Session 2: Energy Storage Systems

Presented By

Dr. Arindam Maitra, Vice President Energy Innovation & Services, L&T DES, Fairfield CA, USA

Meeting the Needs of Future Energy System
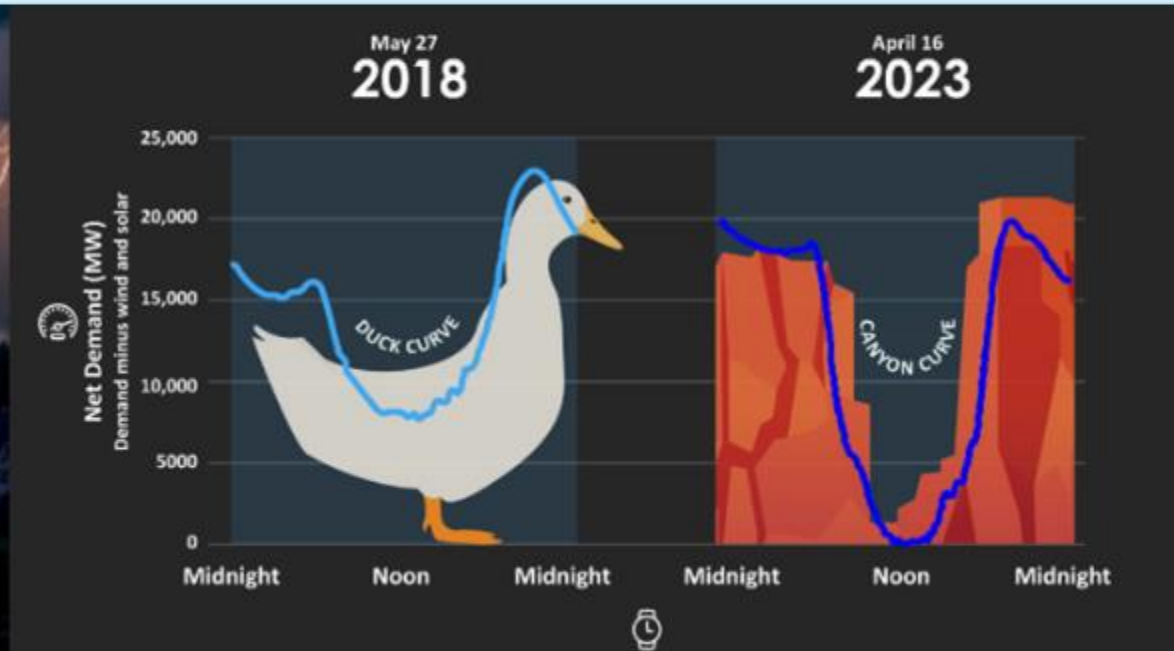
- What do we need to do to meet the needs of the future energy system?
- How do we provide customer resilience as we experience more frequent extreme weather events?
- How do we keep system reliability as IBR and intermittent renewable generation increases?
- What resources can provide the flexibility required for steep ramping of net load?

