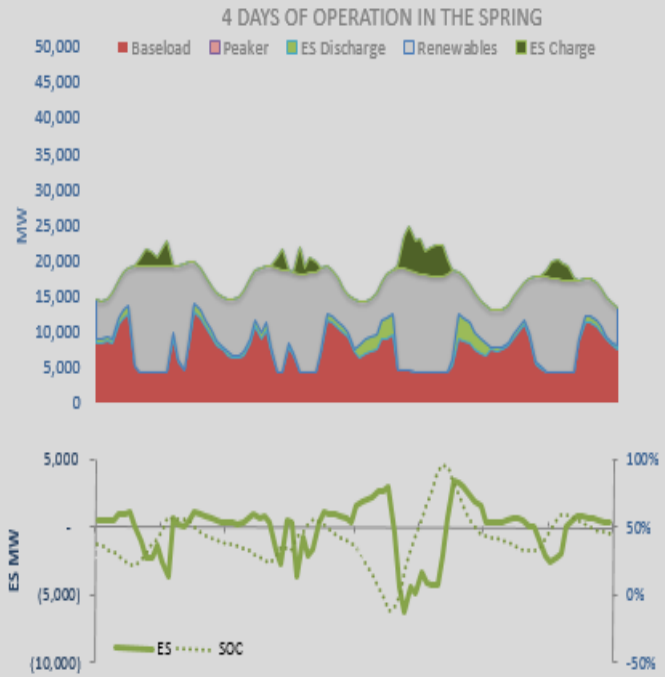
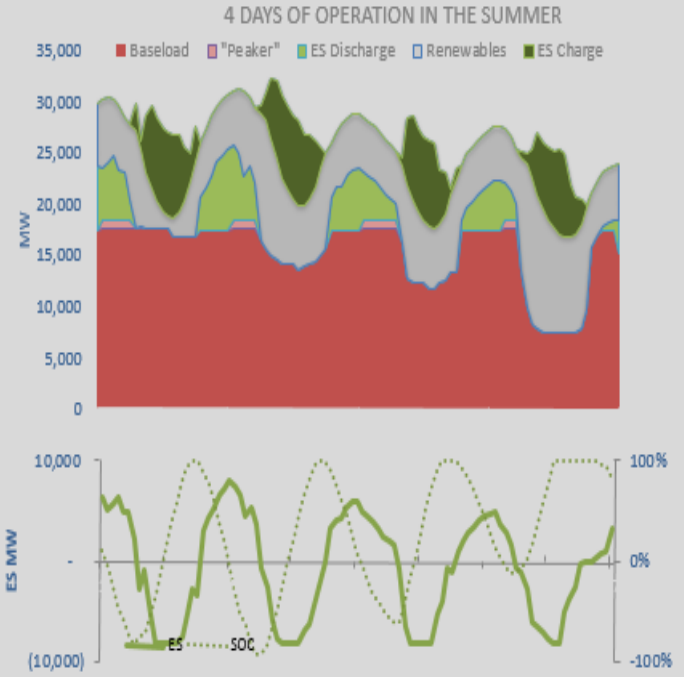
NYISO at 50% Renewables w/8GW ES











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The utility of the future . . .
Is a battery.

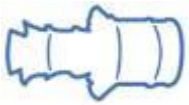
Bringing the strengths of GE to **Energy Storage**

