The Road to Resilience

Living with Climate Change: Surviving the Polar Vortex In a Warming World

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Wisconsin Office of Energy Innovation

2018 Flooding HWY 2 WI

Wisconsin State Journal

Friday

March 5 1976

Madison, Wisconsin

46 pages ★★★ 15 cents

Storm ties up city

Mayor decrees an emergency

It's bad all over Midwest

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A Brief History of the Office of Energy Innovation: Home of Wisconsin's State Energy Office

- 56 Energy Office (50 states 6 territories)
- Energy Policy & Conservation Act of 1975
- Each state is required, under 42 U.S.C. § 6323(e)(1), to submit an energy emergency plan that it will utilize in the case of an energy supply disruption.
- Moved in 2015 to PSCW, (ch. 16.955 Department of Administration, State Planning and Energy has been updated to Ch. 196.025(7) as of January 2018.

Chapter 196.025(7) Information.

"**(7)** State energy office.

(a) The commission shall do all of the following:

1. In cooperation with the other state agencies, collect, analyze, interpret, and maintain the comprehensive data needed for effective state agency energy planning and effective review of those plans by the governor and the legislature.

2. Administer federal energy grants, when so designated by the governor pursuant to s. 16.54.

3. Prepare and maintain contingency plans for responding to critical energy shortages so that when the shortages occur they can be dealt with quickly and effectively.

(b) The commission may provide technical assistance to units of government other than the state to assist in the planning and implementation of energy efficiency and renewable resources and may charge for those services. The commission may request technical and staff assistance from other state agencies in providing technical assistance to those units of government.

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Wisconsin's Efforts to Build Resilience

Threats we face- from methane emissions to flooding to derechos, tornadoes, ice storms, and the polar vortex.

The last two decades have been the warmest on record in Wisconsin and the past decade has been the wettest. **Extreme events** are already causing immense disruptions across the state and impacting health, economy, and natural resources.

Effective collaboration is the only way to facilitate the change that we need to foster – sooner than later!

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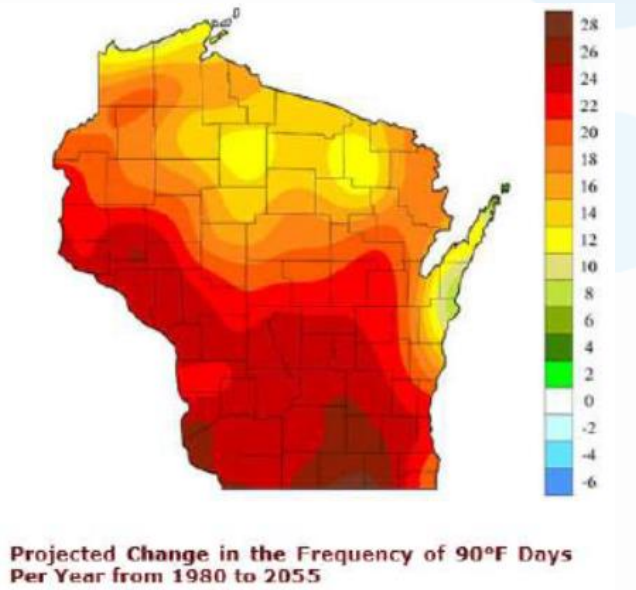
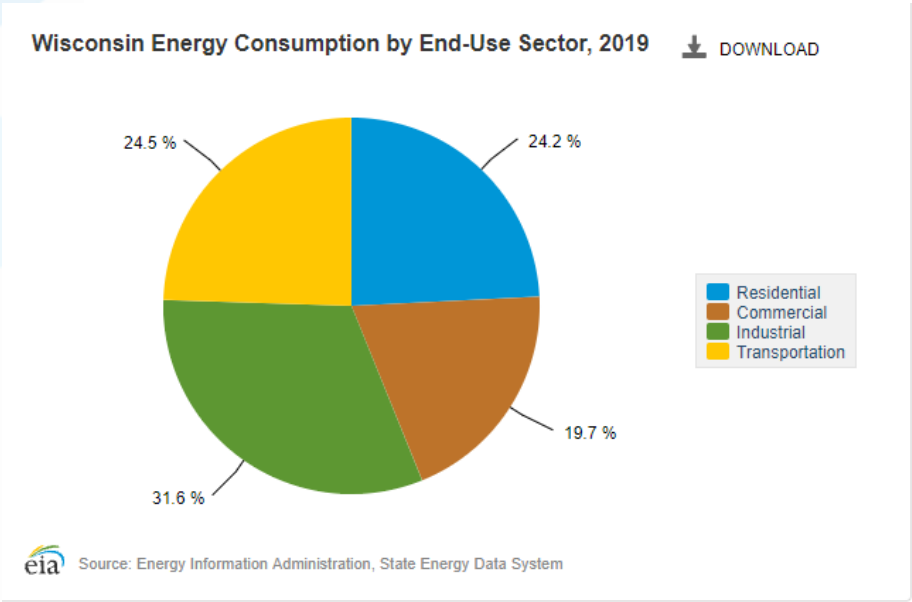
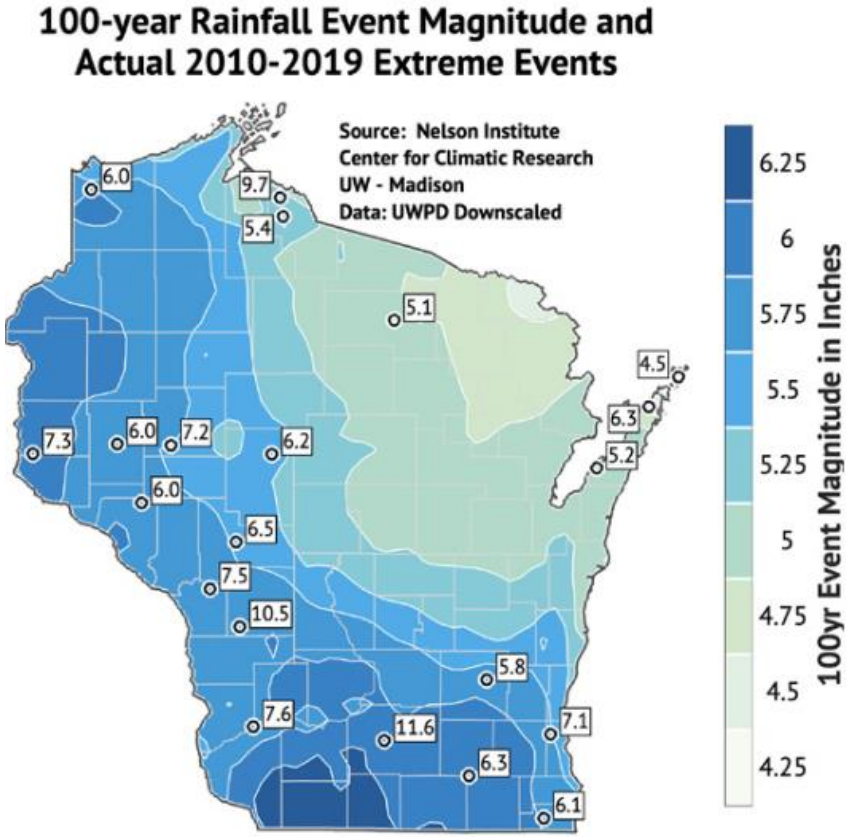
The $14 Billion Problem