Meeting the Needs of Future Energy System

L&T Green Hydrogen Pilot Project

990 kW Solar + 100 kW / 500kWh BESS

Customer : L&T Energy

Location : Gujarat

Blink

BECS For EV Charging Station

Customer : Blink

Location: Philadelphia, USA

CEC V2B

BESS, Site Controller

Customer : PG&E, SCE, SDG&E

Location : California, USA

Amazon Warehouse Microgrid

150 kW Solar + 900 kW / 900KWh BESS

Customer : Amazon

Location : Bengaluru

Microgrid

130 kW Solar + 10 kW / 32 kWh BESS

Customer : Larsen & Toubro

Location : Chennai

Microgrid

108 kW Solar + 250 kW / 238 kWh BESS

Customer : Larsen & Toubro

Location : Kanchipuram

Hybrid PV+BESS

BESS Controller, 20MW PV, 8MWhr BESS

Customer : NTPC

Location :   Andaman, India

Kutch

37 MW Solar + 57 MWh BECS

Customer : GSECL

Location : Gujarat

The NEOM Green Hydrogen Project

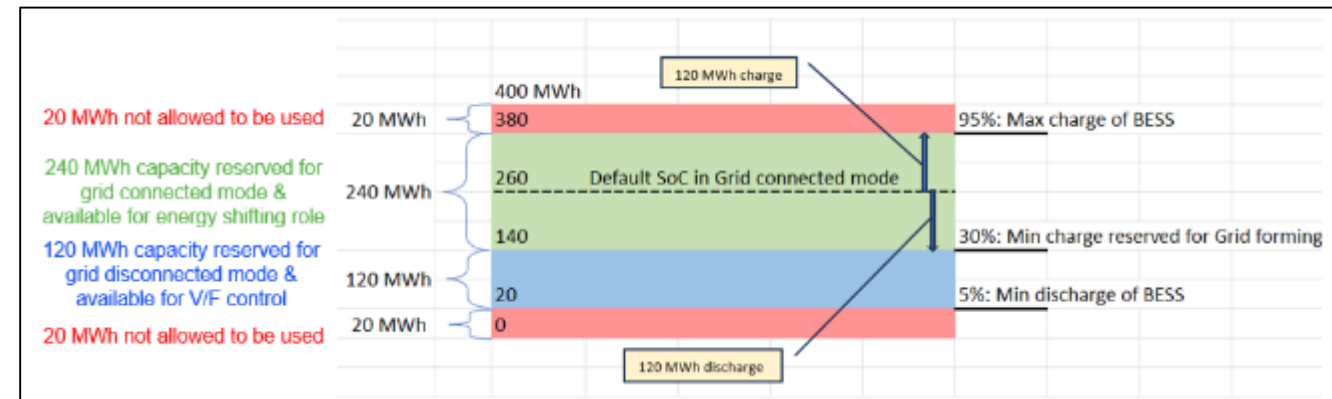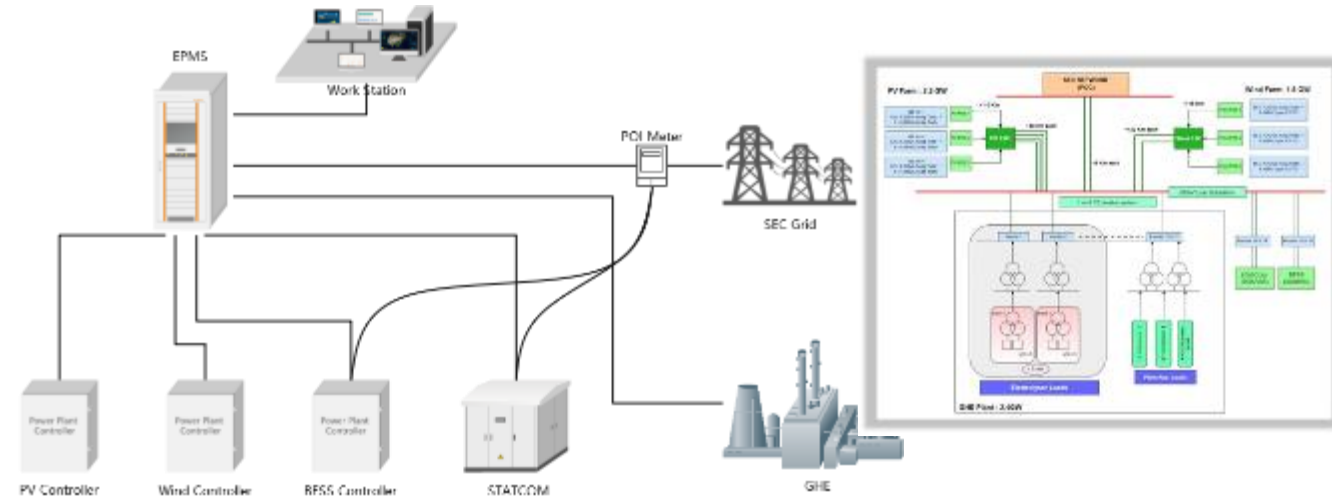**Country :** The Kingdom of Saudi Arabia

Customer : Green Hydrogen Plant Company

Plant Details : 400 MW / 400 MWh BESS Facility in a 2.4GW grid

BESS Supplier : Sungrow

Scope

1. Define role of BESS in grid and off grid conditions
2. Define control philosophy of BESS in coordination with operational philosophy of the overall System
3. Define BESS energy allocation/usage plan under different operating scenarios
4. Model BESS PPC in PSSE and PSCAD for grid compliance and system studies
5. HIL to evaluate BESS system and controller performance within the NGIP and SEC grid
6. Model T&D control system with AGC with the remaining elements for control validation

Net-zero Resilient Multi-family Housing in Petaluma, CA

Country : Meridian, Corona Station, Petaluma, CA

Scope

- Design, develop, & deploy resilient solutions for affordable, multi-family housing complex
- Deploy a local controller for dynamic energy management and load flexibility

