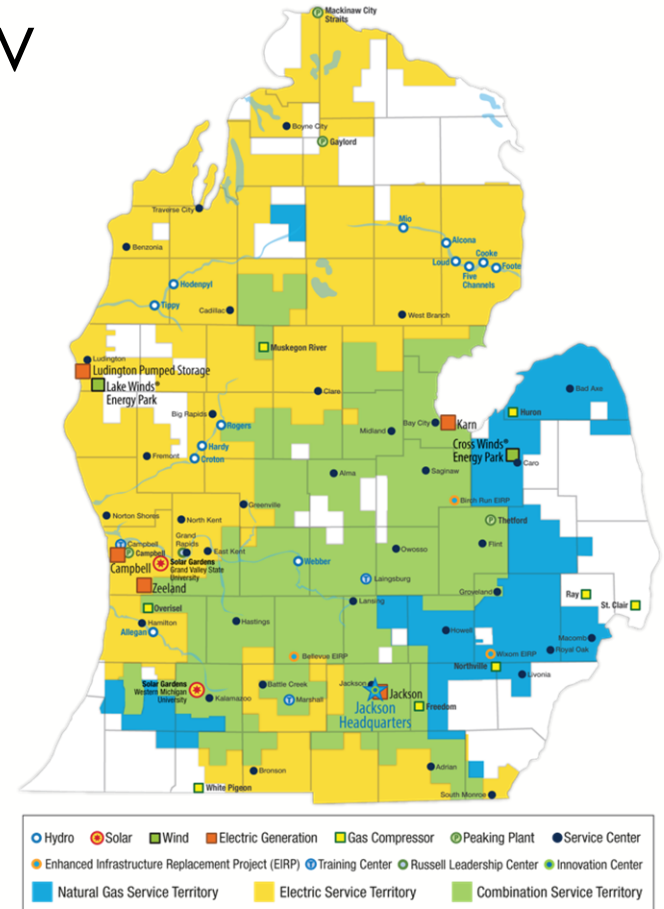
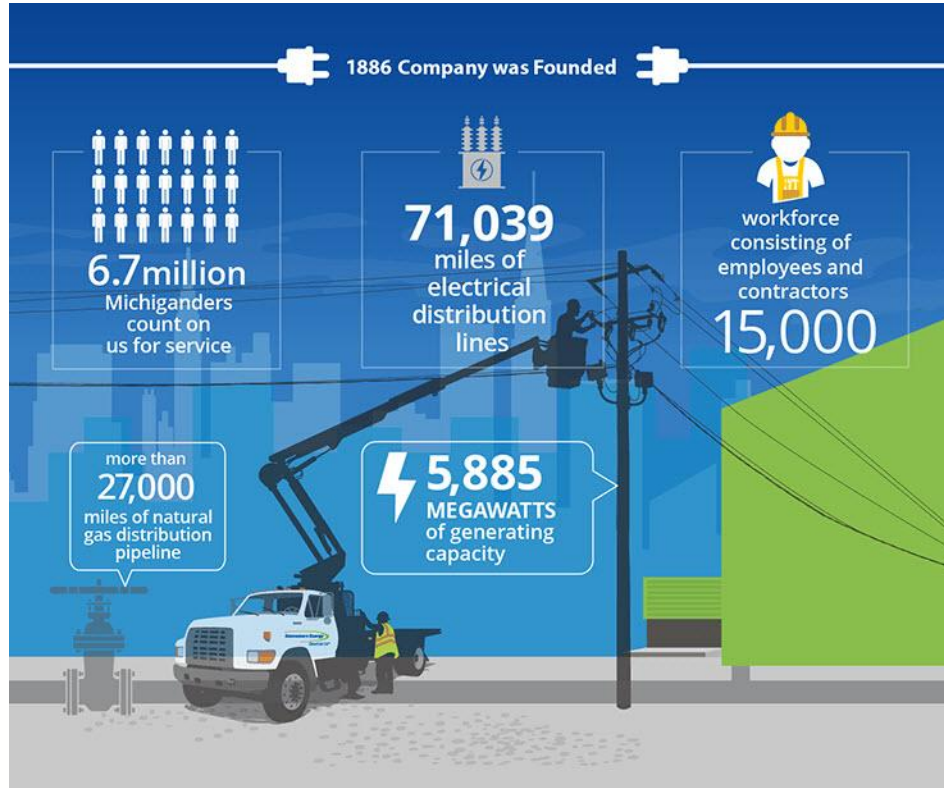


