Introduction of Ty Pate

- Ty Pate is the Vice President of Central Region Operations for Calpine. The Central Region, based in Houston, is comprised of eight gas-fired combined cycle plants and six gas-fired cogeneration plants. The total generating capacity of the Central Region is approximately 9,000 MWs, all located within the ERCOT territory.

- Pate joined Calpine in January 2000 as a Project Engineer in the construction group. Since then, Pate has served in varying roles in Calpine Power Operations including; Plant Engineer, Maintenance Manager, and Plant Manager. He was promoted to his current role in June 2022. Prior to joining Calpine, Pate worked seven years as a Mechanical Design Engineer with Utility Engineering (now Zachry Engineering). Pate earned a Bachelor of Science in Mechanical Engineering from Texas Tech University.

Ty Pate
Regional VP – Central Region Operations
Calpine

Winter Preparedness

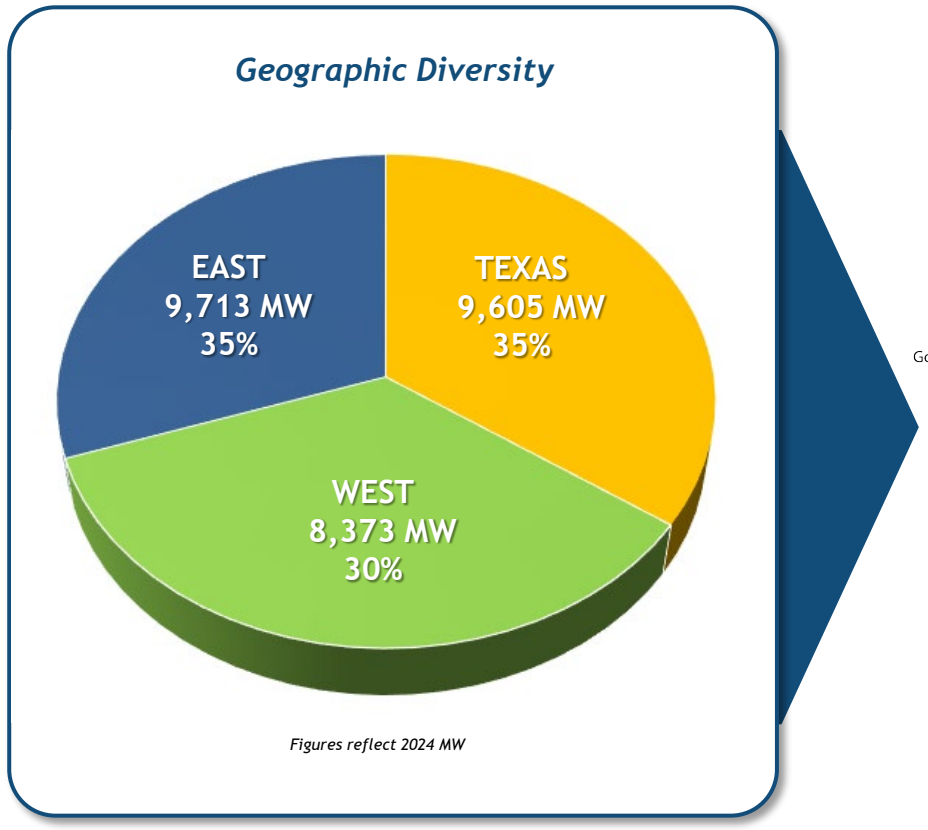
ERCOT
2024-25 Winter Weather Preparedness Workshop

