

NAVFAC Energy Storage Solutions Industry Day Meeting
September 14, 2015
Admiral Baker Clubhouse

Question & Answer Notes:

Tesla Energy

Q&A (questions and answers below have been incorporated/integrated):

- 4.8 MW hours is the largest to date; Tesla will be sticking with 250 kW hours and beyond
- The batteries are monitored remotely at all times. If a pod goes offline, it will not affect the entire system as a whole and a worker will be sent immediately to investigate the pod. To prevent thermal issues, each battery is individually isolated. This also prevents contamination of neighboring cells in the event one is affected.
- The batteries will experience degradation over time.
- Working on subcontracts for O&M. Currently Tesla personnel are the only ones qualified to maintain system.
- Little preventive maintenance – fan, radiator, water glycol mixture.
- The batteries go back to the giga factory for recycling

Aquion Energy

Q&A (questions and answers below have been incorporated/integrated):

- The technology can be scalable to both small and large applications; sustainable green
- Battery can switch from charge to discharge immediately
- Battery can be discharged at 100% without affecting performance or capacity over time
- Linear reduction in capacity over time – no cliff drop-off
- 3000 cycles warrants 8 years for life efficiency based on 100% discharge and not at a 50% discharge
 - Convert hybrid with long lasting and high power arrangements; mixing capacitors are being piloted for hybrid arrangements on utility scale
- NAVSEA is looking into hybrid arrangements for short-term and long-term.

- Question: What is the size of a 1MW/hr footprint?

Answer: Not sure, maybe 2500 square feet.

- Question: What are the maintenance requirements?

Answer: Majority wise, maintenance is not necessary; over a 10 year period inverters may need maintenance

- Question: Is a Battery Management System (BMS) needed?

Answer: High voltage inverters and battery management systems are not needed and will naturally balance themselves

UniEnergy Technologies

Q&A (questions and answers below have been incorporated):

- No fade performance and footprint are the most important specs/criteria
- SDGE an NY have the highest demand and highest variation in demand charges
- Full factory testing - tested in the factory so the product does not need to be tested in the field
- Containers can be organized into triple stack systems or can be placed next to one another
- The containerized batteries are designed so that when the front doors of the containers are opened, all maintenance can be completed in the front without needing to access the back of the container
- Breakthrough in replacing water with sodium chloride which doubled energy, reduced footprint 5x (15x if triple stacked), and tested up to 95° C.
- Maintenance is required for pumps (monitored and usually replaced every 10 years), airfilters (can be changed from the outside), and power electronics; some testing of electrolytes may be necessary
- No cost removal and recycling contract is offered with the purchase
- Vanadium can be reused

Siemens Energy Storage (Dresser-Rand)

Q&A (questions and answers below have been incorporated):

- Looking into Thermal Energy Storage system but still under development
- Recommended that perhaps a hybrid of different storage systems may be the correct answer
- Abandoned steam pipes may be used as storage reservoir
- CAES system not in competition with batteries. Batteries are for instantaneous response then CAES would kick in
- Adaptable to an existing gas turbine system

STEM, Inc.

Q&A (questions and answers below have been incorporated):

- CA, HI, NY Interconnection process has taken place already
- CAL ISO groups together multiple clients to bid capacity into the system (e.g. all of CA or a discrete area)
- Bid in to take advantage of underutilized power generation to participate in load shed
 - 3 markets in CA (1 day ahead, 1 hr ahead, instantaneous)
- There is a way of connecting the system that can be disconnected for the network and completely walled off – a DSL line can be used as well

Sunsave, Inc.

Q&A (questions and answers below have been incorporated):

- Looking for companies to partner with to develop microparticles
- Currently only the concept is patented

Highview Power Storage

- Question:: Can the liquid air be produced in one location then transported to another location?

Answer: Yes, the process will most likely call for the use of liquid-nitrogen instead of liquid air. The flexibility can be injected into an existing plant.

- Question: What exhaust type is used for temperature?

Answer: A low grade exhaust (i.e. turbine intercooling).

Amber Kinetics

- Question: Is the company casting or forging in house?

Answer: Currently Amber Kinetics is forged in the U.S., out of house.

- Question: What is the product plan in terms of capacity unity?

Answer: footprint ½ acre MW, 20 MW systems to 8 acre

- Question: How many containers are in a 2 MW cluster?

Answer: There are 26 containers to 2 MW.

- Question: How are you going to take information and integrate/ use information of energy storage such as savings?

Answer: There is a subjective evaluation with no developed method or easily quantifiable security value. There is an opportunity to communicate with customers on what do we want to get out of performance. There are plenty of solutions and many different storage systems to fit individual needs such as which system makes the most sense economically; reference of study on energy security proactive quantification.

- Question: How will the energy solution be funded? How will the Navy protect itself PVs? Rate tariffs

Answer: The energy service Power Purchase Agreement (PPA) mode, an evaluation of energy storage and how to pay for PV, energy security (to prevent blackouts, hacker into the grid, etc.) as well as pursuing paper studies or small scale case projects.

- Question: Can there be a separate container for the electronics?

Answer: Not right now. The cost might be an issue due to the lack of being able to create it at the factory.

- A motor generator is mounted on the flywheel to spin it up. There is a magnetic lift – 30 watts of power is needed.
- There is 80% efficiency when you add an inventor and a transformer
- A new factory will be on-line in 2017
- Idle to meet demand timing is about 1 to 1-1/2 seconds