Consumers Energy Company's Dam Safety Program Overview

Adam Monroe, P.E., PMP
Chief Dam Safety Engineer
Consumers Energy Company

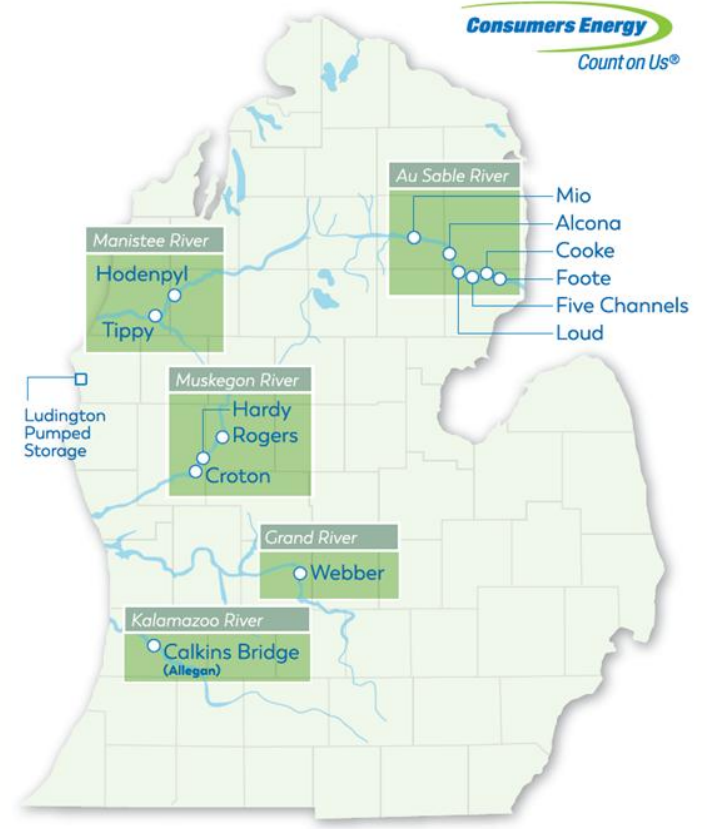
November 2020

Consumers Energy Overview



Legacy Supply Resource that is Renewable

Dam	Capacity (Mw's)	Plant Commissioned
Rogers	6.72	1906
Hardy	31.3	1931
Croton	9	1907
Hodenpyl	18	1925
Tippy	21	1918
Calkins Bridge	2.63	1935
Webber	3.3	1907
Mio	5	1916
Alcona	8	1924
Loud	4	1913
Five Channels	6	1912
Cooke	9	1911
Foote	9	1918
Ludington Pumped Storage	2310	1973



Federal Energy Regulatory Commission (FERC)

Each Plant requires a FERC Operating license

- Governs
 - Dam safety
 - Plant operating procedures
 - Water quality
 - Land management around the reservoirs
 - Requirements for recreation sites and their management
 - Licenses 30 to 50 year term



Ludington Pumped Storage Project

Rigorous Safety Program Ensures Public Safety

Elements of Consumers Energy's Dam Safety Program

- Owners Dam Safety Philosophy Statement
 - Dam safety is of the highest priority
- Rigorous regulatory compliance
- Owner/Regulator cooperation
- Strong leadership support
- Effective operations & maintenance
- Detailed instrumentation and monitoring
- Frequent Inspection and reporting
- Emergency Action Plans
- Continuous improvement



Hardy Dam

All Consumers Energy hydro generation employees have a responsibility to maintain and operate Consumers Energy's hydro generation plants in a safe, compliant, efficient, and dependable manner.

Detailed Monitoring for Dam Safety

Minimum Dam Safety Inspection Frequency

- Operator – monthly (daily dam safety observations completed by Operators)
- Supervisor – quarterly
- Dam Safety Engineering Staff – yearly
- FERC – yearly
- Independent Consultant (Code of Federal Regulations Part 12D) – every 5 years
 - Provided to Michigan Department of Environment, Great Lakes, and Energy
- External Owners Dam Safety Program Audit- every 5 years

Inspector Qualifications

- Consumers Energy personnel complete annual dam safety training.

The Independent Consultants are FERC approved.

