Stationary Energy Storage

Advance Energy Solutions Conference

San Diego October 23rd to 25th

Victor Sauers
CEO / President

WHAT WE DO

TKO Energy Capital (TKO) provides Policy Advisement, Technology Vetting, Business Due Diligence, Funding Preparation plus Consultative Solutions to expand energy related projects into new and strategic markets.

TKO does this through the acquisition and provision of financial resources necessary to support energy projects across the globe in domains including large-scale and aggregated energy and high-efficiency power generation, transmission and distribution.

Specific project families include, but are not limited to:

- Conventional, Solar, Geothermal, Waste-to-Energy and Wind Technologies.
- Energy and Thermal Storage Technologies.
- Advisement on design and installation for early stage start-up energy and related technology companies for large-scale grid applications.
- Connectivity with industry, technology and energy-thought leadership.

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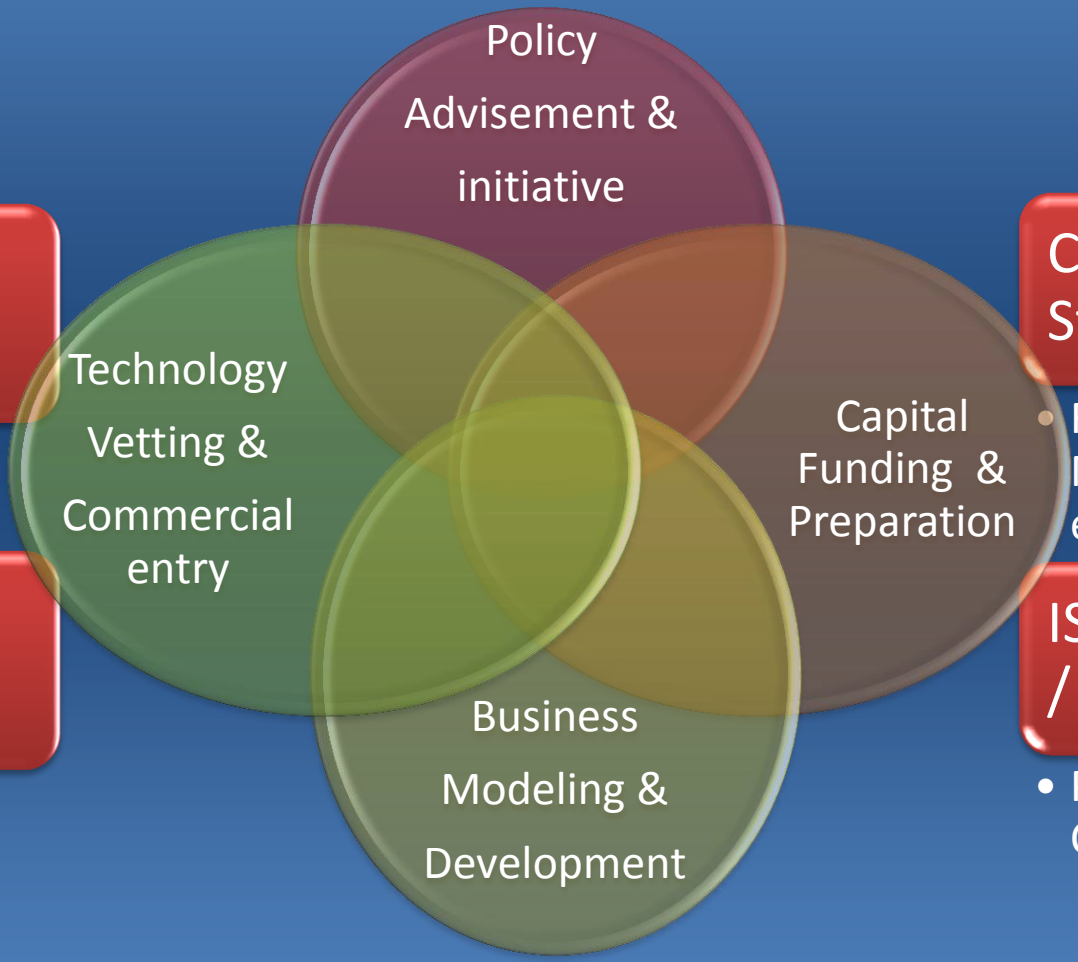
HOW WE PROCESS



Generation Stakeholders

- Wind, Solar, IOU, Muni. CCNG,

EPC Companies

- Jacobs, B&V, Fluor, etc.

C&I, MUD, Stakeholders

- Fabs, Data Centers, Mfg. Retail centers etc.

ISO / RTO / PUC / FREC

- PJM, ERCOT, MISO, CAISO, NEISO, etc.

TKO Clients and Partners

AMD The future is fusion

JACOBS Engineering

Broadlands Financial Group

SAMSUNG

General Catalyst Partners

PLAN THE WORK · WORK THE PLAN
INFRASTRUCTURE
DELANEY
ENERGY

SUNTECH

e·on

EATON
Powering Business Worldwide

Maxwell TECHNOLOGIES

ZBB energy corporation

ALCOA

ERCOT

Infinia Corp

FIELD ASSET SERVICES

SOLAR POWER TECHNOLOGIES

PowerPlus Engineering, Inc.

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Stationary Energy Storage: Defined

Stationary Energy Storage: Permanent 1MW and up Discharge / Charging Energy Storage System Unit(s)

ESS Market:
Advanced batteries will roughly double each year over the next 5 years, reaching $7.6 billion in 2017. Over the next half-decade, growth will level off to a compound annual growth rate of 31 percent, and revenues of $29.8 billion in 2022 for 14GW*.
*Pike Research

The cost estimate for distribution, transmission and generation in the U.S. by 2030 is $1.83 trillion*. *Edison Electric Institute

Grid-Tied Micro Grids in the North America market have grown from 900MW in December 2011 to 1.7GW of planning ending June 2012. TKO expects this market to grow to 2.2GW in the next 18 months*.

