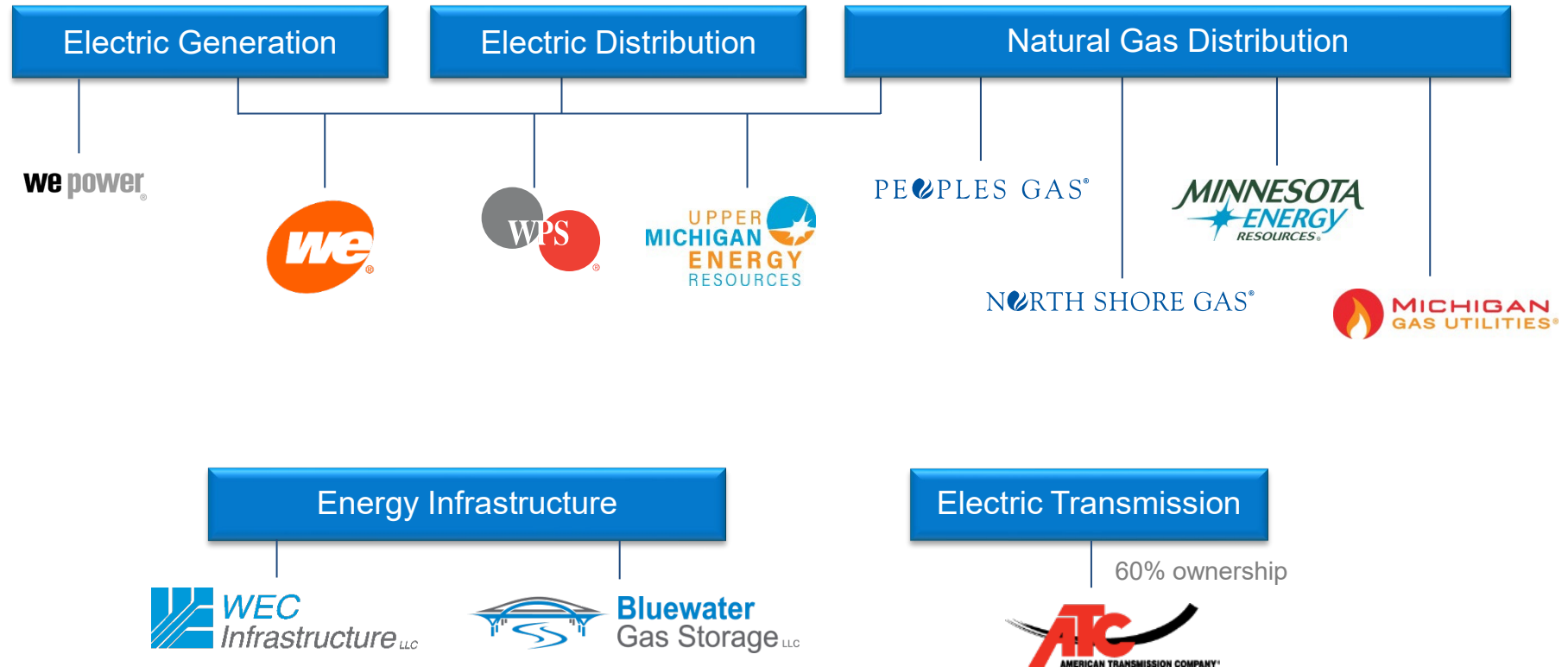




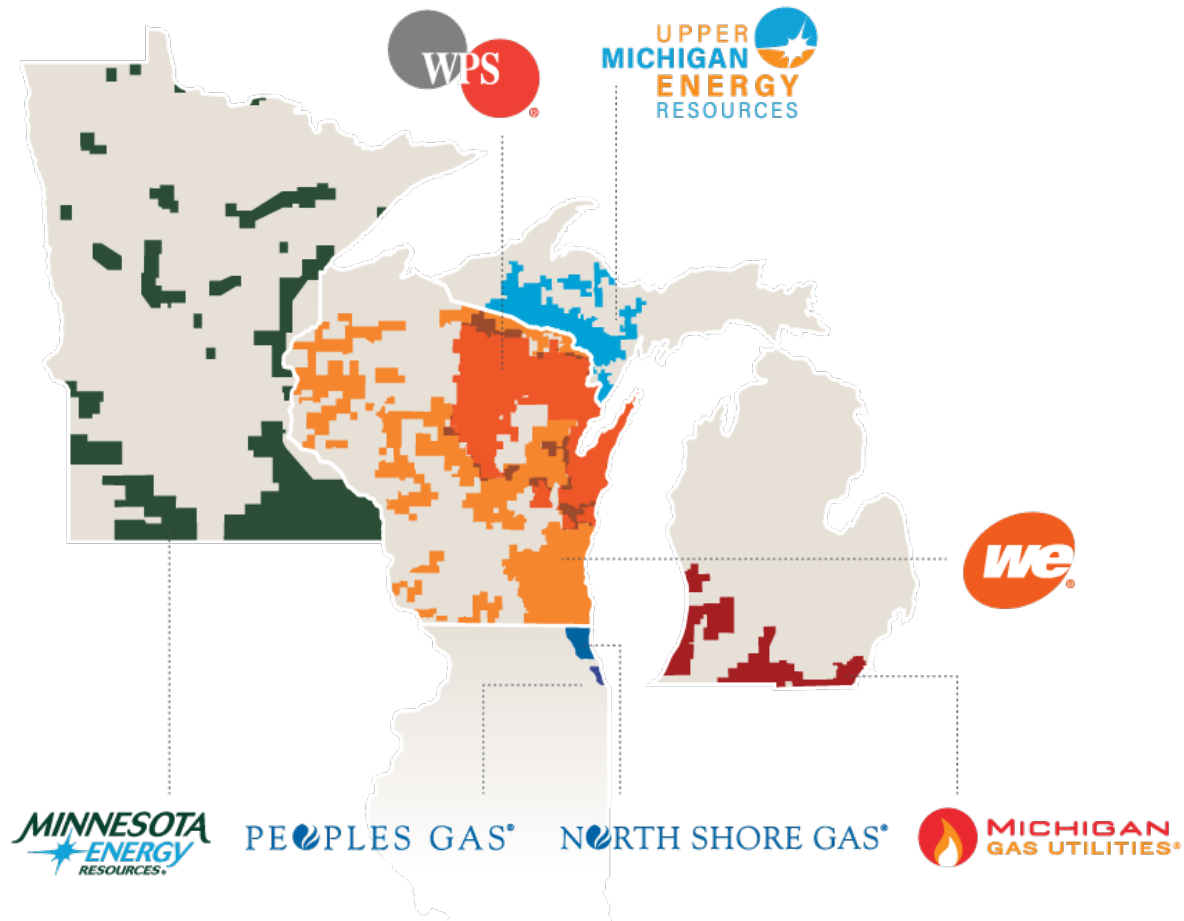
**WEC Energy Group
Winterization Practices at
Generating Facilities
Clarice Zellmer
July 18th, 2022**



WEC Energy Group