2,000GW+ GE power generation

Wind

Solar

Water


Gas Turbines

Nuclear

Combined Cycle

Gas Engines

Power Gen Services

Aero

GE Energy Financial Services

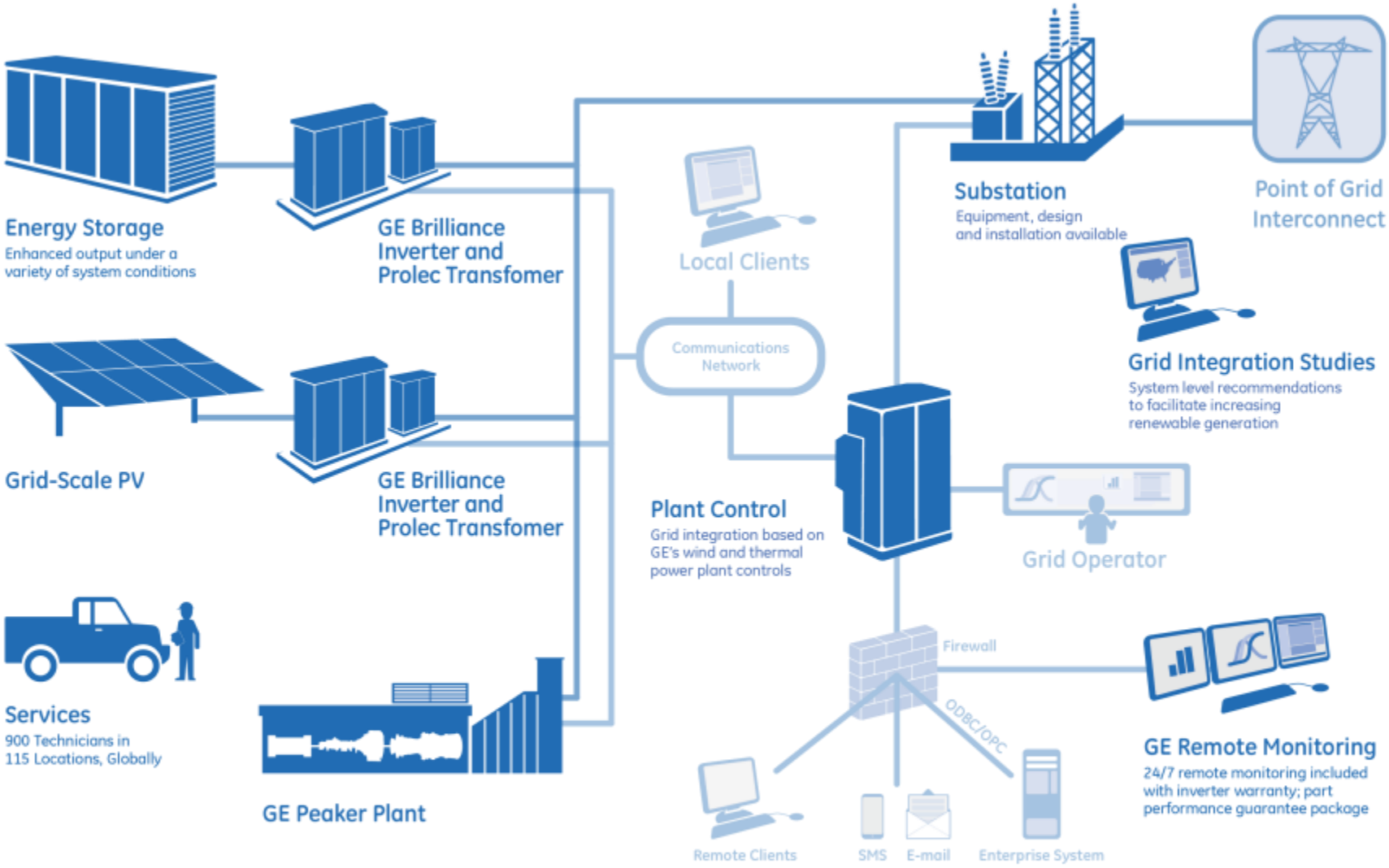
GE Global Research Center

GE Energy Storage

- ✓ GE Store
- ✓ Broad, diversified portfolio
- ✓ Long-term, valued brand
- ✓ Stable & reliable partner