*TKO Energy Capital

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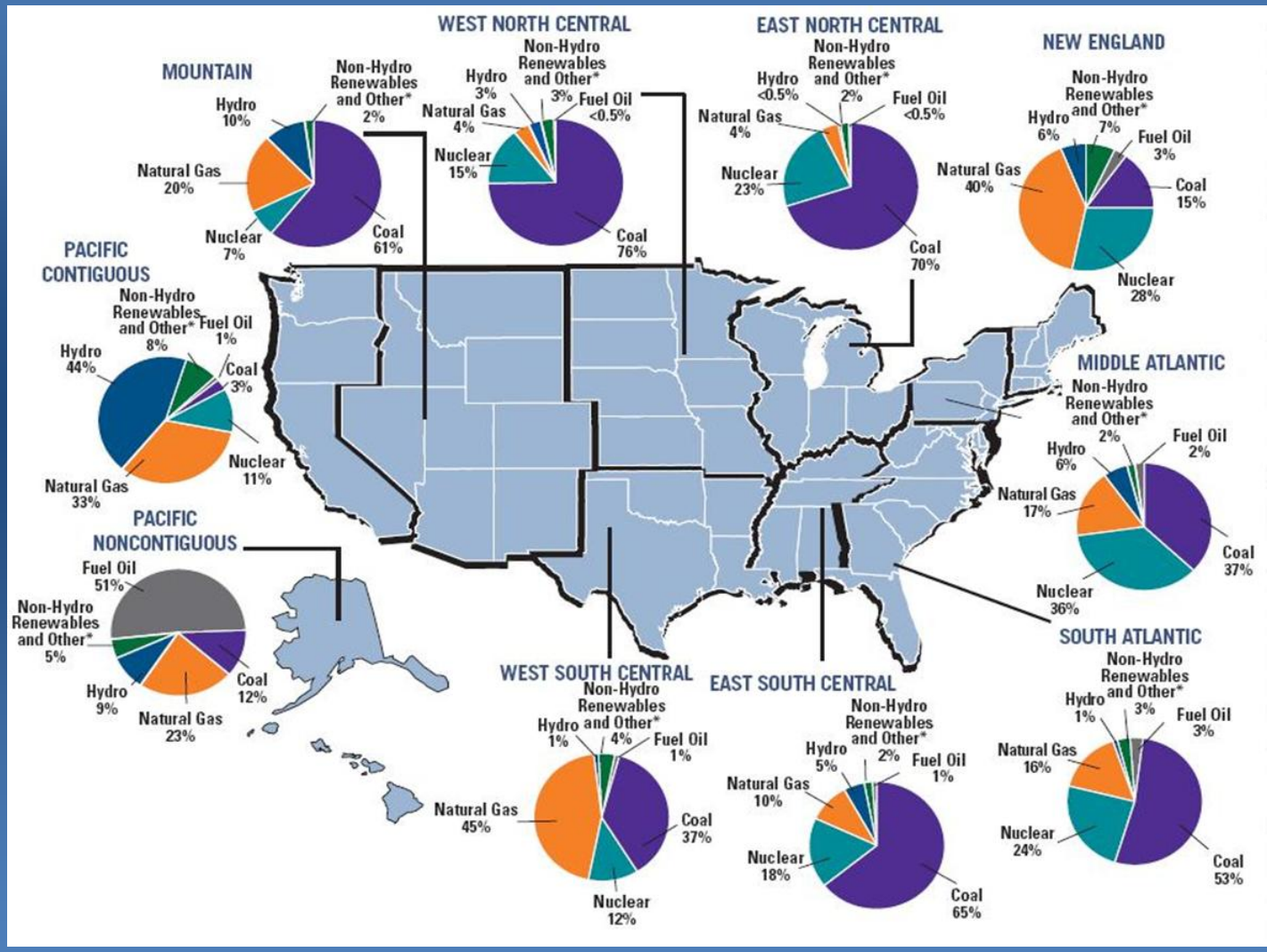
United States Grid / Generation Mix



Across the United States, a diverse mix of fuel is used to generate electricity. Several factors influence an electric utility's decision to use particular fuels. These include the price and the availability of supply. This map, arranged by census region, illustrates the diversity of fuel use and shows how the electricity generation mixes in various regions of the country differ. The map further demonstrates that major changes in the generation mix could have economic and reliability impacts, especially on a regional basis.

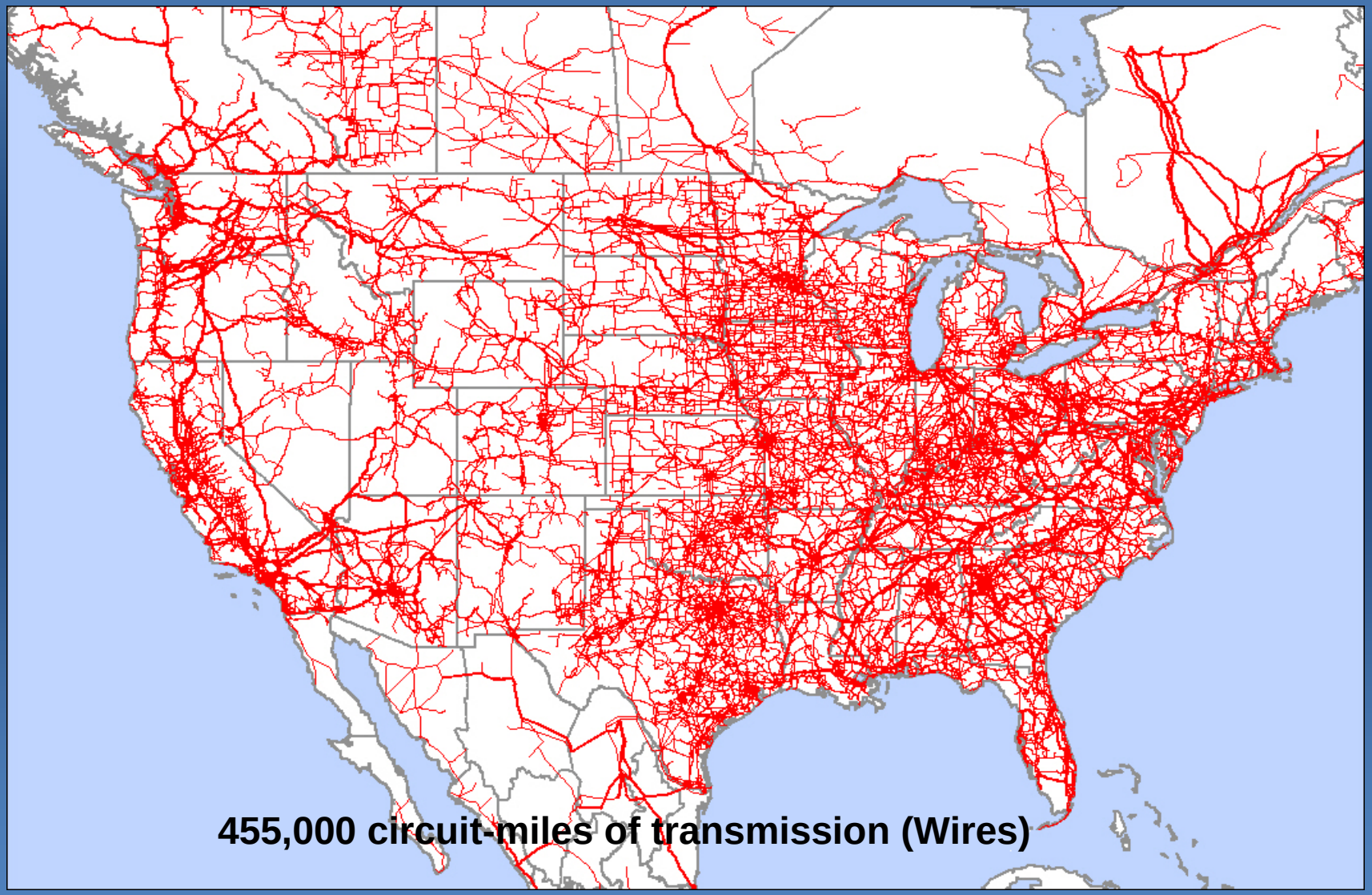
*"Non-Hydro Renewables and Other" includes generation from solar, wind, geothermal, biomass (agricultural waste, municipal solid waste, landfill gas recovery, wood, pitch), hydrogen, batteries, chemicals, non-wood waste, purchased steam, sulfur and miscellaneous technologies.

"Sum of components may not add to 100% due to independent rounding."

Source: U.S. Department of Energy, Energy Information Administration, Power Plant Report (EIA-920), Combined Heat and Power Plant Report (EIA-920), and Electric Power Monthly (2006 Preliminary).

