

# TAEBC ADVANCED ENERGY 101


## Energy Storage and Demand Response





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# SEVEN STATES POWER CORPORATION

## Overview

- ▶ Established in 2007 and located in Chattanooga, TN
- ▶ Formed as a G&T cooperative to serve the 153 local power companies in the Valley
- ▶ Our members distribute TVA-generated power to the 10+ million people across the Tennessee Valley
- ▶ Energy services company
- ▶ Offer a variety of products & services with distributed generation & renewable technologies



# PRODUCT & SERVICES

## Current Offerings

### Available Products

- ChargePoint EV Chargers
- Caterpillar NG Generators
- OATI DERMS Solution
- Solar Solutions
- Electric Ride Through



# EMERGING PORTFOLIO OF PRODUCTS

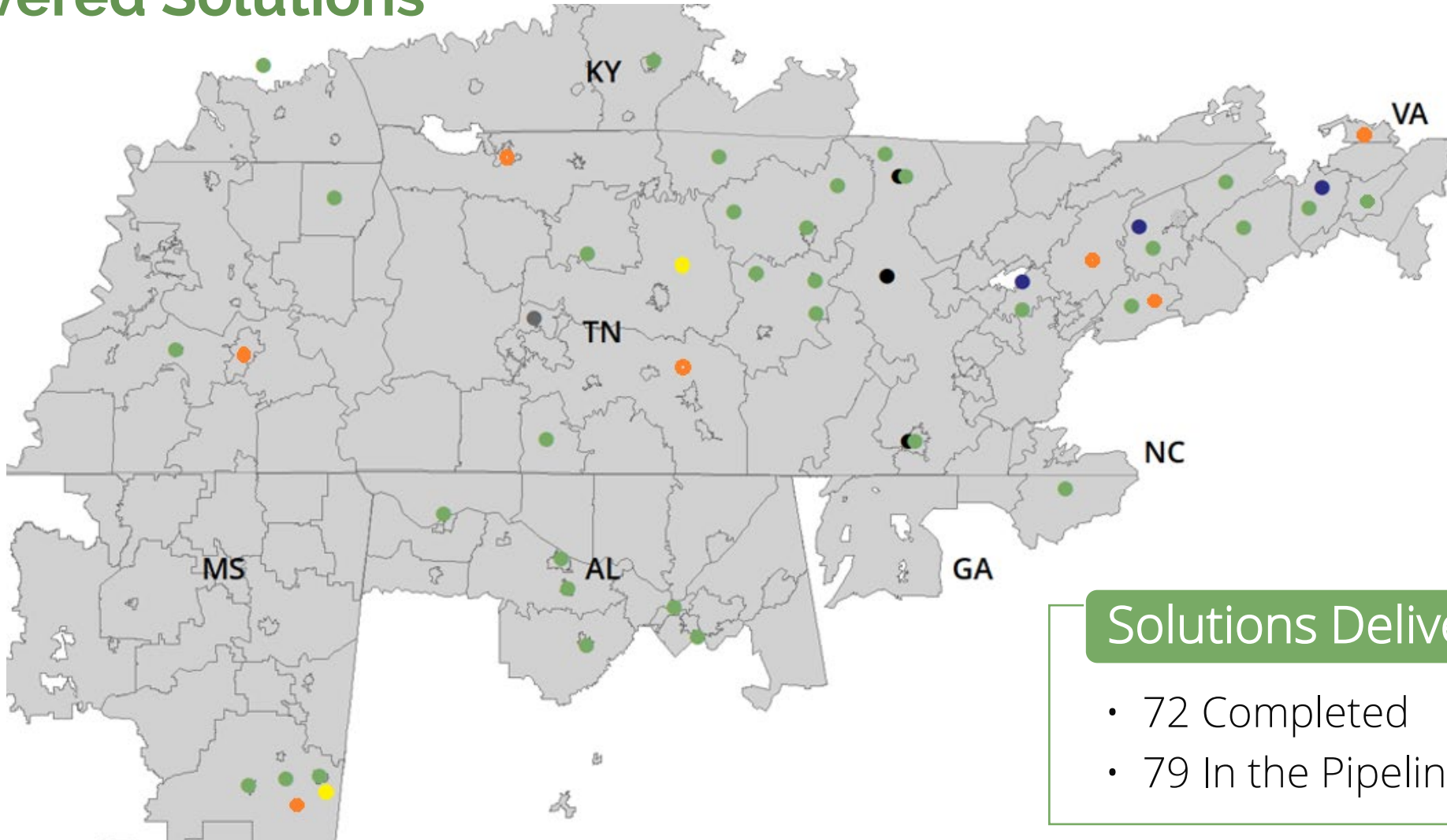
## Coming Soon...