100+ years powering the world … optimizing our future with energy storage

GE's Advantage... integrated solutions



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MW Class ES Platform

Custom solutions from standard, proven building blocks

Controls

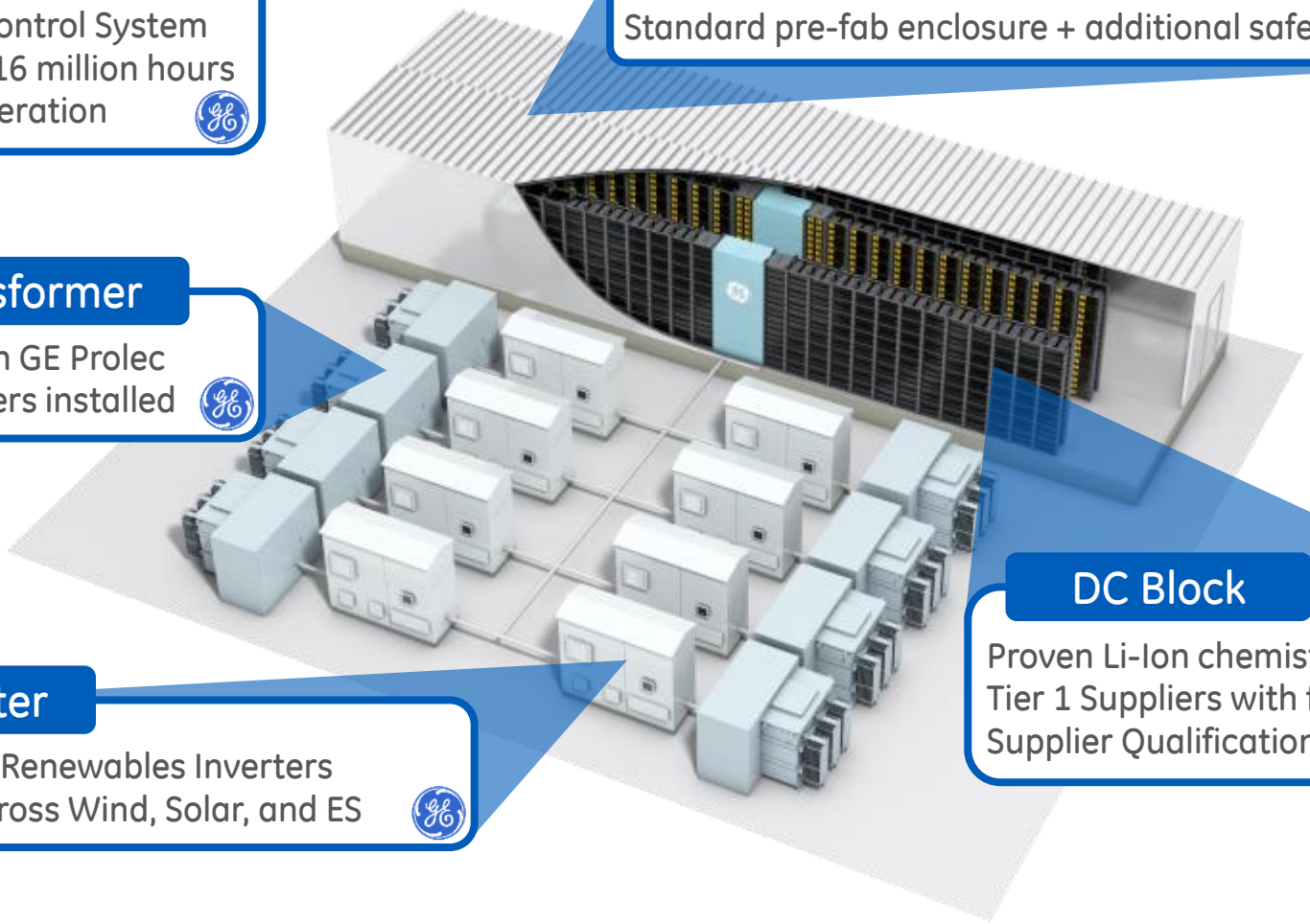
GE's Mark VIe Control System has more than 16 million hours of combined operation