Diligent Dam Safety Inspections

Inspections and Monitoring Observe for

- Seepage (new or significant changes)
- Piping (sand boils)
- Depressions (sinkholes)
- Erosion
- Brush growth
- Concrete condition
- Spillway condition
- Unusual instrumentation readings
- Public safety devices
- Any other signs of instability of any project works



Tippy Dam

Ensuring the Reliability of Hydropower

Asset Health Inspection Frequency

- Semi-annual civil inspection
 - Specific condition assessments as necessary
- Bi-Annual mechanical inspections
- 6 Year electrical inspection

System Health

- Asset Health Database
 - Updated through out the year
 - Reviewed annually
- Threats to Generation
 - Updated through out the year
 - Reviewed in weekly in daily operating review



Tippy Dam

Semi Quantitative Risk Assessment (SQRA)

Dam	Part 12D	Year(s)
Alcona		2015-Present
Mio	x	2018
Hardy		2019
Hodenpyl	x	2019
Ludington		2020
Five Channels		2020



Alcona Dam

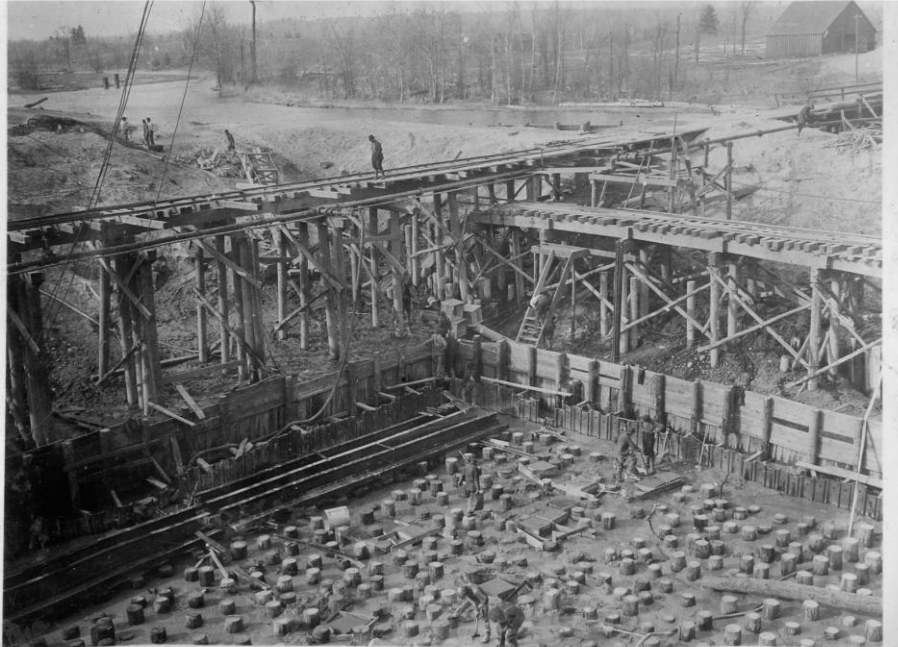
Alcona Risk Informed Decision Making (RIDM)

- FERC Pilot Project
- Simplified Level 3 SQRA in 2015
 - External facilitator and notetaker
 - Internal Subject Matter Experts (SMEs)
 - FERC participation
- More complex Level 3 SQRA 2017
 - External Co-facilitators and notetaker
 - External SMEs
 - Internal SMEs
 - Risk Review Board
 - FERC observation