- ▶ Middle Mile Fiber Optic Network
- ▶ Cybersecurity Solutions
- ▶ Battery Storage Solutions
- ▶ Aggregation Services



# SEVEN STATES FOOTPRINT

## Delivered Solutions



### Solutions Delivered

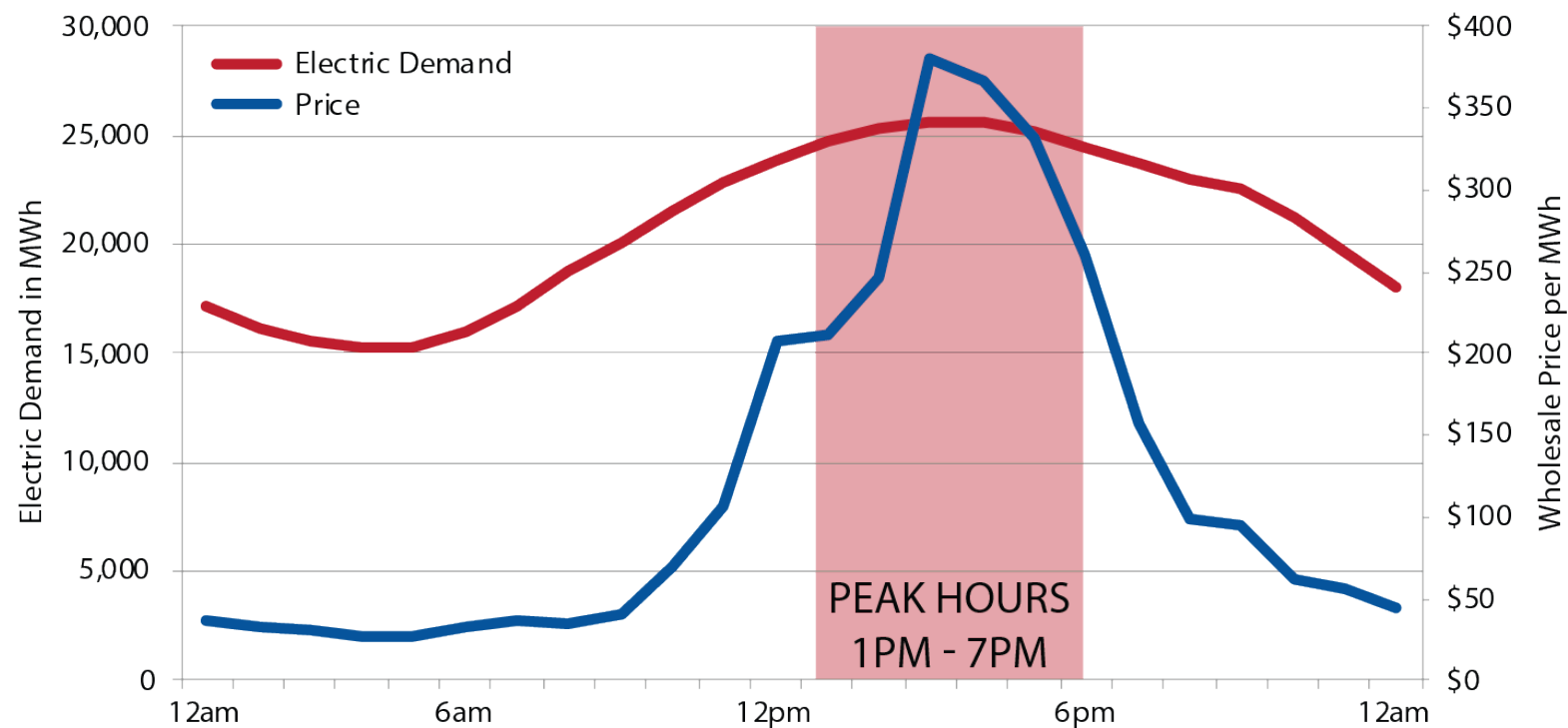
- 72 Completed
- 79 In the Pipeline



# WHY WE NEED...

## Energy Storage & Demand Response

- ▶ Peak demand management
- ▶ Reduces expenses for consumer, LPC & TVA





# ENERGY STORAGE IN THE VALLEY

## Raccoon Mountain Pumped Storage

- ▶ Overlooks Tennessee River near Chattanooga, TN
- ▶ Works like a large storage battery
- ▶ 528 acre reservoir with approximately 107 billion gallons of water
- ▶ Takes 28 hours to fill the upper reservoir
- ▶ 4 generating units with a summer dependable capacity of 1,616 MW





# ENERGY STORAGE IN THE VALLEY

## Battery Storage

- ▶ TVA – Announced 40MW in Vonore, TN