Delivery Highlight

- Net-zero Resilient Community Hub
- Selective Energy Exchange with Grid
- Resilient electrified affordable community

Resilient & Mixed Use

- Proposed Selective Interconnection approach with BTM utilization will streamline PG&E interconnection
- Innovative load shedding strategy
- Solar, Battery and V2G EVs for Grid Services

Unique utilization of L&T-Spark-SHEMS & DFIP

- Provide tenants year-round resilience for both buildings and EV to use no energy from the grid for 95% of all hours in a year
- Zero export to the Grid & selective import from Grid

Adaptability & Scalability Demonstration

- First scaled bi-directional parking lot in US
- First 95-100% resilient apartment complex in CA
- A new template for rapid utility interconnection

CEC Funded V2B Infrastructure at Public Buildings

Goals/Objectives

- Increase <u>resilience and reliability benefits at public buildings</u> that serve DAC/LI and Tribal communities
- Foster <u>V2B technology advancement and adoption</u>
- Pilot a business model to use V2B as a resilient backup power source and promote EV adoption

Technical Innovation and Advancement

- Multi-Vehicle DC Platform (MVP DC) vehicle-to-building (V2B) system integrates DC-DC converters to feed a central DC-AC grid-forming inverter
  - ❑ Ability to Power Share across Multiple EV Types
  - ❑ Grid-Forming and Black-Start Capability
  - ❑ Interoperability with any Commercial Controller
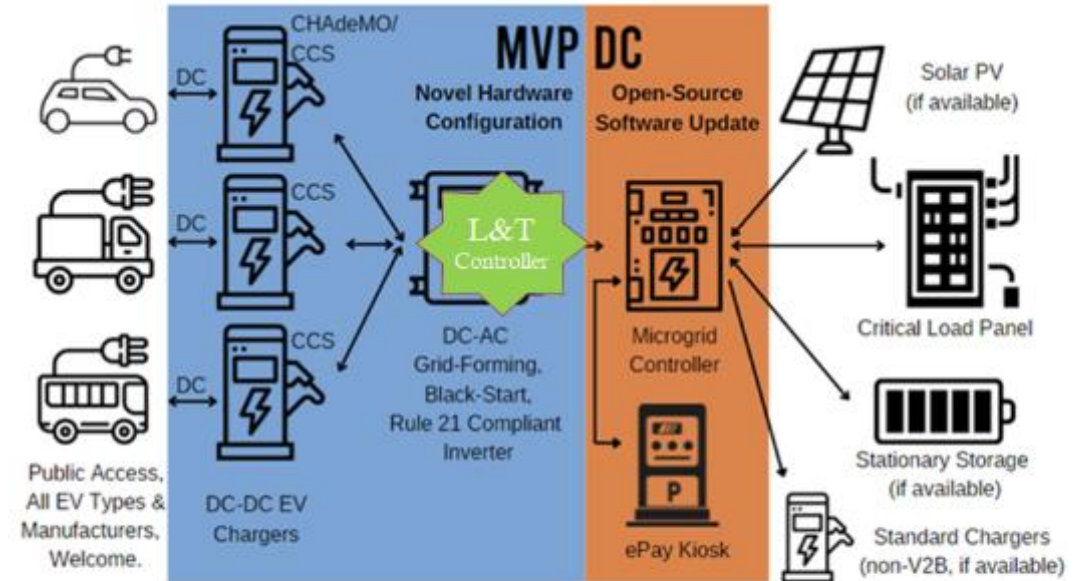
L&T AWARE Operational Planning Tool

AWARE is an **operational planning tool** that utilizes field data from **actual** BESS deployments

Offers **Performance** & **Operations** insights through:
- **Advanced Data analytics**
- Parameter **Tracking** for Safety & Prediction
- **Anomaly Detection**

AWARE can potentially evolve into a custom comprehensive **operational product** for on-field operations monitoring

Operation Dispatch Metrics to monitor BESS operations

24x7 Health Check : monitoring and control

Leverages Machine Learning and Deep Learning for **forecasting** and **anomaly detection**

Degradation Evaluation using AI to guarantee performance and acts as a warranty tool

Situational Awareness: Analytics to support Diagnosis and Predictive operations

The tool will be embedded in the **L&T Spark Platform**

THANK YOU

For discussions/suggestions/queries email: **arindam.maitra@Lntecc.com**
https://ltptd-des.com