NREL

North America Transmission
69 KV and up (Wires)



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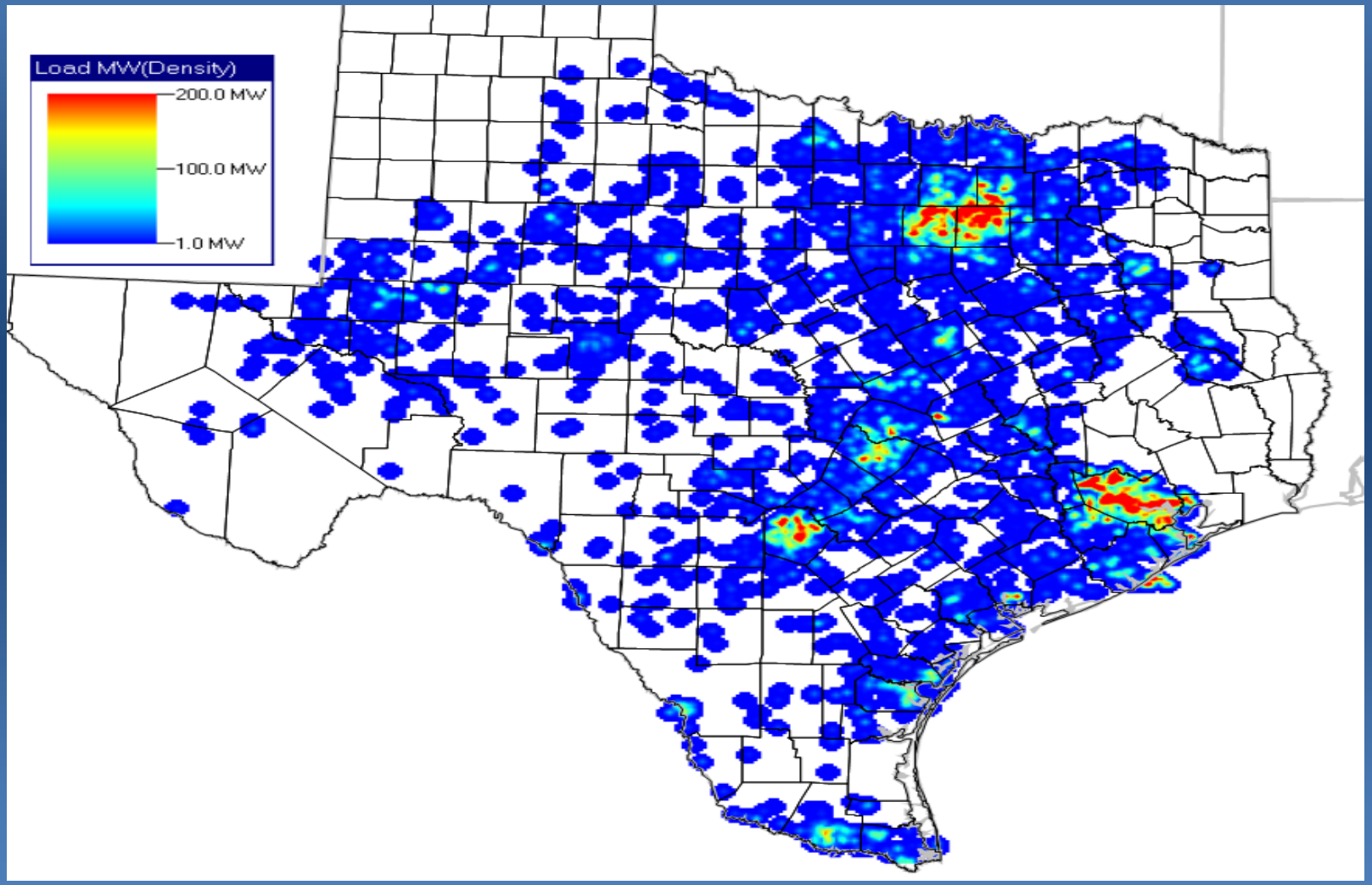
ERCOT (Texas) Sample of Load at 68G



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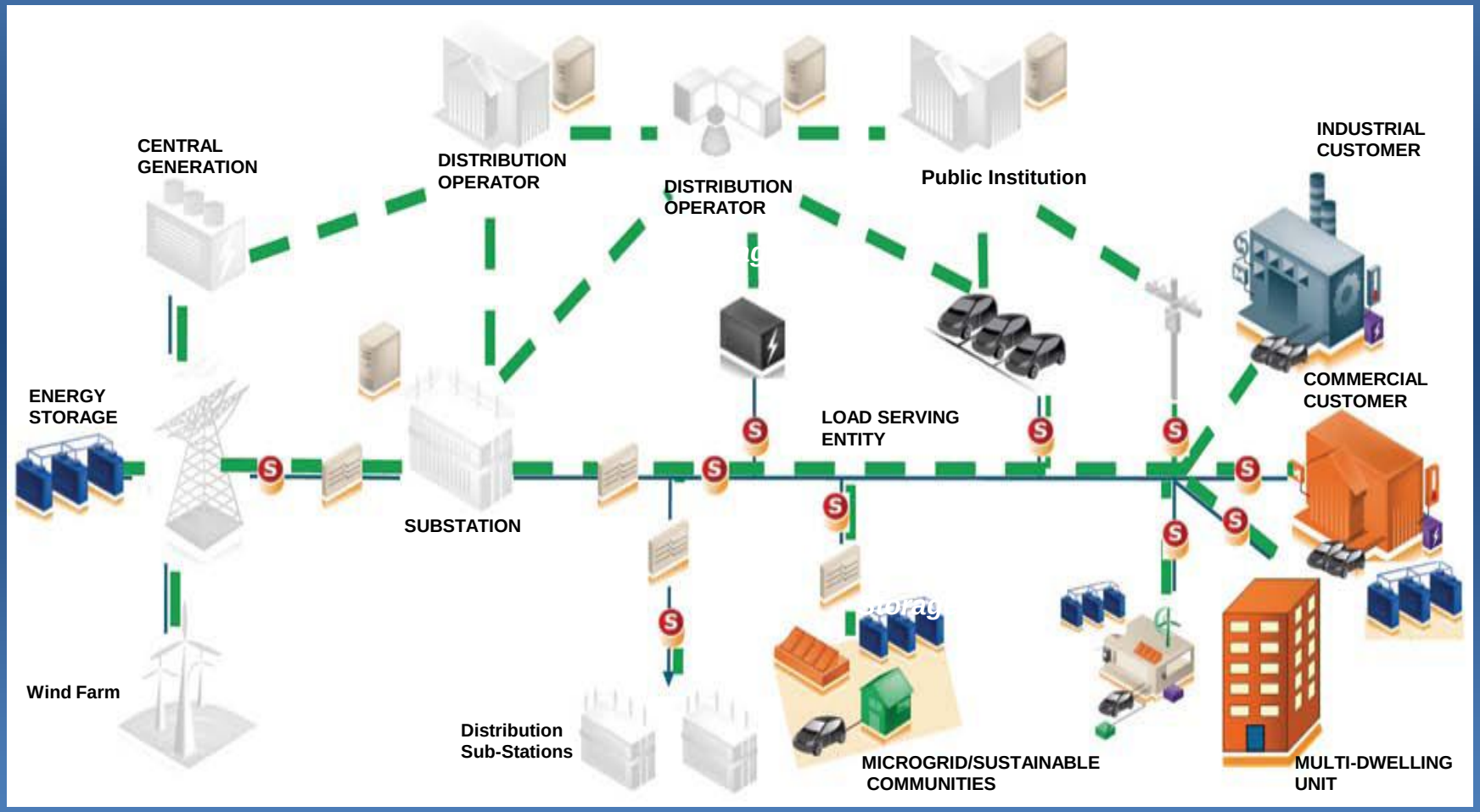
Storage Opportunities, Problems & Solutions



