Session 3
EXPLORING TECHNOLOGICAL SOLUTIONS

MPSC
Michigan Public Service Commission

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

MPSC
Technical Conference
Day 2

Session Three
Exploring Technological Solutions

Speaker Topic:
Existing Tools in the Toolbox

November 5, 2021
11:00 a.m.

EXISTING TOOLS IN THE TOOLBOX

Michigan Public Service Commission

Tree Trimming

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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- Tree interference is the leading cause of customer outages.
- Tree trimming is considered to be the most cost-effective way to reduce the frequency and duration of outages.
- Numerous Michigan utilities are on tree trimming cycles of seven years or less.
- Highlights the tension between capital and O&M spending.

Nick Evans

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EvansN@michigan.gov

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Tree Trimming– 2021-2025 Spending

Consumers Energy

- 2021: $84,000,000
- 2022: $94,400,000
- 2023: $100,000,000
- 2024: $117,600,000
- 2025: $120,400,000

DTE Electric

- 2021: $191,000,000
- 2022: $195,000,000
- 2023: $188,000,000
- 2024: $152,000,000
- 2025: $109,000,000

Sources: Consumers Energy Company's Final Electric Distribution Infrastructure Investment Plan ("EDIIP") 2021-25, filed 6/30/2021; DTE Electric Company's 2021 Distribution Grid Plan Final Report filed 9/30/2021.

(Cont.) Tree Trimming– 2021-2025 Spending

Nick Evans

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EvansN@michigan.gov

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Indiana Michigan Power Company

- 2021: $13,200,000
- 2022: $13,200,000
- 2023: $13,200,000
- 2024: $13,200,000
- 2025: $13,200,000

Source: Indiana Michigan Power Company's Michigan Five-Year Distribution Plan 2021-2025, filed 9/30/2021

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Manager Electric Operations Section

EvansN@michigan.gov

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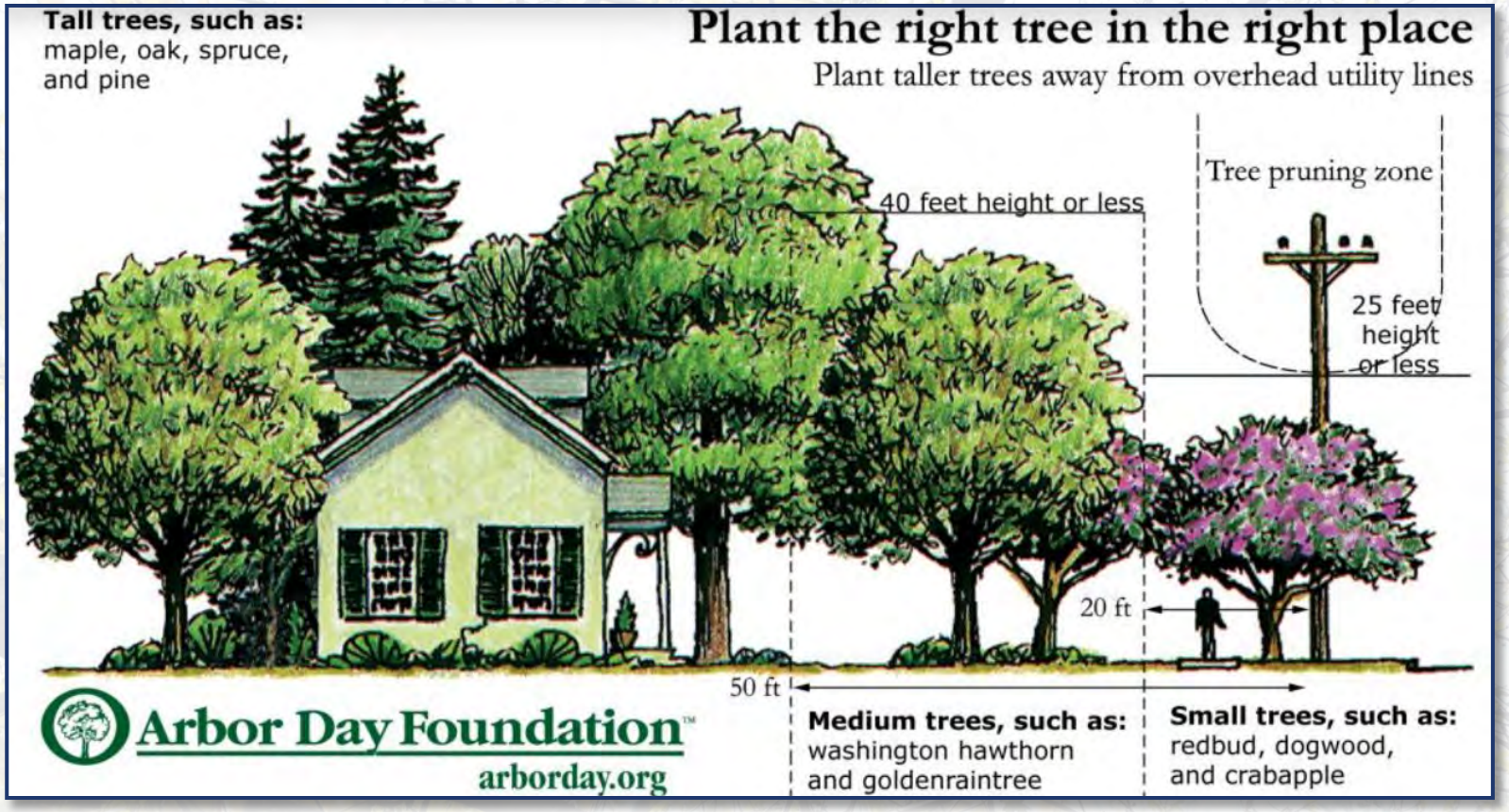
The Right Tree In The Right Place