- *Wisconsin consumes 6 times more energy than it produces.*
- *Despite a warming climate on the whole, Wisconsin will have thermal needs that are difficult to satisfy as well as more cooling load in the summer.*



Projected Change in the Frequency of 90°F Days Per Year from 1980 to 2055





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A Brief History of OEI Programs Promoting Resilient Communities

ENERGY INDEPENDENT COMMUNITIES PROGRAM

"Generate 25% of Wisconsin power and transportation fuels from renewable resources locally by 2025"

- **150 Energy Independent Communities**
- **50 Communities received grant funding for creating sustainable energy plans for government operations in 2009 and 2010. More communities have written plans in the ensuing years. Updated goals- 100% carbon free**
- **Encompasses 3.41 million people**
- **58.7% of Wisconsin's population**

Municipal Energy Efficiency Technical Assistance Program- MEETAP

Petroleum Shortage Contingency Planning

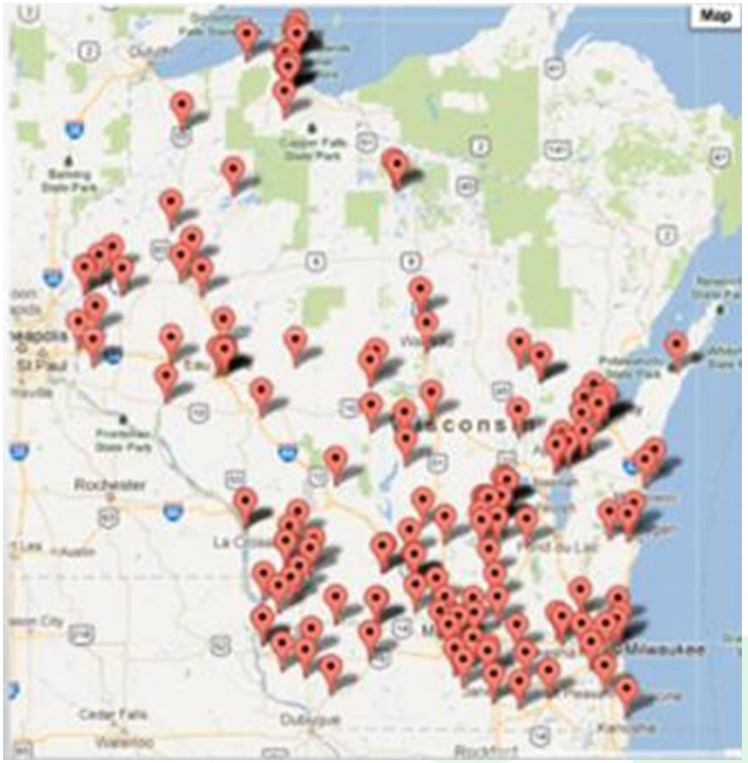
Energy Security Planning and Response

Focus on Energy Ag/Propane Incentive Program

Statewide Assistance For Energy Resilience and Reliability

SAFER2

- **Recruit Tribes and Communities to update emergency plans and participate in "deep-dive analysis"**
- **Deep-dive components (customized to participants' needs and goals):**
- **Wisconsin Clean Cities Alternative Fuel fleet assessment**
- ***Micro-grid feasibility study of critical infrastructure***