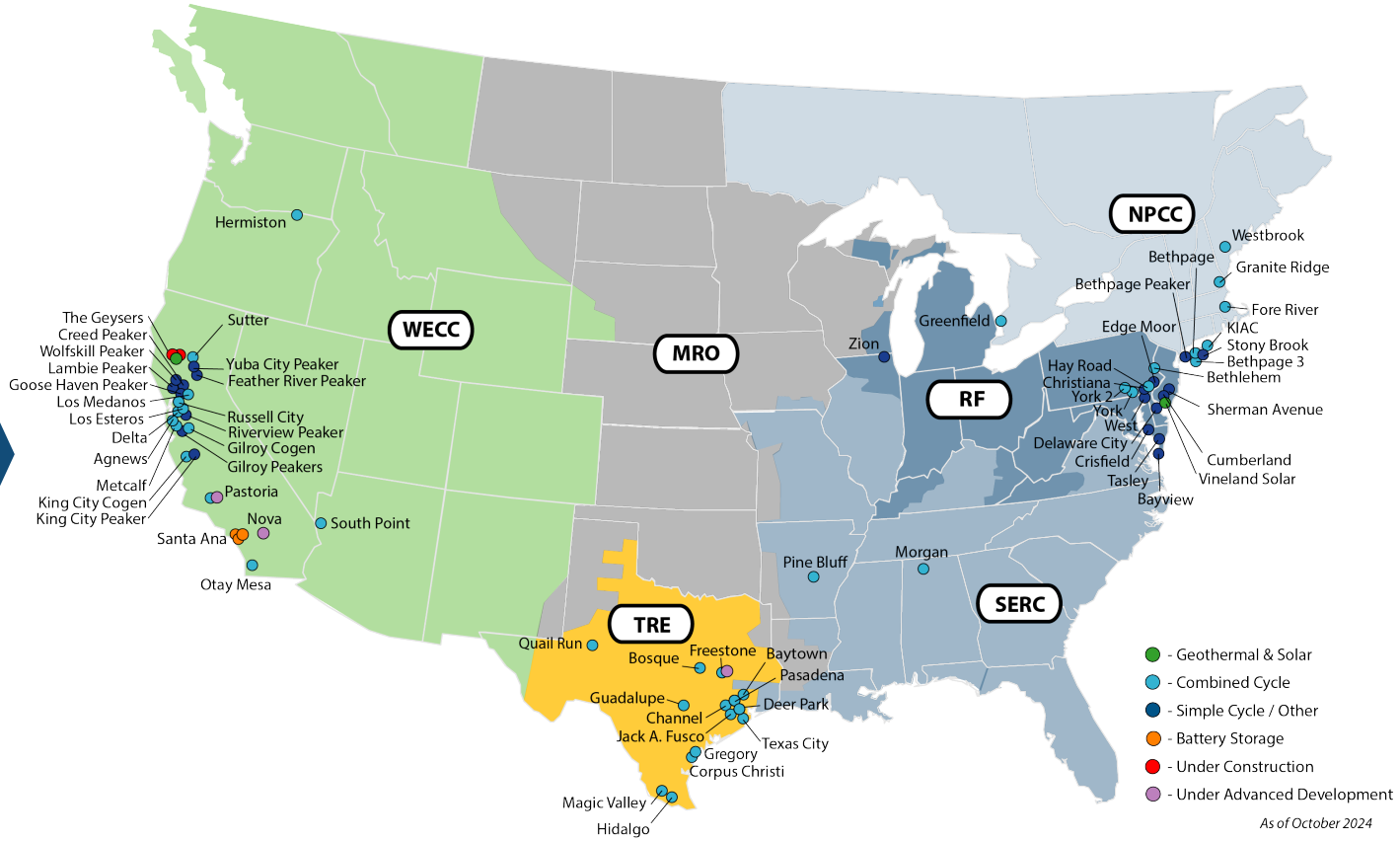
October 28, 2024

Calpine Corporation (National Portfolio ~27,600 MW)

- Geographically diversified portfolio: Scale in America's most competitive power markets
- More than 2,400 employees
- Serve wholesale and retail customers in 22 states, Canada and Mexico
- Largest geothermal power producer in America
- Largest operator of combined heat and power (cogeneration) in America

CALPINE®





Gas Plant Winterization

1. Plant personnel health and safety is one of our core values.

2. Winter weather can present operational issues with sensitive instrumentation and critical equipment at a combined cycle power plant.

3. Operational challenges can exist with, among other things:
   - Process Instrumentation (drum level transmitters, pressure transmitters, etc.)
   - Instrument Air System Dew Points / Valve and Actuator Operations
   - Ammonia systems [for plants with selective catalytic reduction systems (SCRs)]
   - Water and Steam Systems
   - Steam Drains
   - Lube Oil System
   - Cooling Water and Cooling Towers (Icing)
   - Makeup Water Intake Debris Screens
   - Gas Regulation and Pressure Control
   - Combustion Turbine Inlet Filter Icing
   - Chemical Shortages / Supplies
   - Emissions Sampling / CEMs systems

4. Winterization of combined cycle and simple cycle generation facilities should consider several factors, including among other things, the region in which the plant is located, the physical orientation of the facility, design of the facility, age of the facility and the experience of the facility in prior weather events. There is no one-size fits all solution with respect to winterization.