Serving the region's energy needs



4.6 million
customers

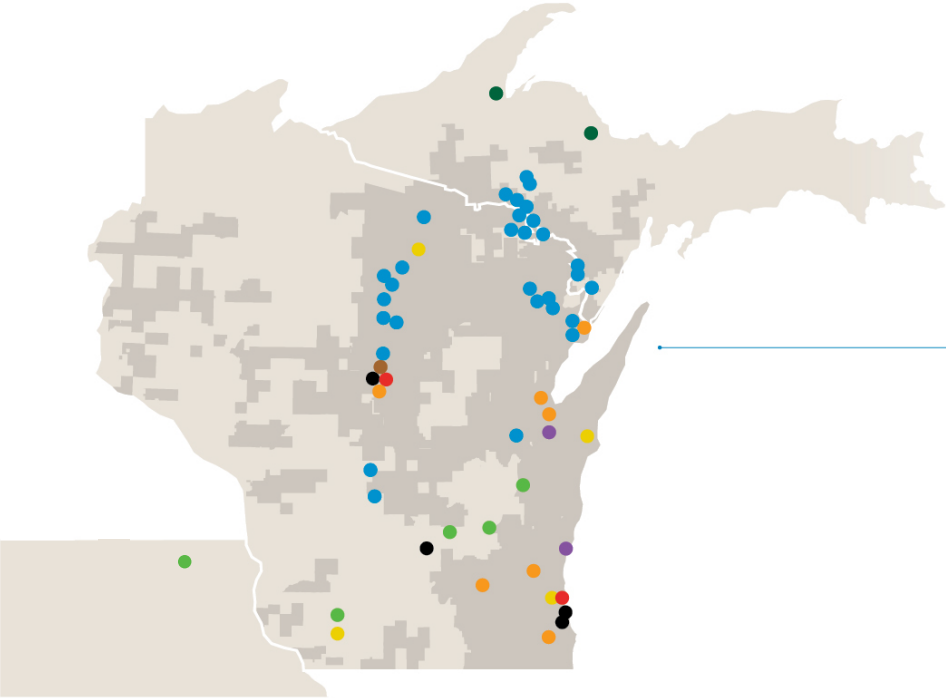
71,400 miles
of electric distribution

52,100 miles
of natural gas
distribution and
transmission lines
(including mains)