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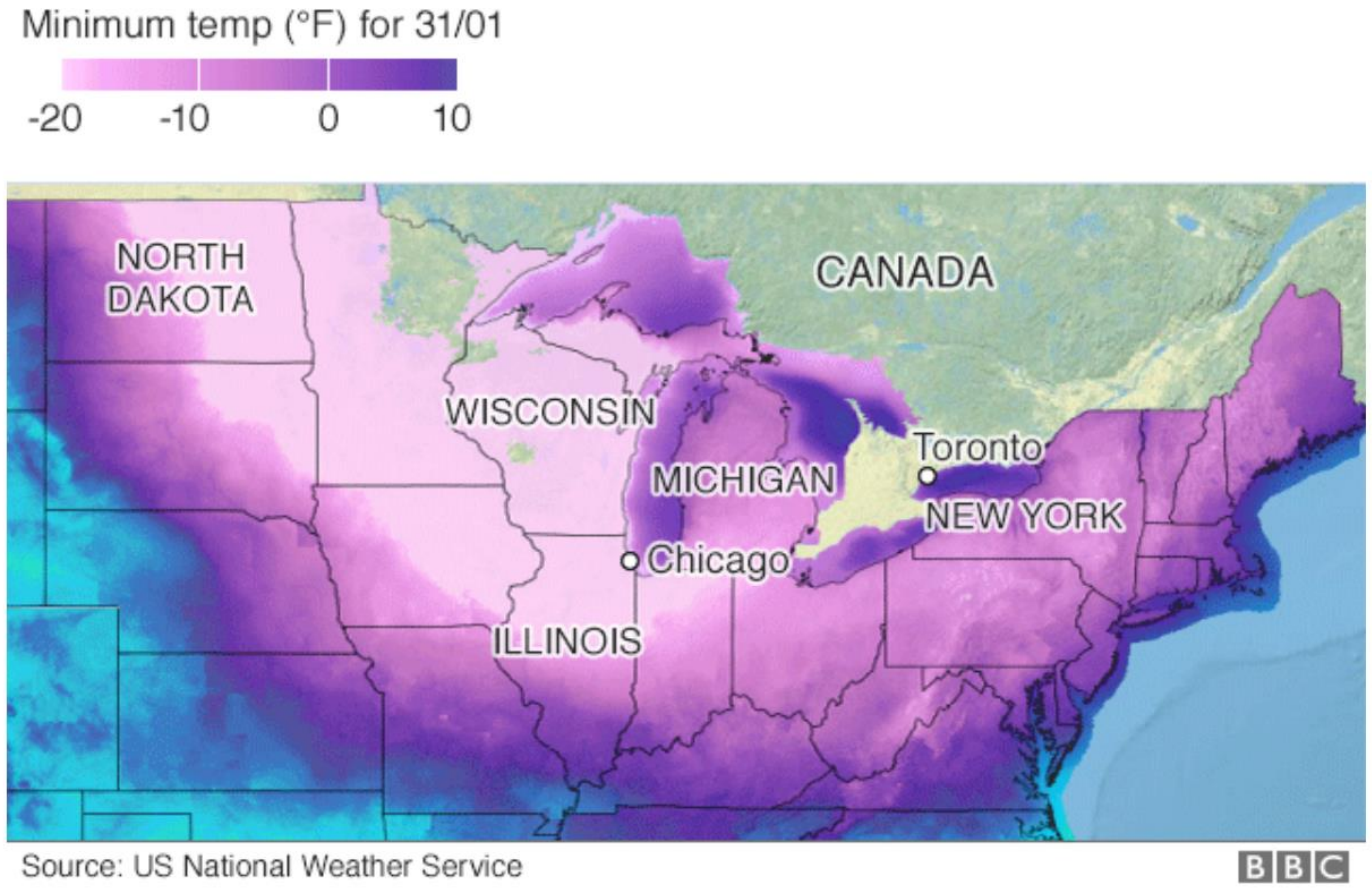
2014 Polar Vortex and Associated Energy Emergency



- ❑Bumper Corn Crop
- ❑Late harvest (lots of rain)
- ❑Low propane inventories due to increased exports
- ❑Reversal of key pipeline that brought LP to MN
- ❑POLAR VORTEX

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2014 Polar Vortex – Deepest Cold Temperatures