Stationary Energy Storage: Utility Services

Utility Storage & Applications

Ancillary Services:

- Frequency Regulation
- Area Regulation
- Fast Responding Regulation Service
- Regulation Up and Regulation Down
- Spinning and Non-Spinning reserve

Array / Farm Generation Support Services:

- Firming of Generation
- Reliability Asset Enhancement
- Merchant Market Plays

Transmission Power Line Services:

- Deferment of Capital
- Reduction of Capital
- Regulatory Requirements

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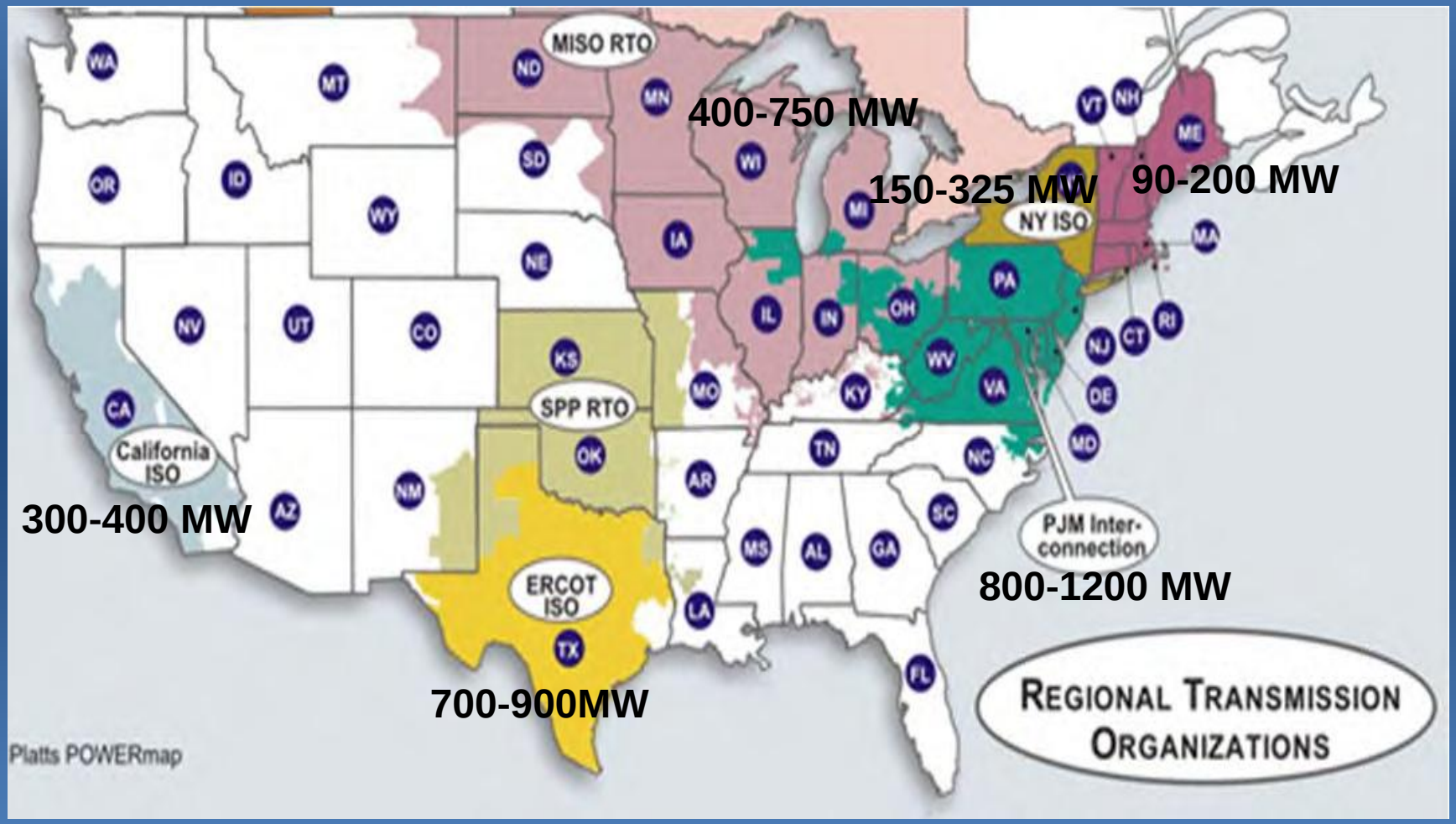
Frequency Regulation Market Size:

Need more then one market segment (Sample of a market)



Platt's Power map

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Stationary Energy Storage: Utility Services

Utility Storage & Applications (Continued)

Capacity / Peaker Services

50MW to 400MW systems

Example: ERCOT needs 4GW of additional capacity to maintain resource adequacy standards and CA-ISO looking at 5x increase to support 33% RPS initiative.

Distribution Storage Services

ESS at Substation Levels 1MW to 20MW:

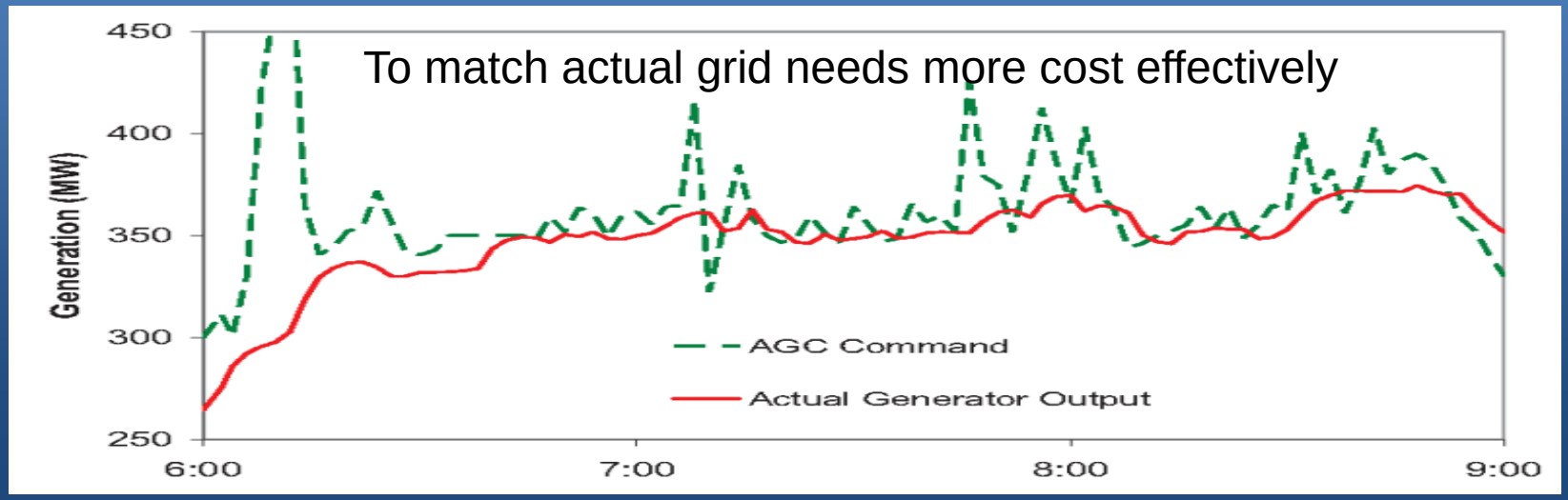
Future replacement for demand charges??