7,700 megawatts of
power capacity

7,000 employees

Generation facilities



- Biomass (fluidized bed boiler): 1
- Coal: 4
- Combustion turbine: 7
- Combined cycle: 2
- Gas-driven steam turbine: 2
- Hydroelectric: 30
- Reciprocating internal combustion engine: 2
- Wind: 5
- Solar: 4*

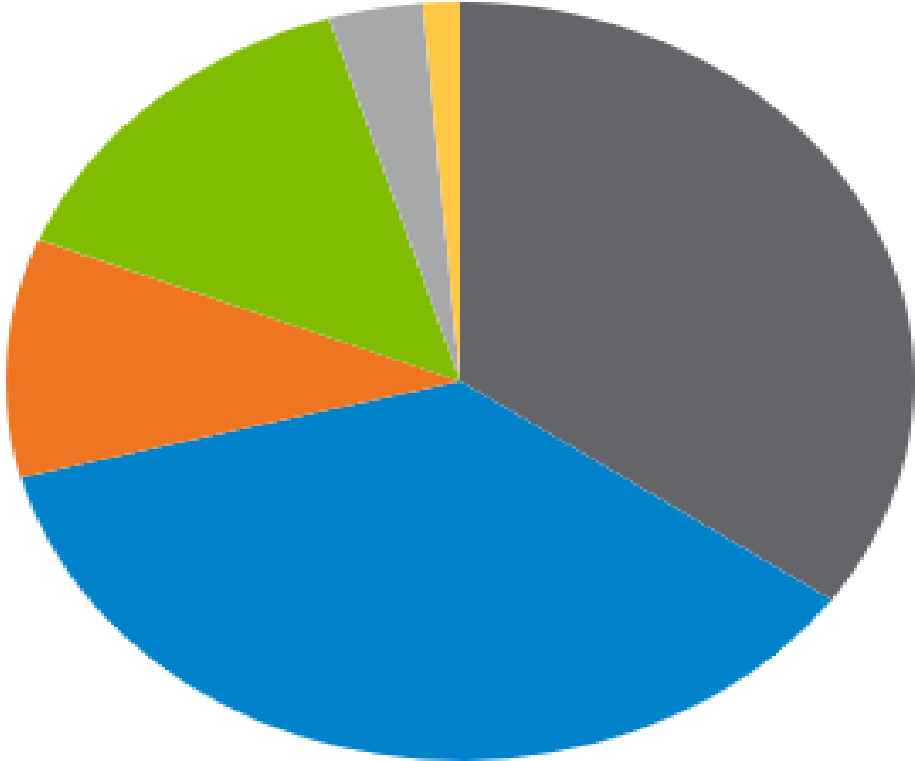
As of March 2022

* Consolidates multiple Solar Now projects in the Milwaukee area



16-Jun-2022 - Interval 16:20 EST

Total Megawatts: 107,982



- Coal (37,686 MW)
- Natural Gas (39,163 MW)
- Nuclear (11,013 MW)
- Wind (15,446 MW)
- Other (3,632 MW)
- Solar (1,426 MW)



Cold Weather Preparedness



“Ensuring reliability and resiliency of the Bulk Power System”



February 2021 Cold Weather FERC-NERC Report

- 1045 Generating Units Affected
 - 58% gas; 27% wind; 6% coal; 2% solar; 7% other
- 4124 Unplanned Outages, Derates, Start-up Failures
- 1823 Freezing Failures (44%)
- 1293 Fuel Issues (31%)
- 870 Mechanical/Electrical Issues (21%)
- 61 Transmission System issues (2%)
- 4.5 million people lost power

Generator Facility Preparedness

- GO to identify and protect critical components
- Enclosed Facilities easier to protect
- Wind Turbines: invest in cold weather options
- Fuel Supply adequacy (gas and coal)
- Proper training is critical to preparedness
- Communicate generator Availability/Capacity
- Lessons Learned and Corrective Action Plans

WEC Reliability Strategy:

Compliance + Best Practice

WEC Winterization Program

- Well-established Procedure
- Work Management (checklists and PMs)
- Technical Oversight and Consultation
- Routine communication with Power Ops/MISO
- Lessons Learned and review of previous issues
- Participate in industry audits and discuss results

Winterization Checklist-Example

Start Date: _____

Date Completed: _____

WINTERIZATION CHECKLIST TO BE COMPLETED BEFORE 10/01 OF EACH YEAR

Initials

- _____ Check all doors for weather stripping.
- _____ Check all windows and replace broken or missing panes and weather stripping.
- _____ Check all doors for salt and shovels.
- _____ Check snow blowers for fuel levels and operational readiness.
- _____ Check fuel tank levels.
- _____ Check Tool Cat snow plowing attachments, bucket, sweeper, snow blower & salter.
- _____ Install plow on truck.
- _____ Check ammonia pump house heaters.
- _____ Check gas trip valve building heaters.
- _____ Check switchyard control house heaters.
- _____ Check all motorized plant entrance gates for proper lubrication and smooth operation.
- _____ Complete Block 1 inlet cooling winterization.
- _____ Complete Block 2 inlet cooling winterization.
- _____ Maintain proper recirc temp. on plant intake.