- ▶ LPC Installations – MTEMC, VEC, EPB of Chattanooga
- ▶ Seven States – Tesla Powerwalls & Generac PWRCell



# PROJECT "LIFT OFF"

## Technologies Working Together

- ▶ ChargePoint Level-2 EV Chargers
- ▶ 31.2kW Solar Parking Canopy
- ▶ Generac 7.6kW PWRcell Battery Storage





# ENERGY STORAGE IN THE VALLEY

## Water Heater Storage

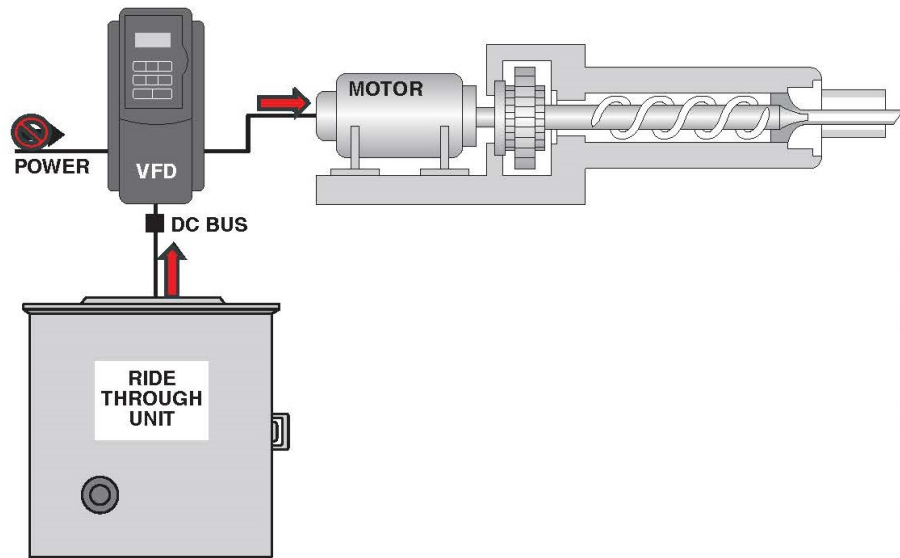
- ▶ Bristol Tennessee Essential Services
- ▶ BrightRidge
- ▶ Used for peak shaving, load shifting, valley fill
- ▶ 1000 Water Heaters @ 0.5kW per unit = \$5,000/mo
- ▶ Approximately 4.5M water heaters in the Valley



# ENERGY STORAGE IN THE VALLEY

## Other Storage Technologies

- ▶ Thermal Energy Storage
- ▶ Electric Ride Through – Capacitor-based Storage
- ▶ Electric Vehicles – V2G