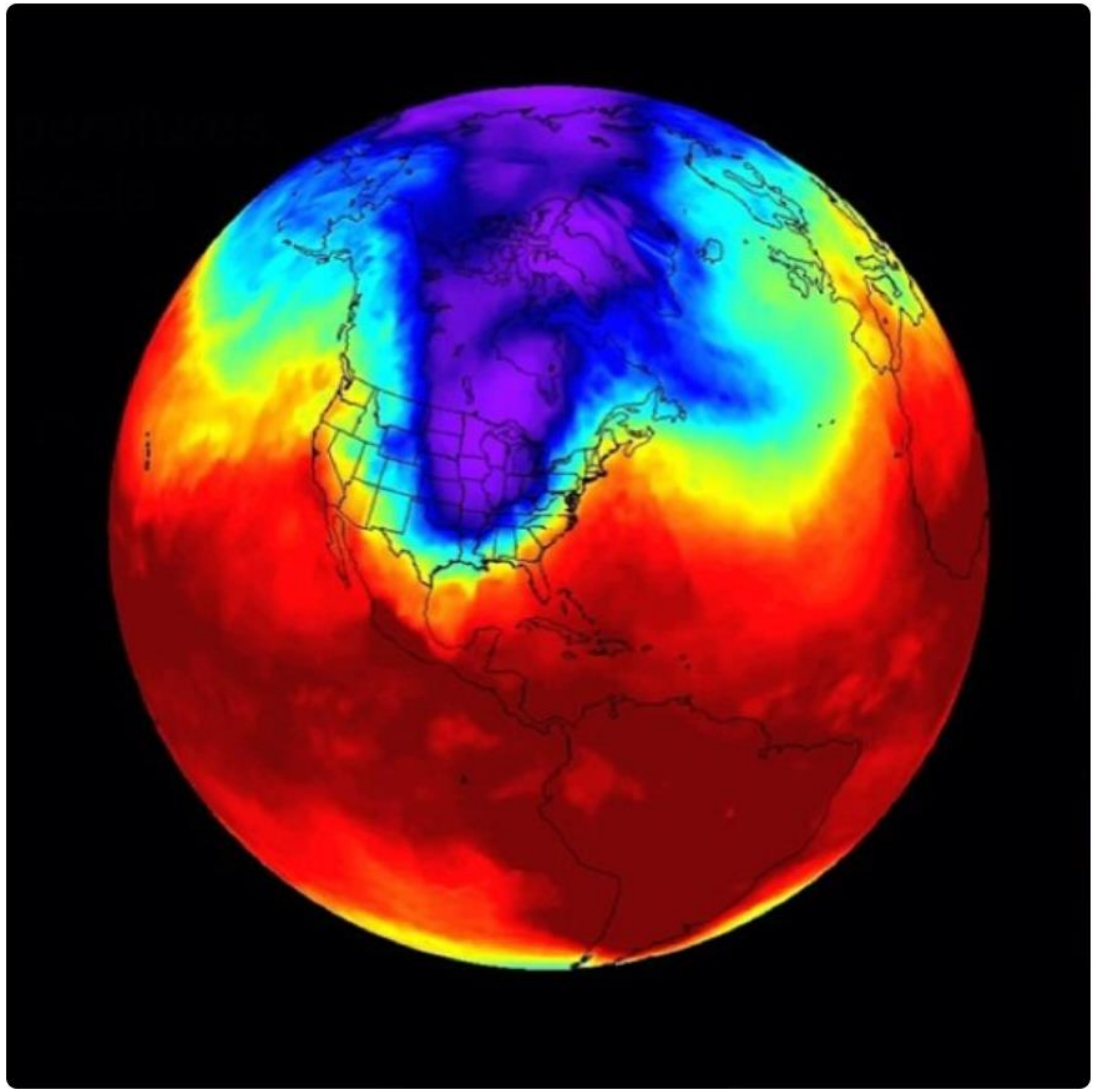

Image credit: NASA

- **Price for LP hit $5/gallon (record high) wholesale at Conway, Kansas hub.**
- Trains can't use brakes in extreme cold weather (40% or more LP in Wisconsin delivered via rail)
- 260,000+ residents use LP for home heating, 26,000 low-income/vulnerable

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2019 Polar Vortex – MISO Emergency- NG curtailment

- Infrastructure designed for bitter cold temperatures.
- Insulated wind turbines, heat traced pipes
- Crushers to break up piles of coal
- 11 deaths directly related to temperatures, record lows including -55 F wind chill

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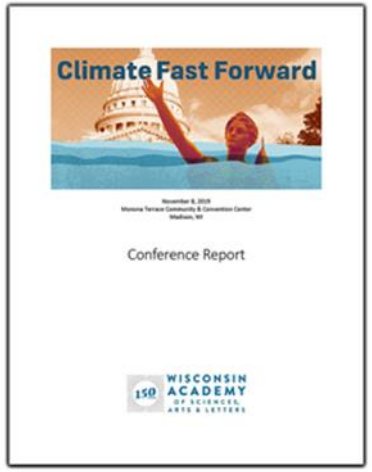
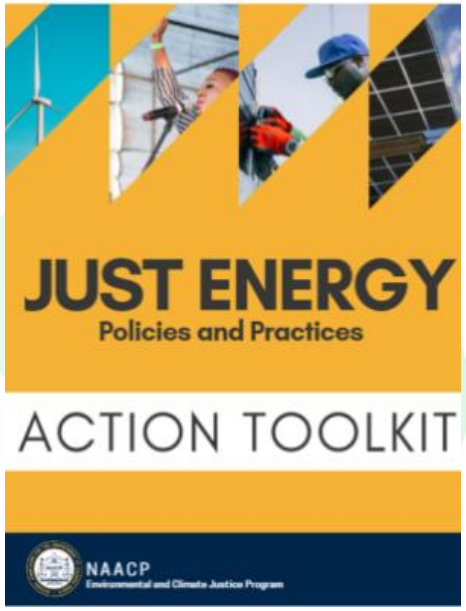
Energy Justice is a Critical Component of Energy Security