Winterization Checklist-Heater Checks

Electric Heating Units

Inspection to Include:

Fan Functionality

Heating element operating

Unusual conditions, mounting, pluggage, corrosion, etc

Local Control switch set to ON, temp setting as required

Thermostat is located on back of heater.

Heating Unit Number	Location	Serviceable	Notification #
0-VS-EHU-4	South Storeroom Wall, East Heater	Yes <input type="checkbox"/> No <input type="checkbox"/>	
0-VS-EHU-3	South Storeroom Wall, West Heater	Yes <input type="checkbox"/> No <input type="checkbox"/>	
0-VS-EHU-2	North Storeroom Wall, West Heater	Yes <input type="checkbox"/> No <input type="checkbox"/>	
0-VS-EHU-1	North Storeroom Wall, East Heater	Yes <input type="checkbox"/> No <input type="checkbox"/>	
0-VS-EHU-10	Storeroom, Between Inner and Outer Roll Up Doors	Yes <input type="checkbox"/> No <input type="checkbox"/>	

Lessons Learned Tracking Spreadsheet

Winter Season	Plant / Site	Cold Weather Event	Lesson Learned
2020-2021	XXX	Unit failed to start when called upon to run for dispatch.	The lube oil temperature was very cold due to the low ambient temperature and the fact that there are no heaters on the sump. We are looking at heater options.
		Experienced incidents of failing to successfully run a unit due to cold temperatures that prevented the unit from transitioning through the different combustion modes.	It was determined that the unit was not tuned properly for the extreme cold temperatures. We have since changed out the control system and will be performing seasonal tuning as needed.
		Had a unit trip due to low gas pressure as a result of an off site gas regulating station not repsonding properly.	Not much that we can do from a site perspective given that we don't have control over an extenal device.
2020-2021	XXX	The gas was curtailed due to extreme cold weather which required site to run on fuel oil for nearly a week. This requires additional water injection, which is the weak point. We have limited water storage capabilities and ability to make up demin water.	We need to develop a better means of making and storing demin water to allow for long duration runs during the cold weather.
2020-2021	XXX	A Buchholz relay become activated do to low oil level in the transformer. Prior to the cold weather the oil level was on the lower side of the level but still acceptable.	The colder temperature had an effect on oil level that brought up the Buchholz alarm. With this alarm up we could not use the transformer until we resolved this issue. We have since created a PM to ensure oil levels are checked and acceptable prior to cold weather.
2021-2022	XXX	No real event just lessoned learned	Added to Comple Trash Rake PM & Cable Replkacement to Winterization Check list
		No real event just lessoned learned	Establish PRE & PRV Operations Based on Checklist 47B
2021-2022	XXX	No real event just lessoned learned	Added to Winterization checklist <ul style="list-style-type: none"> • Close House Service water supply to valve house (valve# 2WH114, el. 6, east wall) and drain lines
		No real event just lessoned learned	Added to Winterization checklist <ul style="list-style-type: none"> • Ensure all REXA ID fan damper drive heaters are on and in good working order.

WEC Lessons Learned examples

Examples of Lessons Learned:

- Wind turbine min temp auto shutdown @ -20 deg F (communicated to MISO >24 hours prior)
- CT gas curtailed + Fuel Oil supply/start issues
- Solar: frozen tracking modules 1st winter season
- Temporary enclosures w/heaters in key locations
- Freeze protection for units in outage

NERC Cold Weather Compliance 04-01-2023

Multiple standards with additional requirements

- EOP-011-2 (PG = Generator Owner)
- IRO-010 + TOP-003 (BA/RC/TO)

Purpose: To enhance the reliability of the BES during cold weather events by ensuring Generator Owners, Generator Operators, Reliability Coordinators, and Balancing Authorities prepare for extreme cold weather conditions.

NERC Standard changes 04-01-2023

- Implements site Min. Design Temp (or...)
- Renewed emphasis on capability/availability
- Report fuel supply/inventory concerns
- Notification of “current and projected conditions” to BA/RC (MISO thru Power Ops and SRS)
- New site training requirements
- Additional NERC Standard changes are expected (Project 2021-07)

WEC Strategy-Cold Weather and Reliability

- Leverage existing program strengths (work management and Lessons Learned)
- Establish and track min operating temp + system limitations for each unit/site
- Centralize and improve PMs and checklists
- Adjust communications with BA/RC per MISO
- Training on new procedure + review of site specific information (situational awareness)
- Implement changes this year; adjust by 4-1-23



Questions?