Community Storage Services

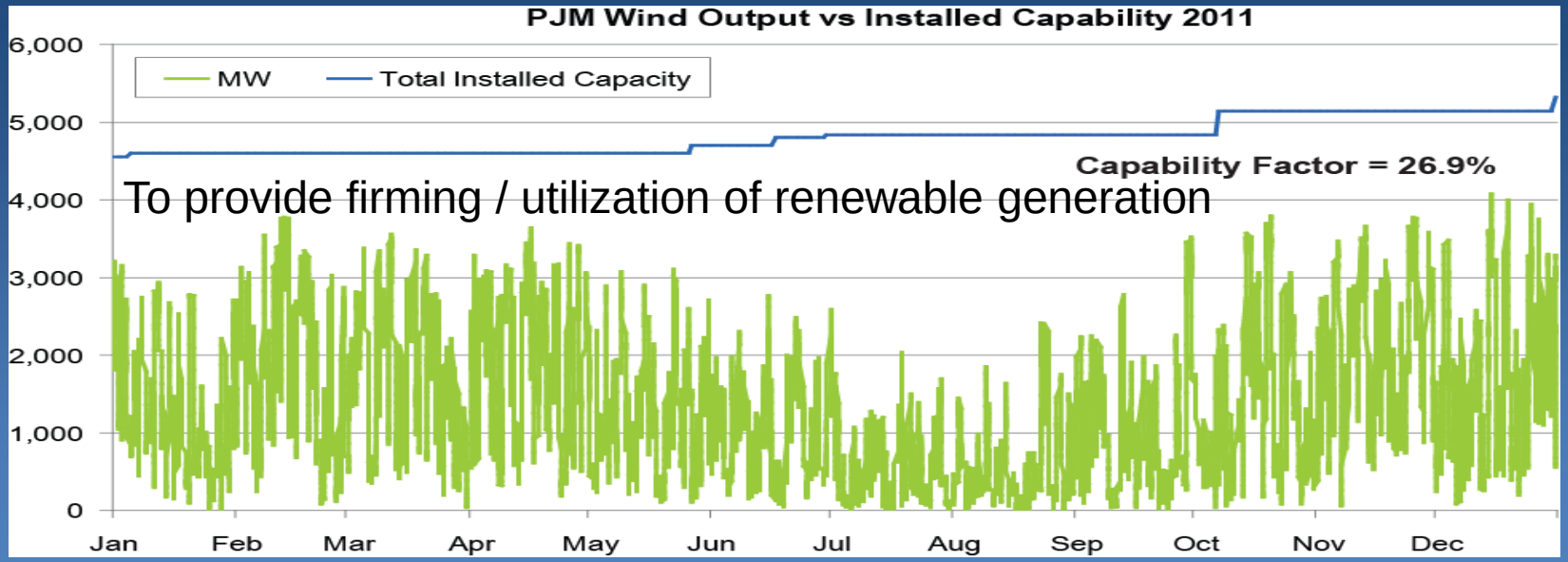
MUD Districts 20KW to 50KW ESS.

Addresses the main variability of daily residential load profiles.

Utility Needs for Large Stationary Energy Storage



ERCOT



PJM

Stationary Energy Storage: Transportation & Retail

Transportation

- Electromechanical Rail (In operations)
- Charging Stations (Emerging trends)
- Vehicle Parking Sites (Future)

Commercial / Industrial (C&I)

- UPS Systems (UPS support Plus)
- Micro Grids support (Trends to mitigate IEEE 1547)
- Demand cost reduction (Emerging Technologies, Rules and Agreements)

Stationary Energy Storage: Technology & Markets

Technology Characteristics:

- Long Cycle life: 20 years plus
- Low O&M cost: Competitive to conventional generation
- Scalable (Energy / Power)
- Wide range for control characteristics (Power Electronics)
- Low Hazard / Environmental cost impact (End of Life)
- Empirical data to confirm commercialization of technology.

Market Characteristics:

- Needs of the Wholesale & Retail markets
- Economic Trends & Drivers
- Market Participants
- Asset categorization and interconnection rules
  - (What is trending)

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Stationary Energy Storage: Business Modeling

Revenues:

- **Multiple revenue capabilities**
  - **a) Power Purchase Agreements (PPA)**
  - **b) Merchant Plays (Market Rules)**
  - **c) Generation Support (renewables)**

O&M Cost:

- **Multiple mitigation capabilities**
  - **a) Reliability value**
  - **b) Operating characteristics**
  - **c) O&M requirements**
  - **d) lifecycle costs**

Capital Expenditures:

- **a) CapEx for sustainable future growth ($400 - $700 KW)**

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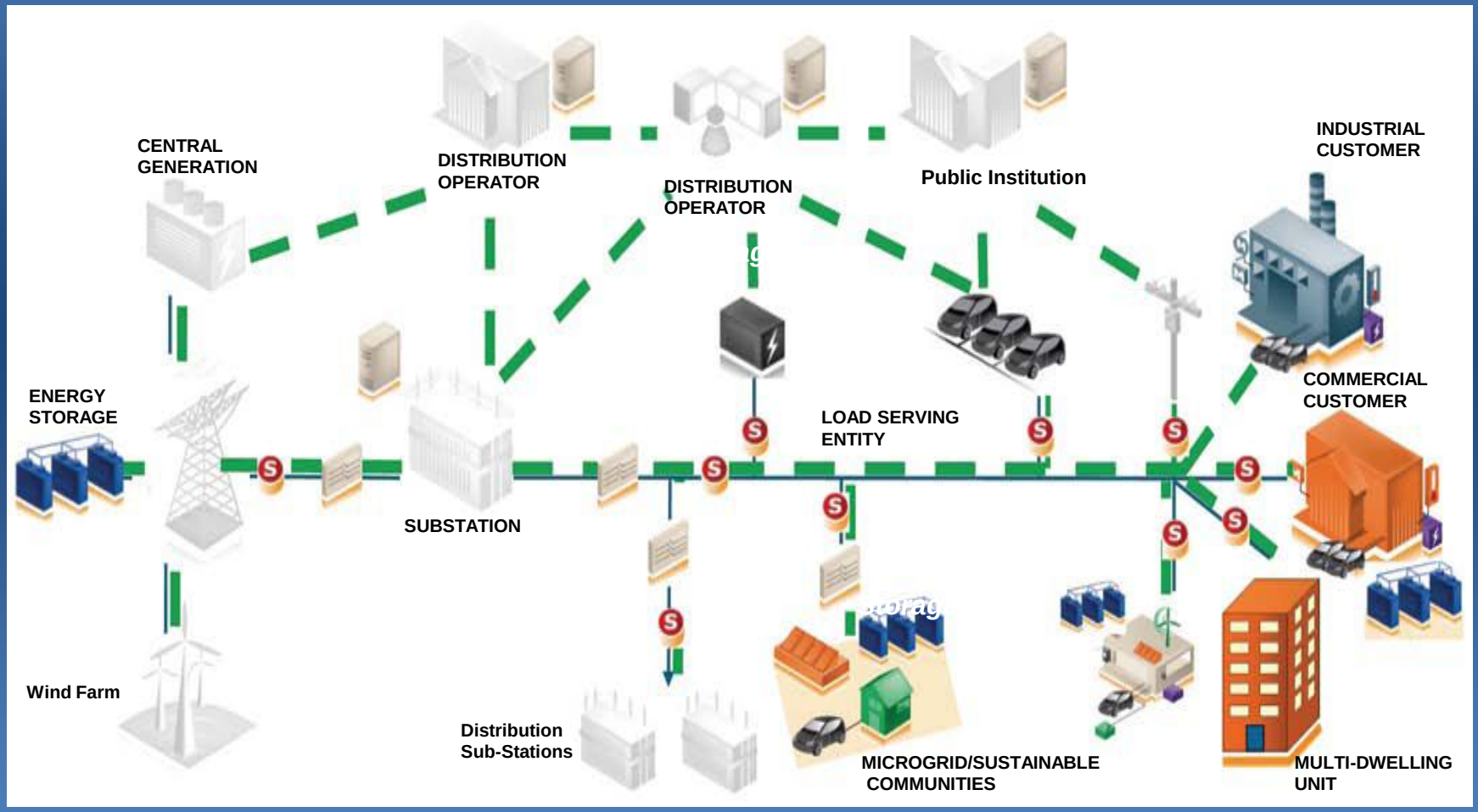
Active Energy Storage Opportunities, Problems & Solutions