Figure 1 Wind events July 2019 https://www.weather.gov/grb/071919_severe_event



Energy Storage for Social Equity Initiative -- https://www.pnnl.gov/projects/energy-storage-social-equity-initiative



https://www.naacp.org/climate-justice-resources/just-energy/

2010 San Bruno Pipeline Explosion

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Energy On Wisconsin

OEI Extension UNIVERSITY OF WISCONSIN-MADISON Wisconsin Office of Energy Innovation

Critical Infrastructure Microgrid & Community Resilience Center Pilot Grant Program

- **The Pilot Grant Program (CIMCRC)** design details were established by the Public Service Commission in an open meeting on April 15, 2021

- **Federally Funded** through U.S. Department of Energy by the State Energy Program

- Program Design Memorandum staff researched programs in:
  - New York (NY Prize)
  - Connecticut
  - New Jersey
  - Rhode Island
  - Maryland
  - Massachusetts

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Strategic Objectives

- **Energy Security:** Foster critical infrastructure security and resilience, improving the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents.
- Prioritize reliability and resilience benefits (during outages not caused by events beyond a utility's control) and benefits of avoiding major power outages (i.e. outages caused by major storms or other events beyond a utility's control).
- **Clean Energy Equity:** Help provide equitable access to the benefits of clean energy, efficiency, and preparedness by reaching broad applicant types. This includes applicants who may traditionally face barriers to adopting clean energy solutions and the benefits they provide, or whose communities may be disproportionately impacted by the negative effects of traditional fossil fuel and inefficient energy systems.

Critical Infrastructure Microgrid & Community Resilience Center Grant Program

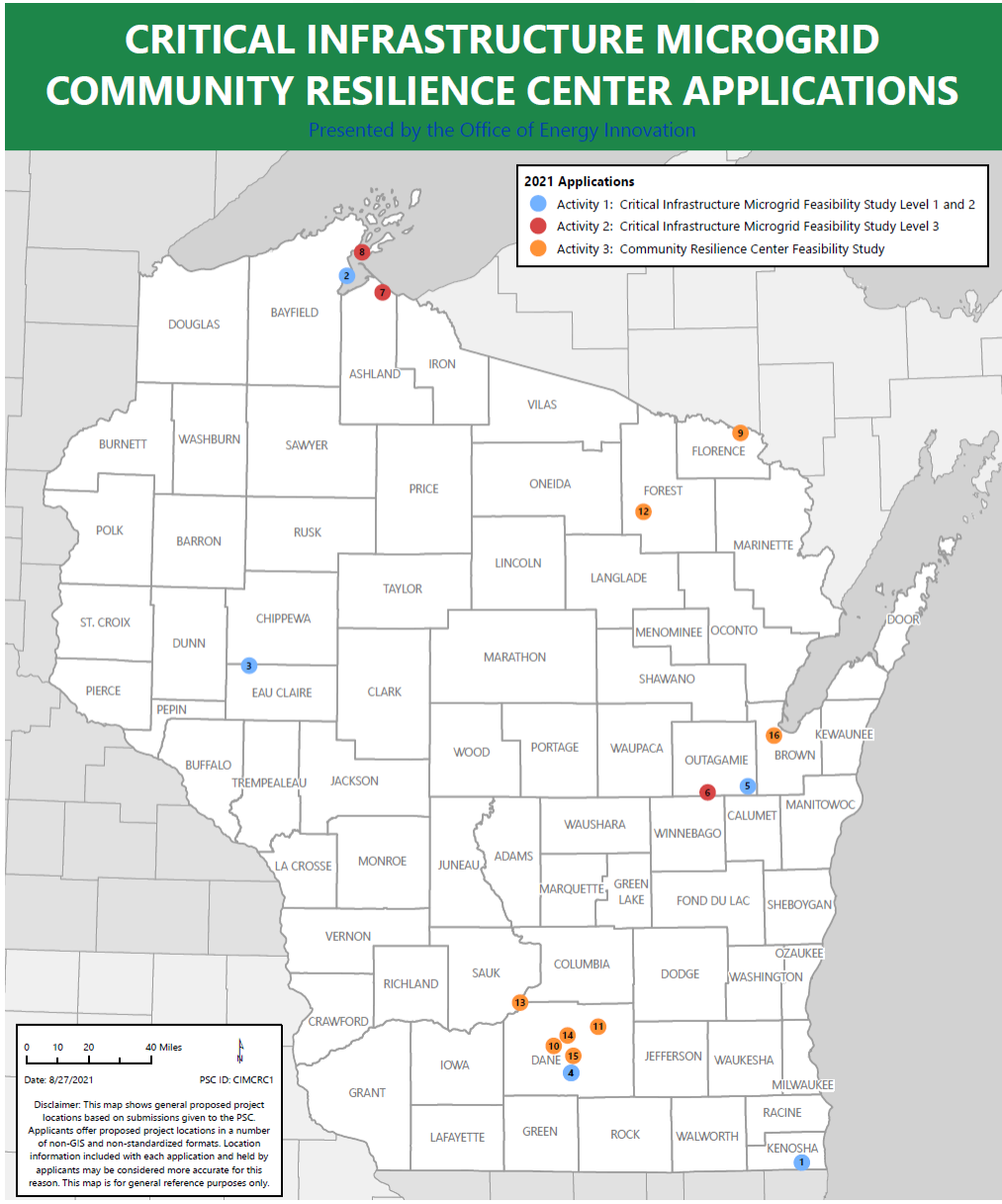
15 projects funded to study the feasibility of Microgrids for resilience across Wisconsin:

Projects include:

Hospital, Airport, Police Operations Center, Business Park, Mobile Microgrid, Mini-grid (combination of 3 microgrids), Water Treatment Facility, Wastewater Treatment Facility, and more!

$915,000 awarded

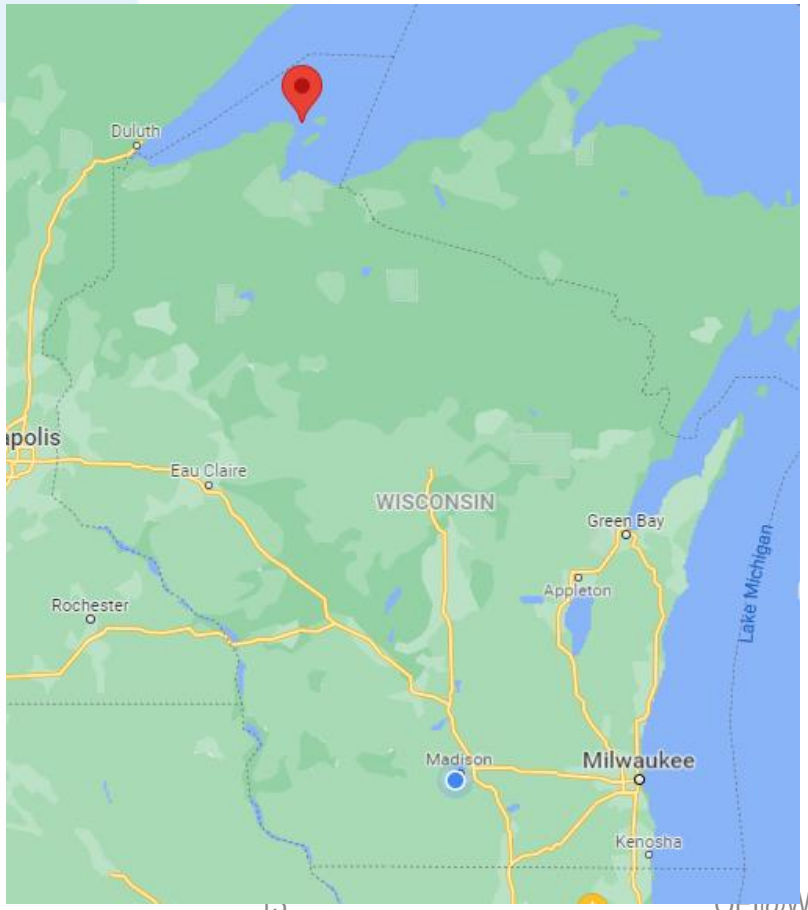
Docket# [9705-FG-2020]

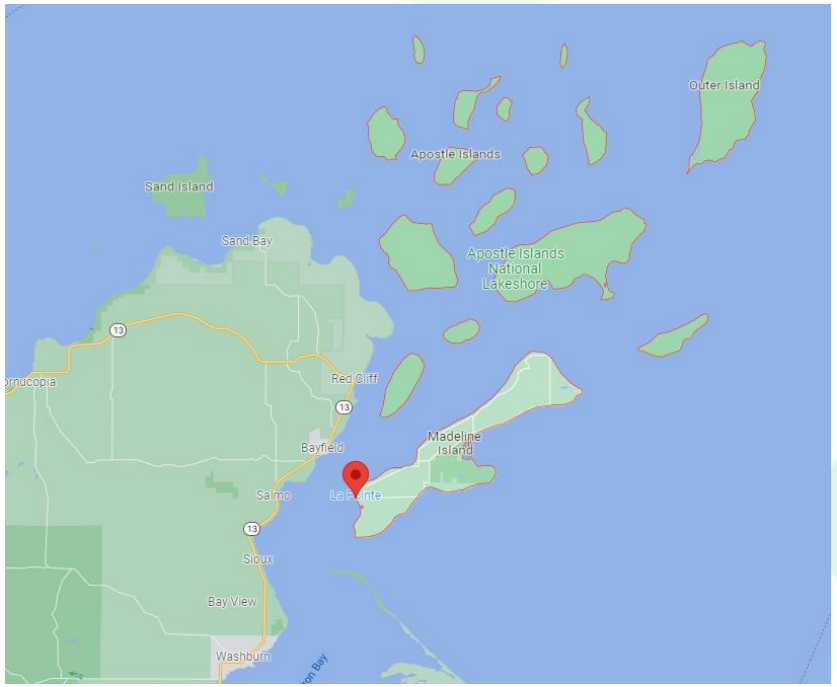


Town of La Pointe Microgrid Feasibility Study

Level 3 Critical Infrastructure Study:

Remote community located on Madeline Island, part of Apostle Islands National Lakeshore





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Town of La Pointe Microgrid Feasibility Study

Level 3 Critical Infrastructure Study:

Key to the project- existing DERs and propane generators- considering lithium-ion battery storage, controls, solar.