- Plant low-growing trees near power lines.
- Other applications.



Source: https://www.berkeleyelectric.coop/right-tree-right-place

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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DTE Electric Infrastructure Resiliency & Hardening

Consists of:

- Capital replacement programs
- Substation risk
- 4.8 kV Hardening Program
- Frequent Outage Program
- 4.8 kV relay improvements
- Mobile fleet

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EvansN@michigan.gov

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Consumers Energy Reliability Program

- Aims to reduce system outages and harden the system.
- Install, upgrade, and rehabilitate:
  - ✓ Low voltage distribution (LVD) lines
  - ✓ High voltage distribution (HVD) lines
  - ✓ LVD and HVD substations
  - ✓ Metro underground equipment
  - ✓ Protective relay equipment
- Includes capital expenditures to modernize the electric grid.

I&M's Reliability And Asset Renewal Projects

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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- Aim to replace aging infrastructure and harden the system.
- Four main projects:
  - ✓ Overhead line rebuild
  - ✓ Underground replacement project
  - ✓ Pole replacement project
  - ✓ Distribution feeder breaker replacement

Pole Inspection And Replacement Programs

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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Consumers Energy:

- HVD Pole Inspection Program
- HVD Overhead Line Inspection Program
- LVD Overhead Line inspection program
- LVD Pole Inspection Program

DTE Electric:

- Pole-top maintenance program
- Prior to allowing joint use attachment
- Trouble
  - ✓ Day-to-day
  - ✓ Storm

Pole Inspection Reports

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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- DTE and Consumers are required to file a report every year.
- On November 20, 2009, MPSC Staff filed a report titled "Utility Pole Inspection Program Investigation Staff Report."
- Among other recommendations, Staff recommended both companies:
  - ✓ Achieve a 10-12 year pole inspection cycle frequency to correlate with the standard recommended by the USDA Rural Utility Service for Michigan's decay zone.
  - ✓ Provide a brief Pole Inspection Report to Staff each year by September 1st.

Upgrading Overhead Lines - Grade C To B

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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NESC: Grade B from Grade C.

- Grade B construction allows utility lines to withstand more severe weather conditions.
- The NESC currently requires Grade B for crossings over:
  - ✓ Railroad tracks
  - ✓ Limited access highways
  - ✓ Navigable waterways requiring waterway crossing permits
- Some Michigan utilities are constructing all new overhead circuits to the Grade B standard.
- Downside: Grade B is more expensive than Grade C.

Upgrading Lines From 4.8 To 13.2 Kv (DTE Electric)

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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DTE is implementing a 4.8 kV Conversion and Consolidation program

- Aimed at upgrading the 4.8 kV system to 13.2 kV by building new substations and upgrading circuits.
- Load from multiple 4.8 kV substations can be transferred to a single 13.2 kV substation.
- Should improve reliability and have lower maintenance costs.
- This conversion is expected to take several decades.