Battery Enclosure

Standard pre-fab enclosure + additional safety features

Transformer

>3.5 million GE Prolec transformers installed



DC Block

Proven Li-Ion chemistry
Tier 1 Suppliers with full GE Supplier Qualification

Inverter

>25,000 GE Renewables Inverters installed across Wind, Solar, and ES

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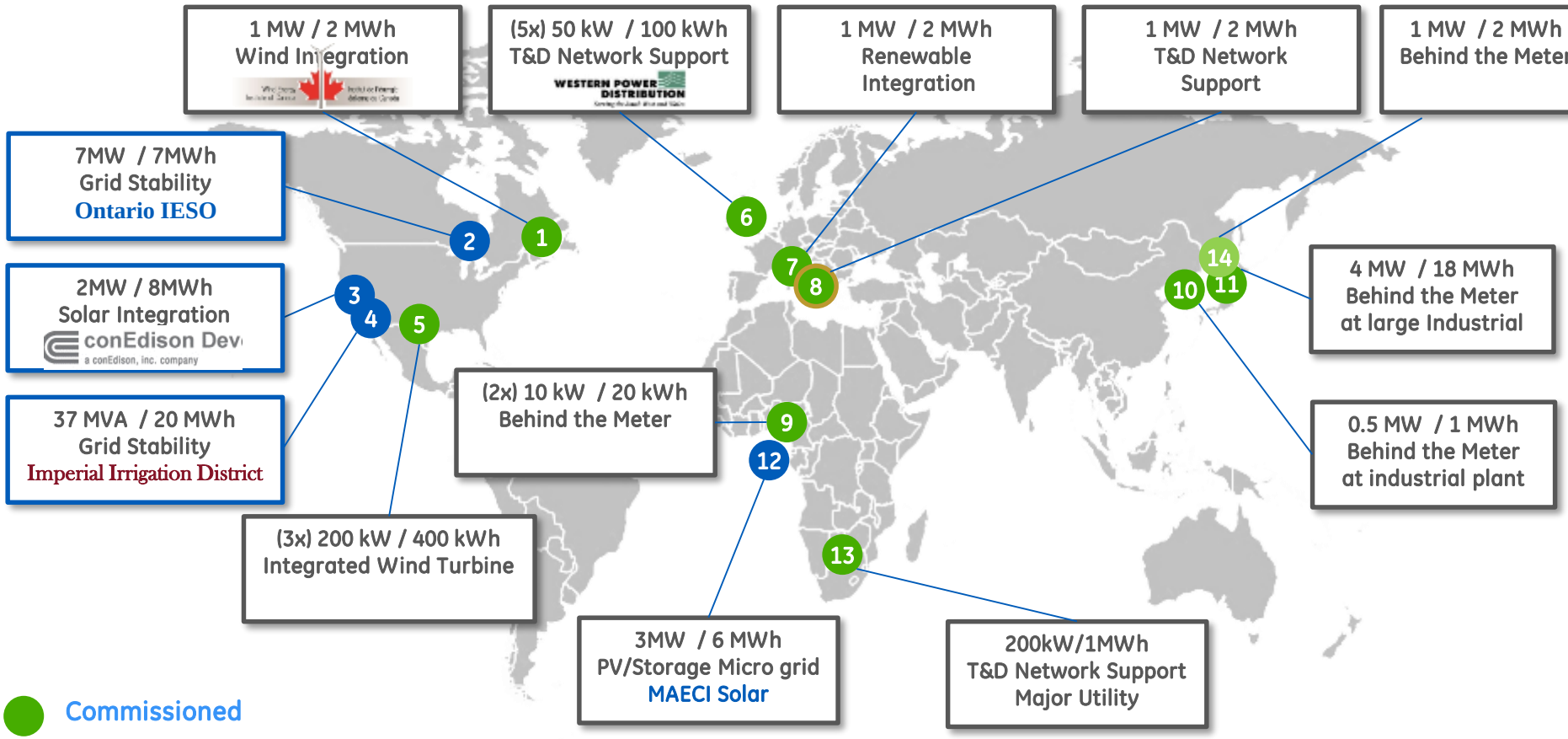
GE Energy Storage Grid Projects



Commissioned

Recent order or being built

~ 60 MW / ~65 MWh of Grid projects Installed or in Process

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