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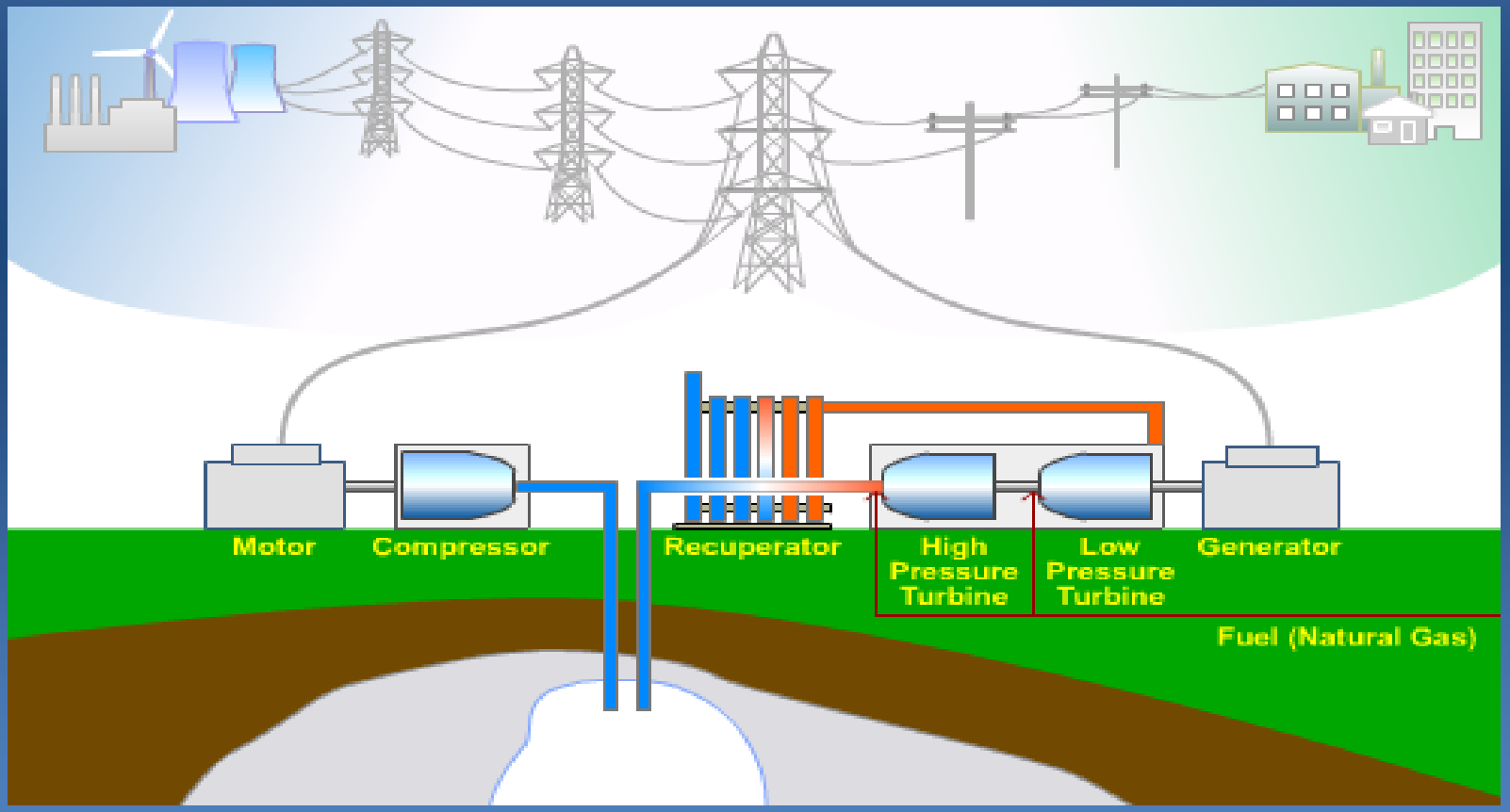
Stationary Storage

Compressed Air Energy Storage (Large Scale)



PJM

Stationary Storage

Transmission:

NKG 4MW/24MWh NaS battery system installed in Presidio, Texas. Transmission deferment with special provision from Texas PUC.

S and C Electric

Stationary Storage

Ancillary Services:

Flywheel ESS for Frequency Regulation & Micro Grid Integration.

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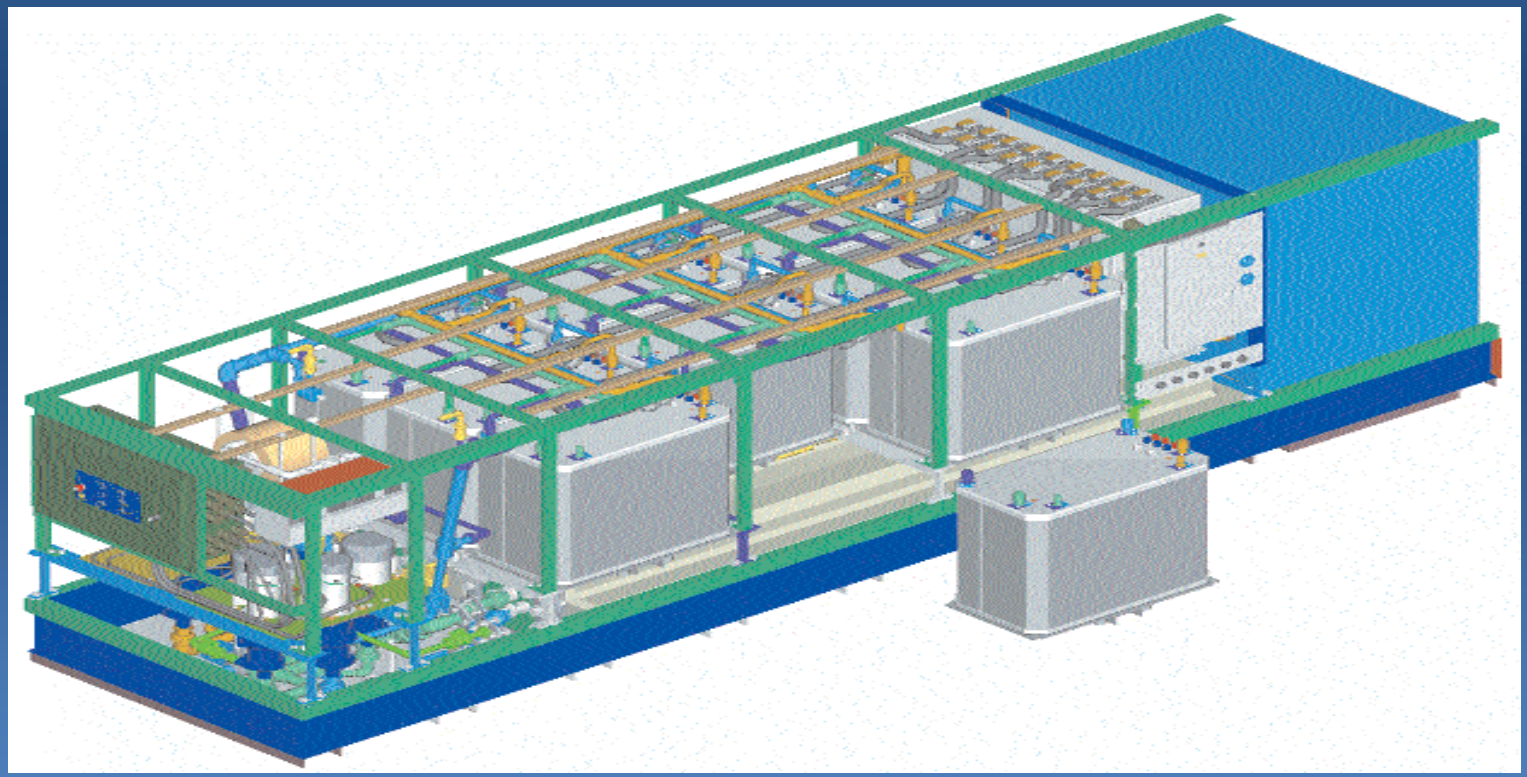
Distribution Storage : (Substation support)