Non-standard Voltage Reduction (CE)

Nick Evans

Manager Electric Operations Section

EvansN@michigan.gov

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- Part of the LVD Lines Reliability targeted circuit improvements.
- Conversion of circuits at non-standard voltages to the three standard operating voltages.
- Benefits:
  - ✓ Grounded wye systems are safer than delta.
  - ✓ Reduced losses and increased system line capacity.
  - ✓ Reduced number of interruptions for single phase failure.
  - ✓ Increased system transfer capability.

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EvansN@michigan.gov

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Undergrounding

- Placing of overhead transmission and distribution lines underground.
- Found in subdivisions and in downtown areas of larger cities.
- Underground lines have advantages and disadvantages compared to overhead lines.

Martin Day

Administrator
Division of Energy
Regulation and Analysis

Martin.Day@wisconsin.gov

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Wisconsin Reliability and Resilience Perspective

November 5, 2021
11:10 a.m.

Public Service Commission of Wisconsin

The PSC of Wisconsin ensures **safe**, **reliable**, affordable, and environmentally responsible utility services and equitable access to telecommunications and broadband services.

Martin Day

Administrator
Division of Energy
Regulation and Analysis

Martin.Day@wisconsin.gov

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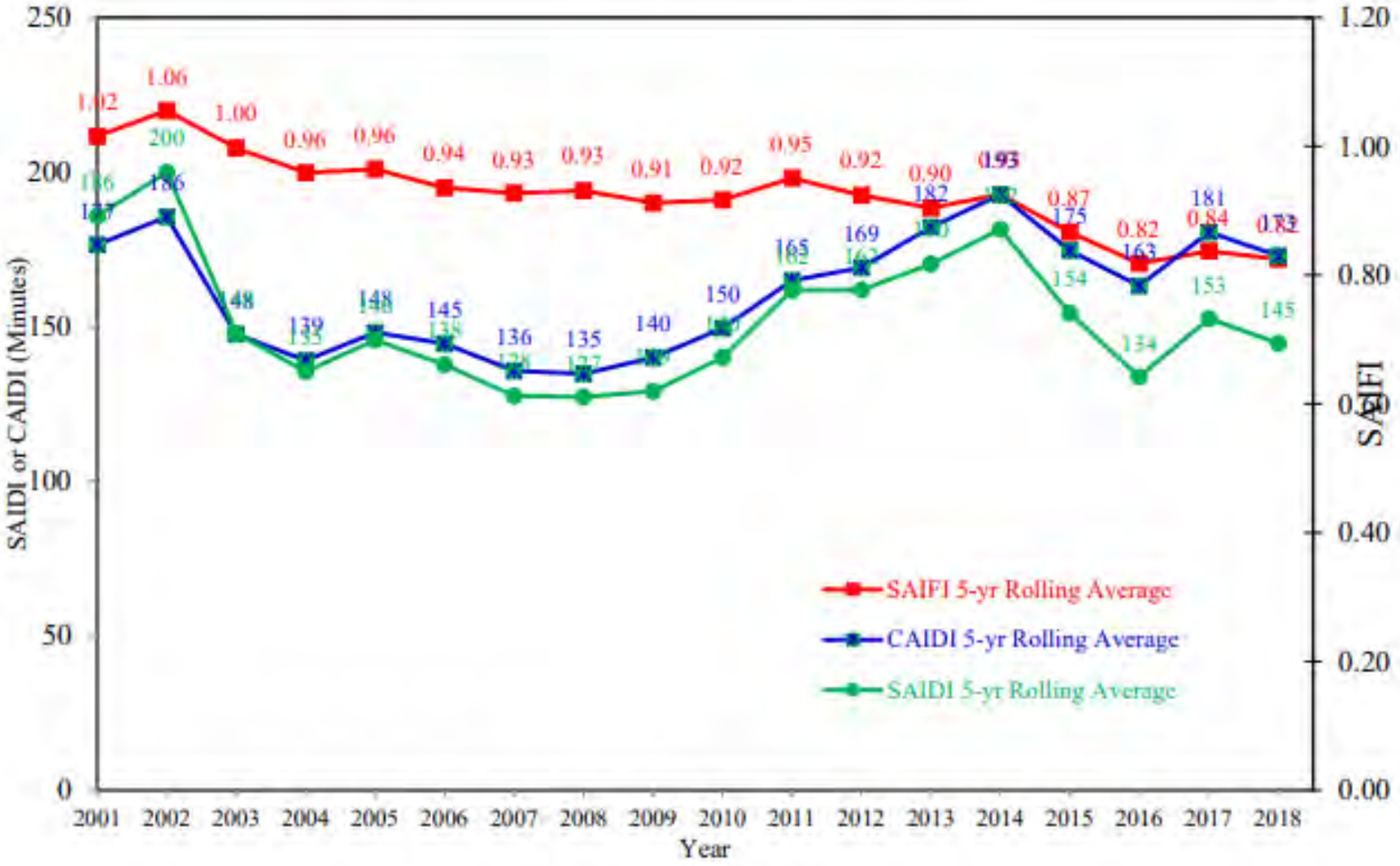
Statewide Average SAIFI, SAIDI, and CAIDI Values for Major IOUs[35]