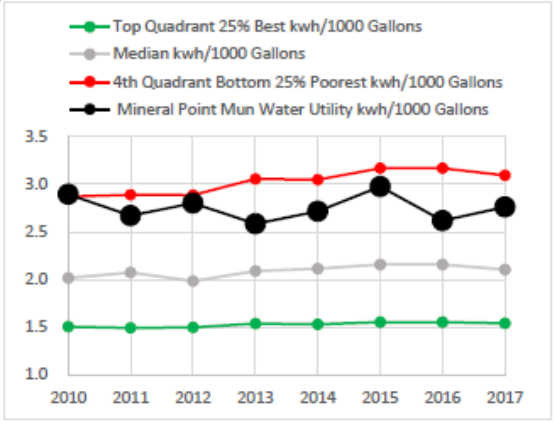
Technical Assistance Programs: MEETAP- Water Utility Analysis

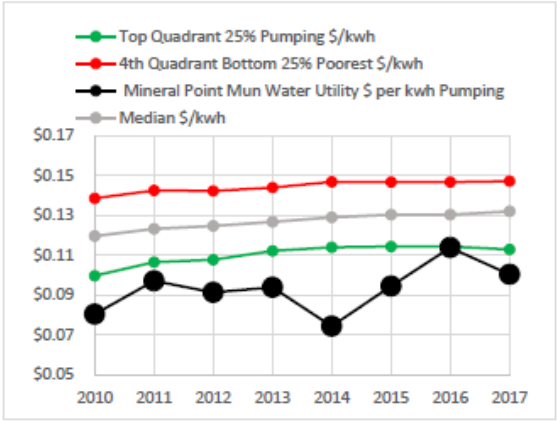
Quartile Statistical Benchmarks where 1 = Top Quadrant 25% Best, 2 = 2nd Quadrant Good, 3 = 3rd Quartile below Median & 4 = 4th Quadrant Bottom 25% Poorest

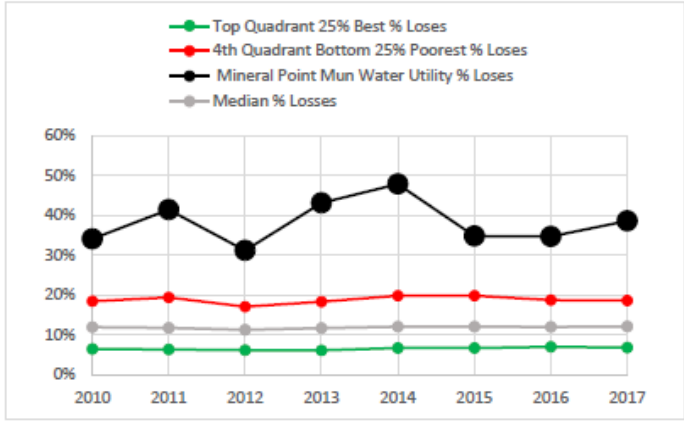
Utility ID	Utility	Performance Benchmark	2010	2011	2012	2013	2014	2015	2016	2017	2010-2017 Average
3740	Mineral Point Mun Water Utility	kwh/1000 Gal Quad	4	3	3	3	3	3	3	3	3
3740	Mineral Point Mun Water Utility	% Water Losses Quad	4	4	4	4	4	4	4	4	4
3740	Mineral Point Mun Water Utility	$ per kwh Pumping Quad	1	1	1	1	1	1	1	1	1
3740	Mineral Point Mun Water Utility	$ per 1000 Gallons Quad	2	3	3	2	2	2	3	2	2

Water utilities with benchmarks of 3 (Yellow) and 4 (Red) can request that MEETAP prepare a system analysis of wells, towers and pumps to estimate demand, energy and cost savings (capacity and average operating characteristics – on-peak, capacity factor, constant flow high pressure control vs variable flow constant pressure, etc.).

