

Large Scale Battery Storage Project

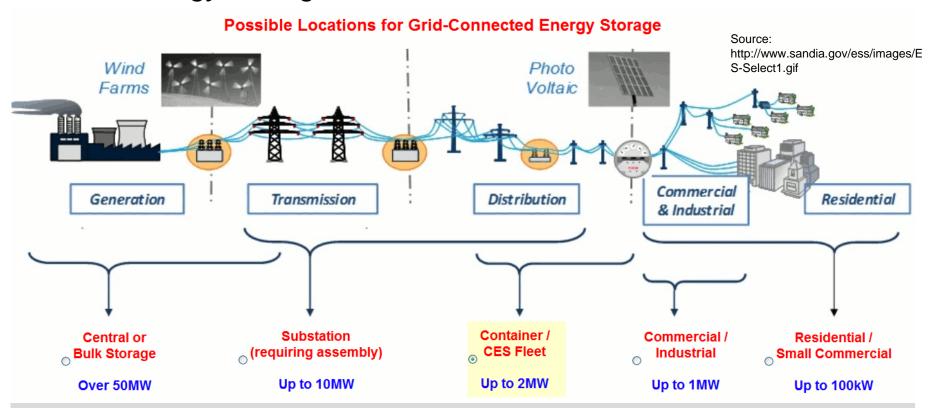


Yutaka Kokai Hitachi America, Ltd.

Why Storage? (Storage Technologies)



Answer: Energy Storage Provides Value Across Power Grid



Advantage:

Energy Storage System has greater efficiency and response time with reduced energy cost compared to Traditional Generation such as coal fire. Building a new plant costs more money, takes more time.

Challenges:

How to make the economics work on each Application (=how to monetize).

Storage Technologies

Discharge Time at Rated Power

Supercapacitor



Source: CES publication "Energy Storage in

FERC Territories (Jan/2015)" **Integrating Renewables** Renewables **Reliability Services** T&D **Ancillary Services** Energy **Transmission** Power Ramp Rate Peak Shaving Non-Wholesale Frequency Regulation Spinning & Quality & Control **Spinning** (Load (smoothing) / Response (Frequency) Energy Voltage Reserve Distribution Leveling) Reserves Wind Firming Deferral Support **Hydro Pumped Storage Hydro Pumped Storage Compress Air Energy Storage (CAES)** Sodium Sulfur Battery (NaS) **Flow Based Batteries** Minutes **Advanced Lead Acid Batteries Lithium Ion Batteries (Li-B) Flywheels** Seconds

CrystEna (1MW System) is designed for PJM FR application.

Li-B can be used for other applications (Need study & different design)

Hitachi has Li-B and Lead Acid Battery which can cover many applications.

HITACHI

CrystEna

Application Examples of Energy Storage System

(1) Micro Grid (Los Alamos County, NM)



(2) Power Grid stabilization (Maui, HI)



LL1500-W-8 192unit (2.3MWh)

PCS

CH-75-6 120 units (153kWh)

(3) Peak Shift at building (Brooklyn, NY)



(4) Output power stabilization system for wind farm (Shiura, Japan)



Brooklyn Army Terminal, NY

LL1500-W-8 60unit (720kWh)

Shiura wind farm (15MW)

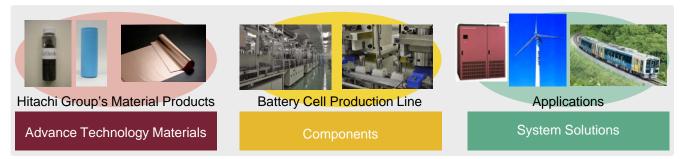


LL1500-W-8 864 units (10MWh)

1 MW Lithium-Ion all-in-one Package Energy Storage



Hitachi can offer everything necessary for Power Grid with global top class Quality.



Concept of "CrystEna"; 1MW BESS package



CrystEna = Crystal (Crystal of Hitachi's state-of-art technology) + Energy





Control System

POWER SYSTEMS COMPANY



Power Electronics

INFRASTRUCTURE SYSTEMS COMPANY



Lithium-ion Battery

HITACHI CHEMICAL CO.,LTD.

Hitachi has developed "1MW Lithium-Ion allin-one Package Energy Storage System" for FR market.

Hitachi started a pilot project in 2014.

BESS; Battery Energy Storage System
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Battery Storage for PJM Frequency Regulation Market



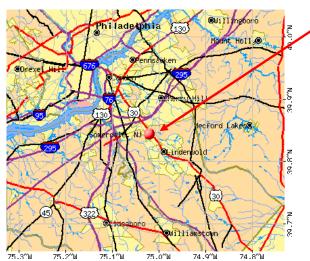
- Pilot project in Somerdale NJ.
- 1MW Lithium-Ion Battery Containerlized System ("CrystEna")
- All-In-One package includes A/C, fire suppression etc
- Use Demansys Software "Grid Daemon."







Somerdale NJ





Please watch the VIDEO

This video is on YouTube

https://www.youtube.com/watch?v=eHBhRJS2bQQ



Thank You!

Questions?

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