Flow Battery Technologies: Zinc, Vanadium materials types



Premium Power

Stationary Storage

Substation Support

A123 Systems SGSSs™ (Lithium) installed on the Chilean power grid. It is a 12MW system performing grid stabilization services and to support mining operations (Owner AES)

Stationary Storage

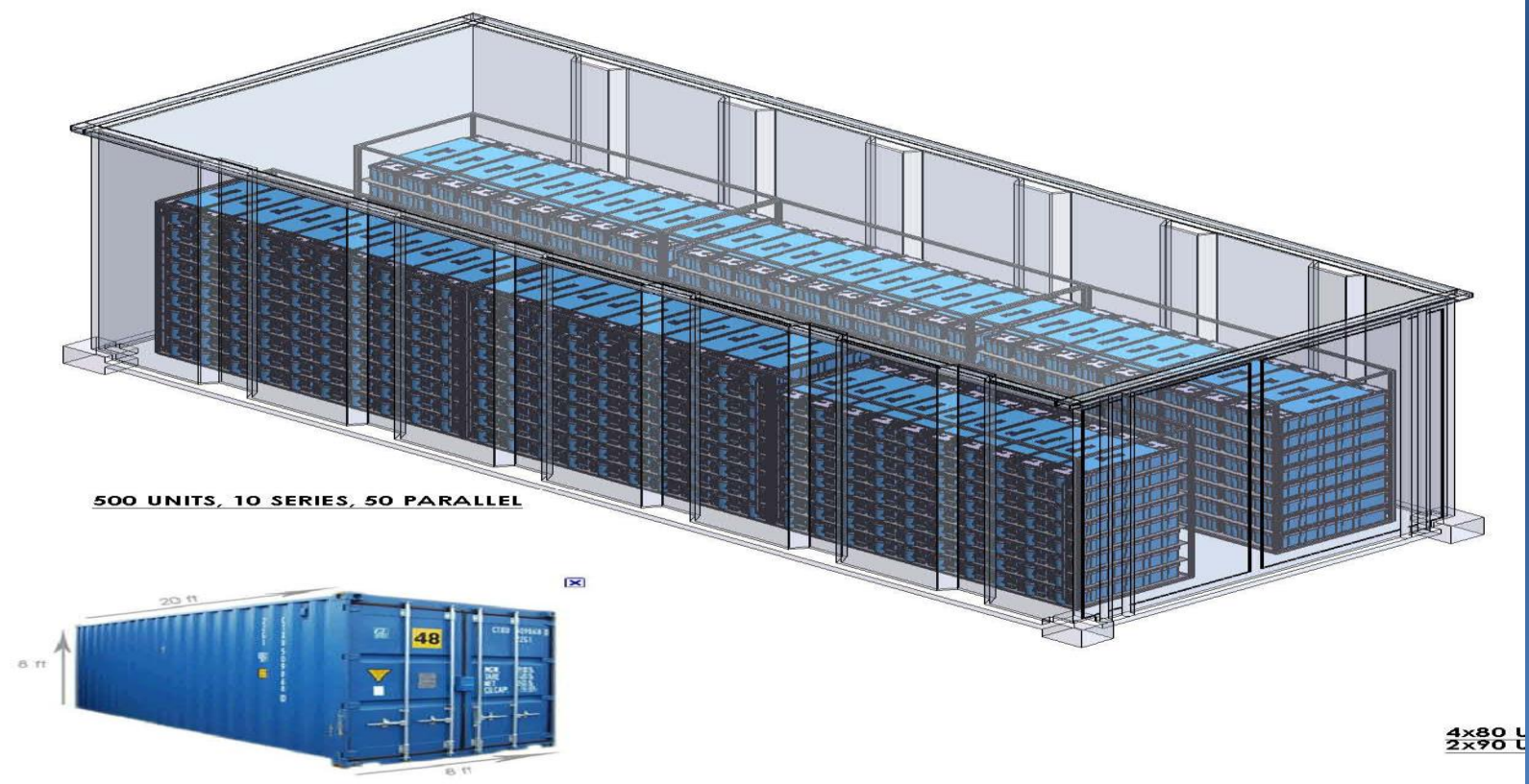
Array / Farm Generation support:

Xtreme Power dry cell Technology (Multi Use Control Applications) 22MW deployed, 53MW in Development.

Stationary Storage

Ancillary Services / Array / Farm support (Hybrids)