# DEMAND RESPONSE IN THE VALLEY

## TVA Programs

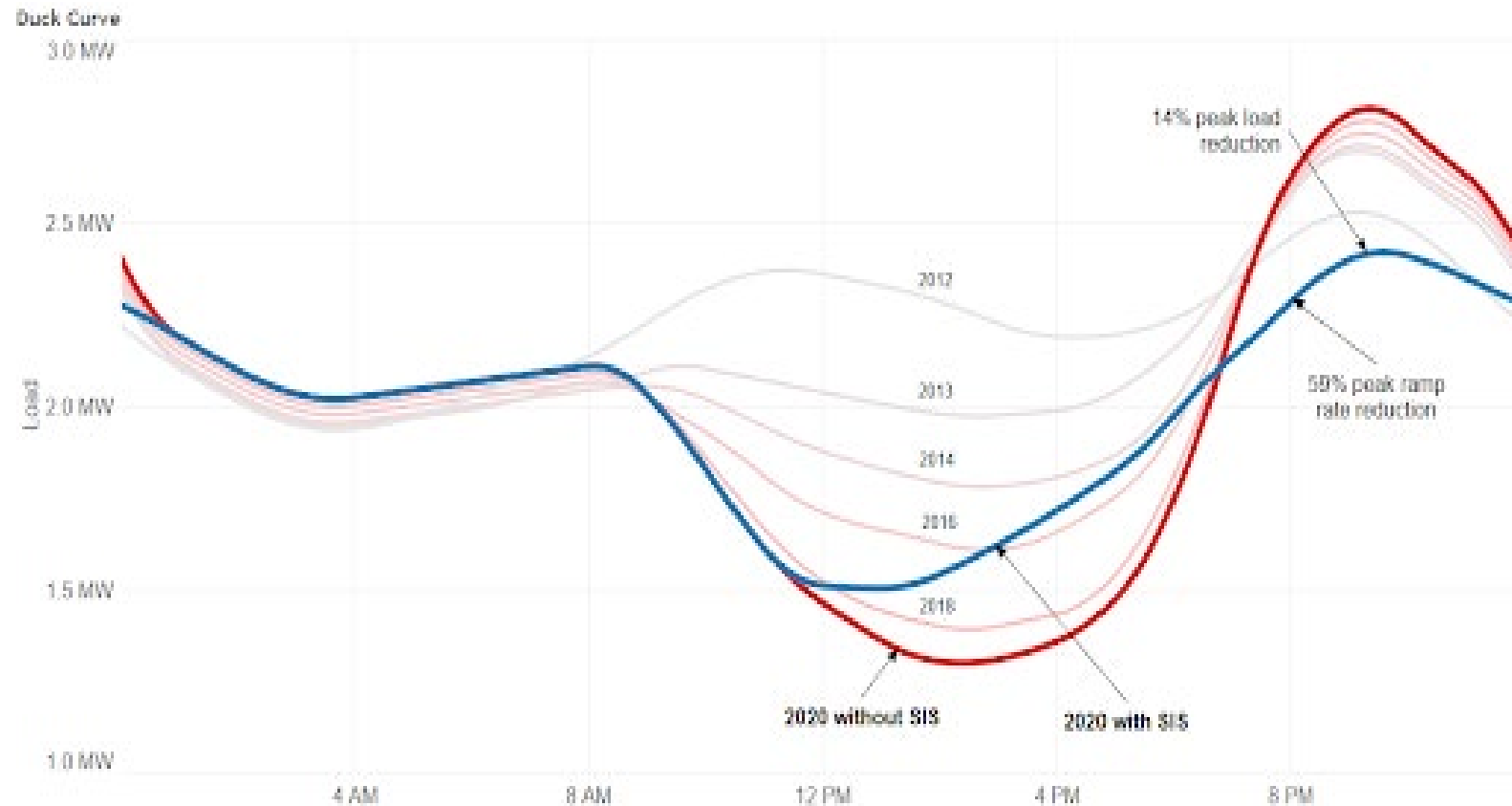
- ▶ Interruptible Power
  - ▶ IP5
  - ▶ IP30
- ▶ Peak Power Partners
  - ▶ EnelX (EnerNoc)
  - ▶ ADR (Seven States Power Corporation)
- ▶ Voltage Optimization



# DEMAND RESPONSE IN THE VALLEY

## Local Power Company Programs

- ▶ Non-direct load control (C&I customers)
- ▶ Direct load control (C&I customers)
- ▶ Water heater peak shaving
- ▶ Smart thermostats
- ▶ Prime power natural gas generators
- ▶ Battery storage
- ▶ Voltage reduction