NOTE: *The comments contained herein reflect information gathered from the Calpine from its operational experiences and industry standards. This does not represent the only winterization strategies available. Each GO must individually evaluate its own facilities when establishing winterization plans.*

Combined Cycle Power Plant - ERCOT

Combined Cycle Power Plant – CA ISO

Combined Cycle Power Plant - NE ISO

Winter Readiness Sample Timeline

Winter Readiness Plans begin well in advance of Winter:

1. Post-Winter meeting to review issues and incorporate lessons learned into the Winter Readiness Plan and the Winter Operations Procedures (March-April).
2. Initial Site-Specific Pre-Winter Readiness Meetings (May - July):
   - Review the implementation of the Plant Winter Readiness Plan and plan work
3. Final work scope and winterization work plan is in place (August - September).
4. Site-Specific Winter Operation Procedures reviewed and updated based on lessons learned, equipment additions, and any new industrial best practices (October).
5. Complete training on Winter Readiness for plant personnel (November).
6. Site-Specific Pre-Winter Readiness Reviews and Certification of Readiness (typically November).
7. Winter Preparations, including training completed by December 1.

Samples for Gas Plant Readiness

1. Document the minimum plant design operating temperature to determine the lowest ambient temperature at which the unit can reliably operate without a forced outage or forced derate.
2. Review any modifications performed to the plant over the past years to assure these modifications meet the minimum plant design operating temperature or historical minimum operating temperature, or if different, document the minimum temperature limitations of these modifications.
3. Review of the past winter's issues and experience with any equipment freezing; review fleet lessons learned; review other ISO lessons learned; and review NERC lessons learned.
4. Review annually and identify any critical equipment that may be impacted by cold weather.
5. Identify what type of heat tracing is used for the critical equipment and develop and perform annual preventative maintenance for the heat tracing systems prior to winter.
6. Document the maintenance performed on the instrument air system: How moisture is removed? What is the design dew point? How dew point is monitored? Is installed dew point meter accurate?
7. Perform a walkdown of the critical equipment and identify areas of insulation that should be considered for repairs prior to winter operation. Inspect insulation on monthly basis during Winter Period.
8. Check inventory of necessary consumables and supplies on a monthly basis.
9. Test portable heaters and equipment in storage.

Samples for Gas Plant Readiness

11. Complete all PM/CM Work Orders for Winter Readiness
12. Test permanent building space heaters.
13. Test heat tracing systems as well as test circuits monthly during the winter period.
14. Check glycol concentration in all closed loop cooling water systems to ensure that the fluid freezing point is at or below the site minimum design temperature.
15. Prepare for installation of temporary wind breaks, position temporary heaters.
    - If tarps are used, make sure heavy-duty material that will last for the entire winter period.
    - Inspect windbreaks on a monthly basis to ensure they remain intact.
16. Repair any leaks on outside critical components that may be subject to freezing.
17. Check transformer and high voltage bushing oil levels prior to winter period and monthly during winter period.
18. Drain all non-critical systems (e.g., compressor water wash, evaporative coolers, chillers, etc.).
19. Confirm available power supplies for heaters are tested.
20. Check and inspect all safety showers and eye wash stations for proper freeze protection operation.

Winter Readiness Training

1. Conduct site specific training (Plant Level)
2. Conduct Operational Drills at each facility (Plant Level)
3. For Cogen Facilities – Communicate scenarios/responses with hosts.

Winter Readiness Event Staffing

1. Calpine's value system is the safety of our employees, preservation of the environment, and protection of the equipment. Accordingly, keeping our employees safe during an event is the first concern and will drive our behaviors.

2. Salting and sanding of the site is performed as required using direct or contracted staff.

3. Employee Sequestration at the Site.

4. Contractor Supplemental Staffing

5. Managers and plant support are broken into two 12-hour shifts for around the clock coverage with a manager leading each shift.

6. Off-site support.

Examples of Equipment Retrofits

1. Calpine utilizes an experiential process that assesses plant performance at the end of each winter season and conducts more advanced analysis when new, low temperature / windchill conditions are achieved.
2. Critical System Reviews
3. Windbreaks and Enclosures upgraded to protect critical systems, floors and roofs included where required.
4. As an option at some facilities, heated enclosures were added to the top of the HRSG at specific locations to allow personnel to get out of the weather and warm up (minimizes exposure time in the elements).

Examples - Wind Breaks & Enclosures

Examples - Heated Instrument Enclosures