Alcona Dam

Alcona RIDM Background



Power house pit - note concrete caps on broomed pile . 5-12-23

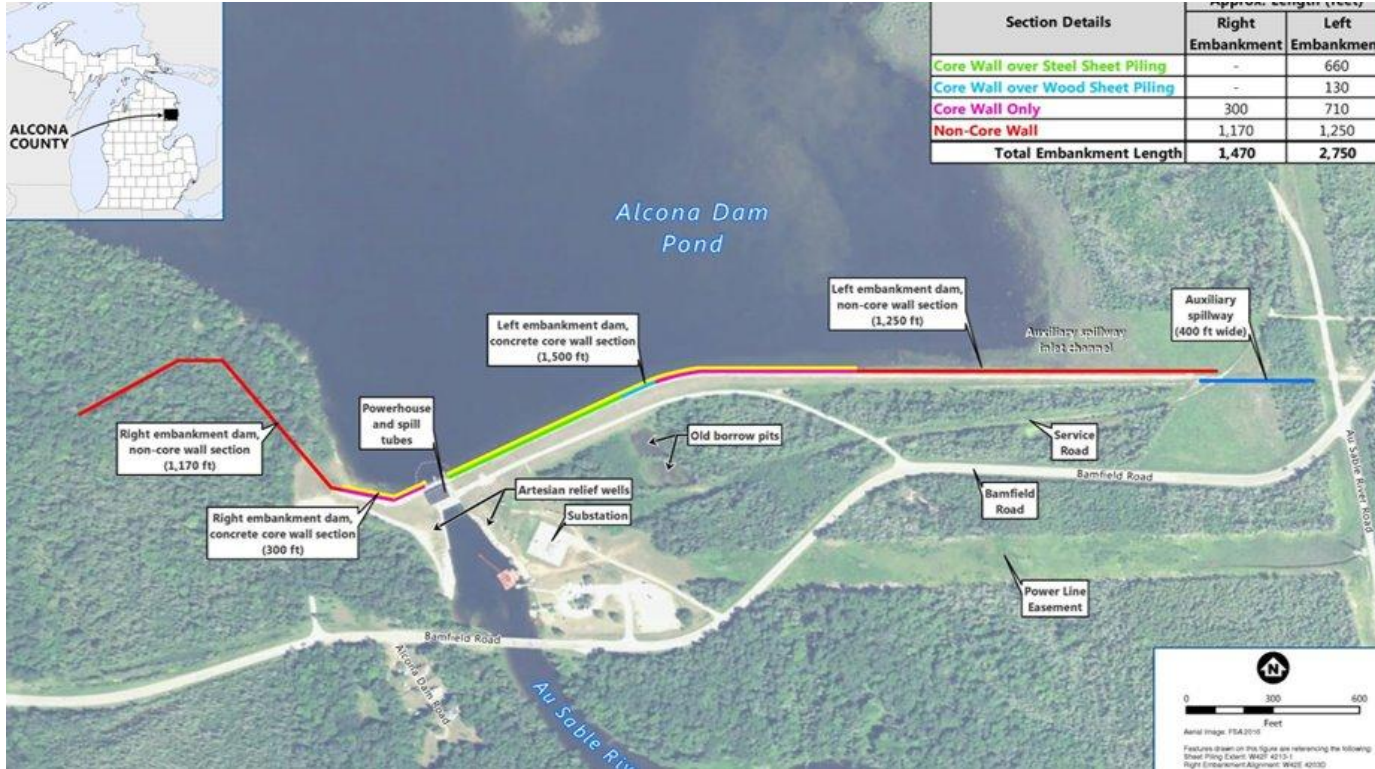
Alcona Dam



*3159
Boil in downstream Apron Excavation 7-17-23*

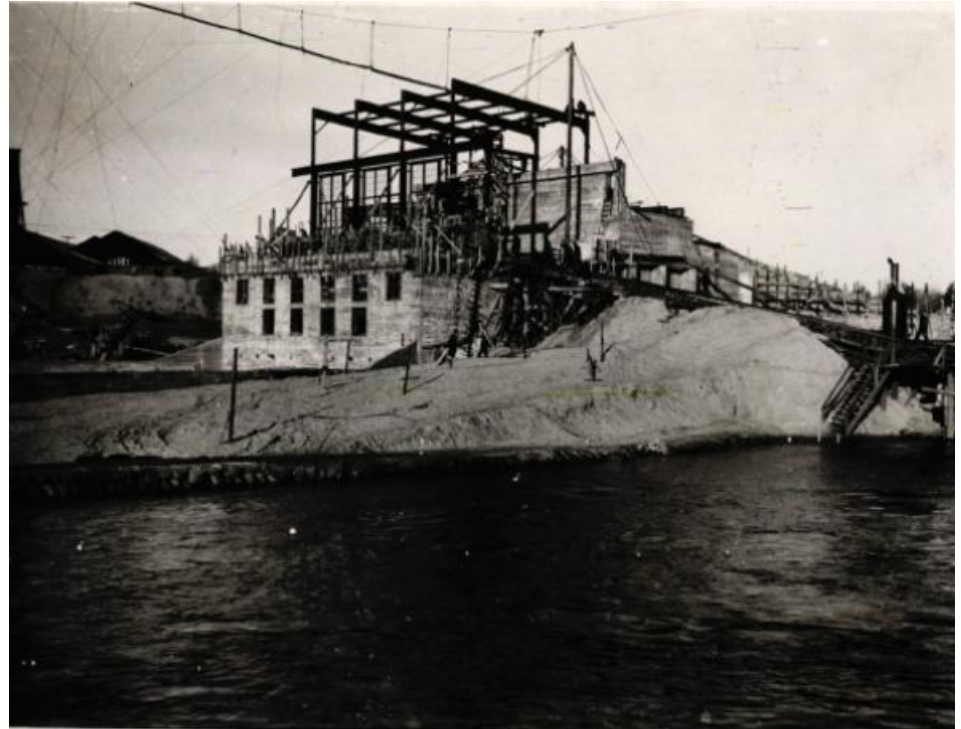
Alcona Dam

Alcona RIDM Background



Benefits of RIDM

- Better understanding of project
 - Information review
 - Supporting studies
 - Potential Failure Mode Analysis
- Project prioritization



Alcona Dam

Key Lessons Learned from RIDM

- Preparation is key
- Needs to be scalable
- Use SQRA's to supplement Part 12D process
- Documentation
 - Major findings and understandings
 - Lessons learned
 - Parking Lot
 - Final report



Alcona Dam

Thank You

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