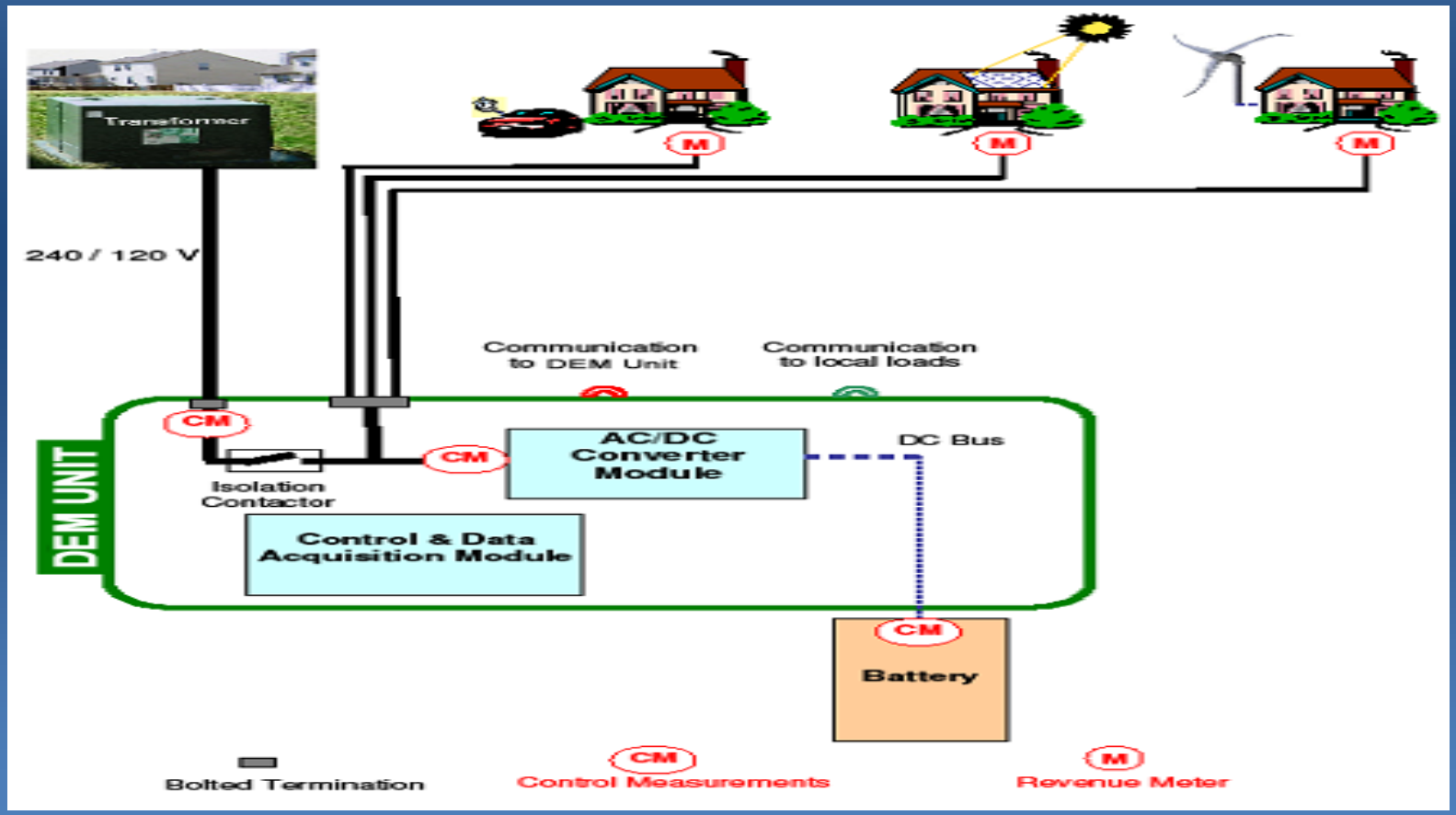
Maxwell Technologies Mega Watt Ultracapacitors



Stationary Storage

Community Energy Storage:

Aggregation of energy storage units while still under a Utility's control.



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Transportation:

Siemens / Maxwell Technologies Ultracapacitors

Stationary Storage: The future mix?

Energy Storage supporting multiple of technologies:

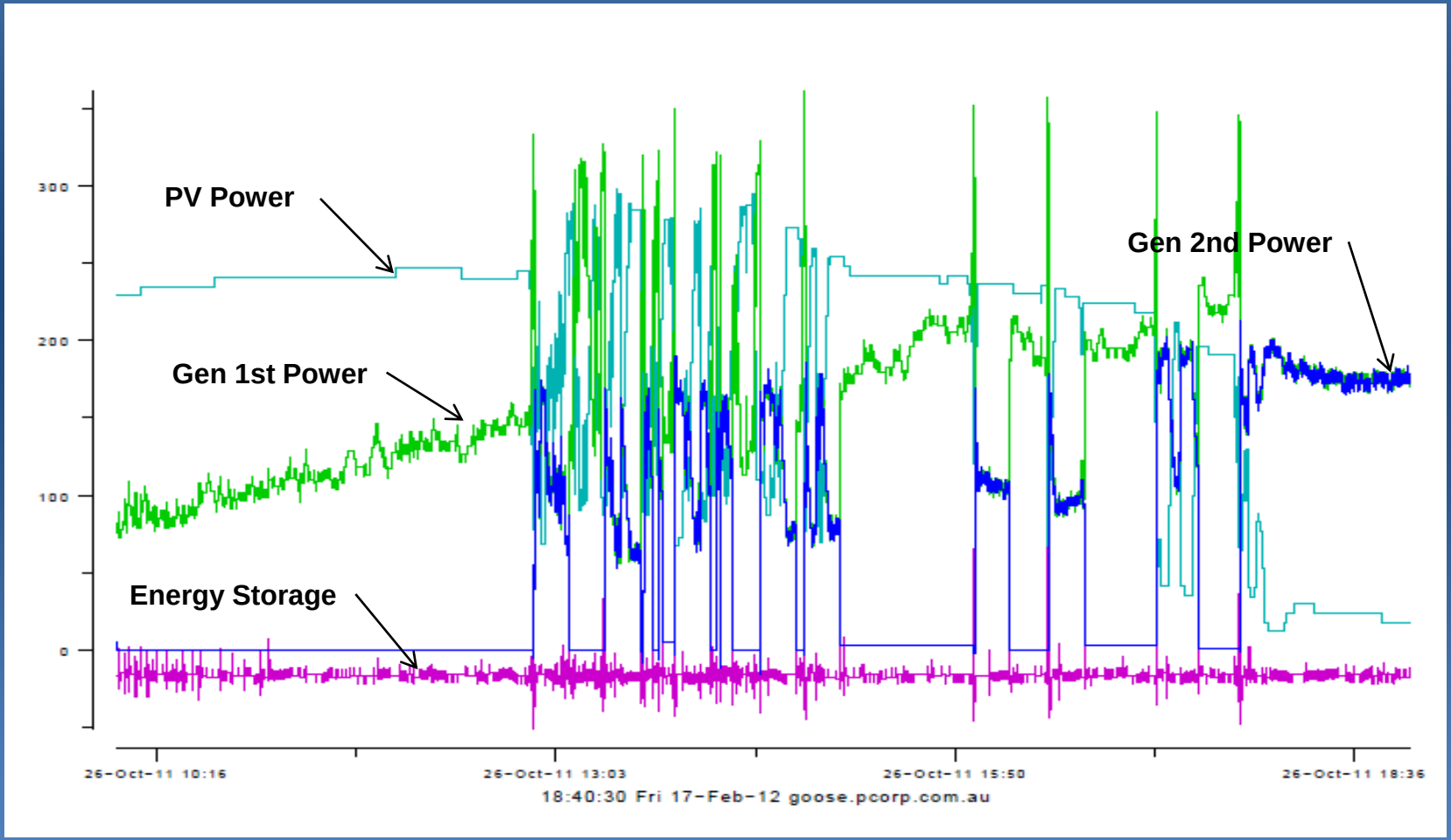

ABB Micro Grid

Final Bold Thoughts

1. **Without energy storage there is no real smart grid (Think control without loss of consumption).**

2. **Without energy storage volume trading of distribution generation will not grow to mass users (Think Google / Apple).**

3. **54GW of renewable generation in United States that can have a positive effect with energy storage (Think Storage PPA's).**

4. **Approx. 16,000 transmission substations in U.S. (a opportunity for Utilities to keep their customers).**

TK ENERGY CAPITAL, LLC.

Quality transparent connections equals long-term success.

Victor Sauers CEO
victor@tkoenergycapital.com
1420 Cypress Creek Road
Suite 200
Cedar Park, TX 78613
Phone - (877) 275-8779
Fax – (512) 857-9870

www.tkoenergycapital.com