# DER MANAGEMENT SYSTEM

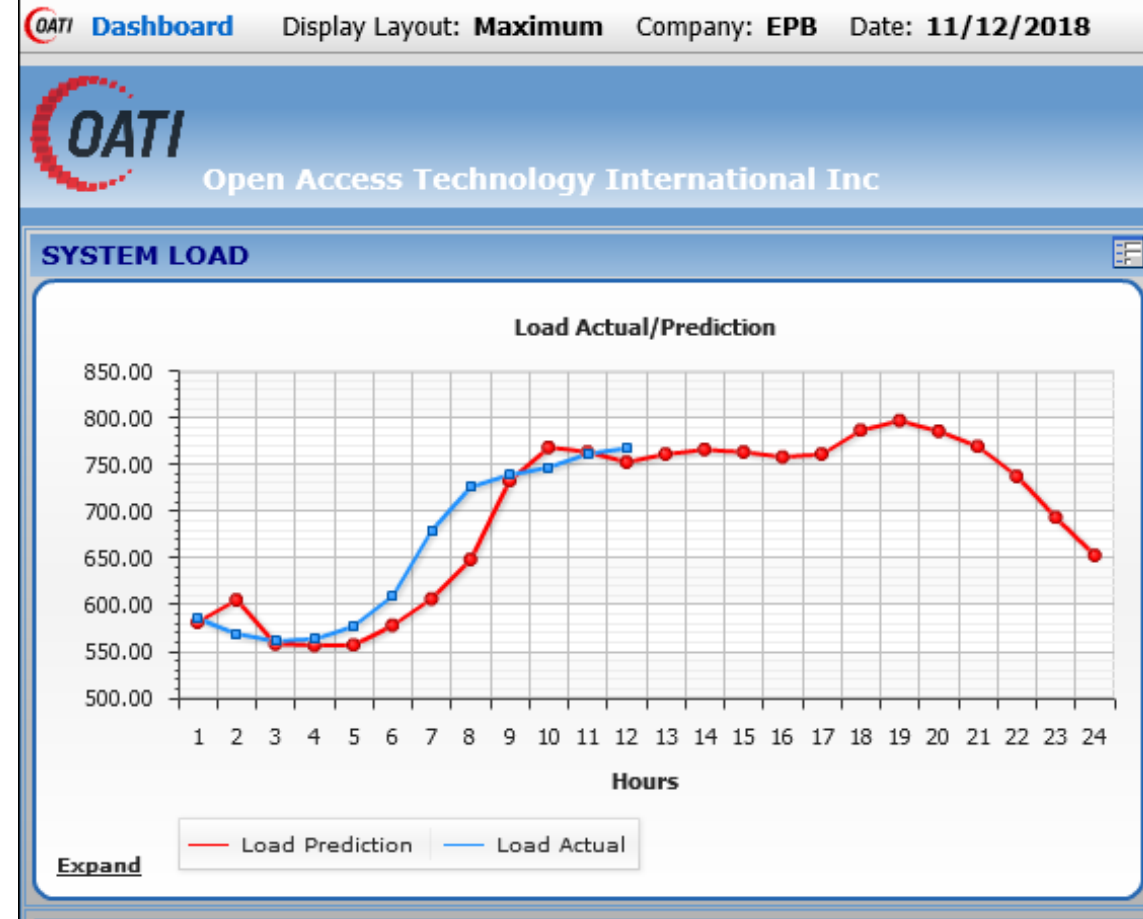
## What is it?

Load management tool to manage a variety of DER programs

- Load forecasting
- Voltage reduction (CVR & DVR)
- Load reduction programs with C&I customers/members
- Control DER assets such as solar, backup generators, battery storage, water heaters, smart thermostats and even EV chargers (V2G)

Can manage LPC developed programs as well as aggregated programs delivered to TVA (ADR)

Potential platform for Valley-wide aggregation



# NEXT STEP

## Valley-wide Aggregation

- ▶ Building the Virtual Power Plant
- ▶ The need to manage demand & energy
- ▶ Requires accurate load forecasting
- ▶ Build a repository of distributed generation (DG) assets with LPCs
- ▶ Develop load reduction programs
- ▶ Identify a tool to aggregate DG & negawatts to build the virtual power plant (VPP)
- ▶ Deliver VPP generation consistently & reliably to TVA
- ▶ Reduces costs for TVA, LPC, & consumer





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