Utility ID	Utility	Performance Benchmark	2010	2011	2012	2013	2014	2015	2016	2017	2010-2017 Average
3740	Mineral Point Mun Water Utility	kwh/1000 Gallons	2.89	2.67	2.80	2.58	2.72	2.97	2.62	2.76	2.75
3740	Mineral Point Mun Water Utility	% Water Losses	34.07%	41.39%	31.15%	43.07%	47.78%	34.77%	34.66%	38.55%	38.18%
3740	Mineral Point Mun Water Utility	$ per kwh Pumping	$ 0.08	$ 0.10	$ 0.09	$ 0.09	$ 0.07	$ 0.09	$ 0.11	$ 0.10	$ 0.09
3740	Mineral Point Mun Water Utility	$ per 1000 Gallons	$ 0.23	$ 0.26	$ 0.26	$ 0.24	$ 0.20	$ 0.28	$ 0.30	$ 0.28	$ 0.26







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The Renewable Natural Gas Opportunity

Photo 5: Pipeline injection of biogas from a Dane County Landfill, Dane County Public Works, Madison, WI

WI Biogas Survey 2015:
WisconsinBiogasSurveyReport.pd

WI Biogas Survey 2020:

WI Biogas_Feedstock Survey Report Final (05_18_21).pdf

Photo 3: High strength equalization tank with truck, Waste Water Treatment Facility, Stevens Point, WI

Photo 2: Manure Anaerobic Digester Facility, EnTech Solutions in partnership with Northern Biogas, Middleton, WI

Photo 4: Food waste-to-energy biodigester facility, Forest County Potawatomi Community Renewable Generation, LLC,

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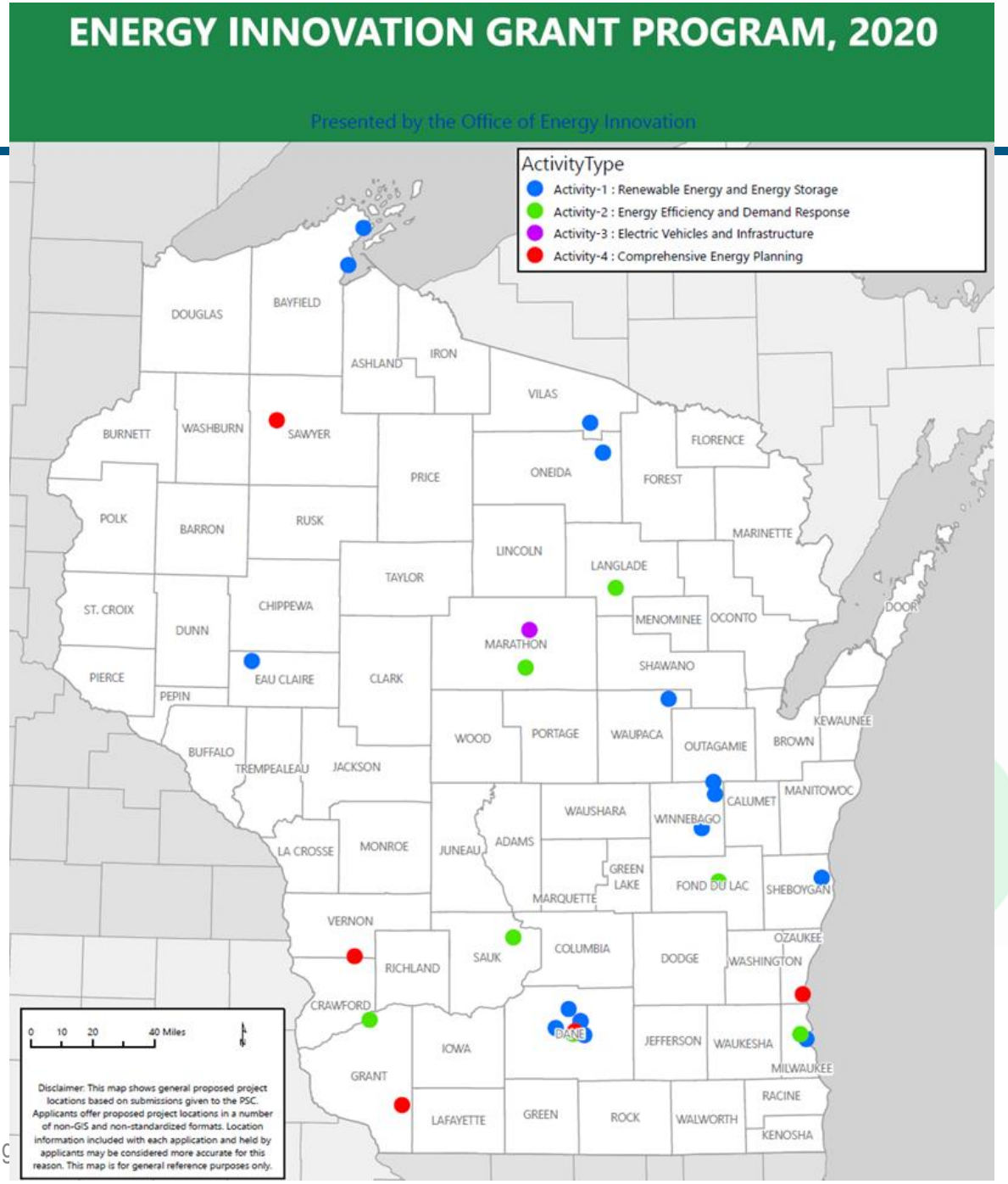
2020 EIGP

$7M Grant Round

32 Projects Funded

- 15 Renewable Energy
  (12 included battery storage)
- 9 Efficiency
- 2 Clean Transportation
- 6 Comprehensive Planning

Docket 9709-FG-2020



Questions?

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