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August 2021 Storms

Martin Day

Administrator
Division of Energy
Regulation and Analysis

Martin.Day@wisconsin.gov

PSC of WISCONSIN

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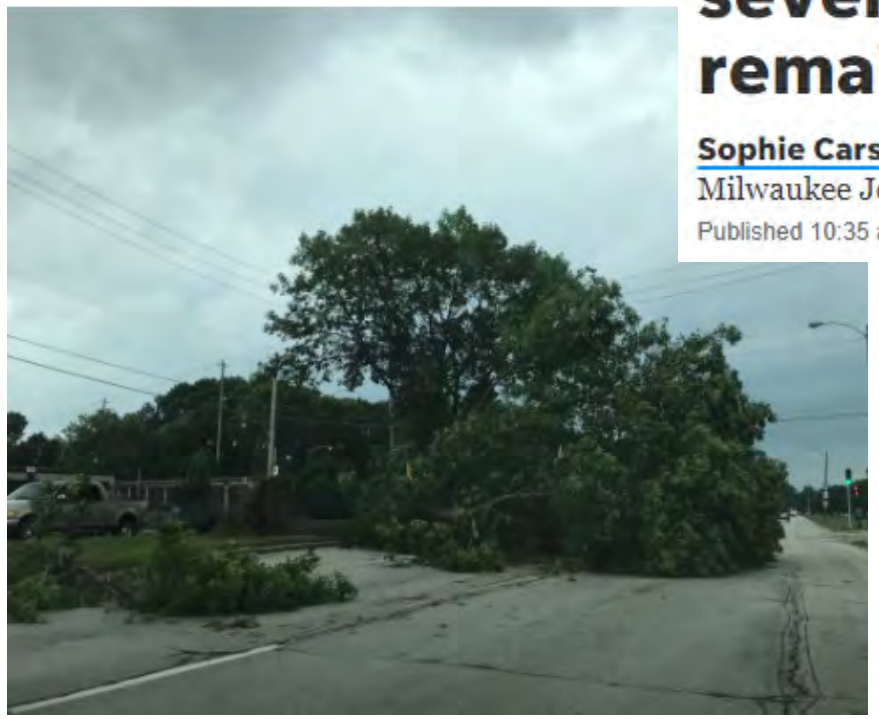

WEATHER

As Wisconsin cleans up damage from severe storms, about 85,000 people remain without power

Sophie Carson, Elliot Hughes, Grace McDermott and Hannah Kirby
Milwaukee Journal Sentinel
Published 10:35 a.m. CT Aug. 11, 2021 | Updated 12:19 p.m. CT Aug. 12, 2021

PSC of WISCONSIN

Martin Day

Administrator
Division of Energy
Regulation and Analysis

Martin.Day@wisconsin.gov

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Survey – 5 Major IOUs

1. Report the year-to-date condition of the System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI), and Customer Average Interruption Duration Index (CAIDI) reliability indices. Provide an impact analysis of the aforementioned weather events and other notable severe storm events on the reliability indices.
2. Provide the annual goals related to these reliability metrics. Provide a description of how these goals were established.
3. Describe the measures you have taken over the past two years to achieve these goals and the results of those measures.

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System Modernization Reliability Project

Martin Day

Administrator
Division of Energy
Regulation and Analysis

Martin.Day@wisconsin.gov

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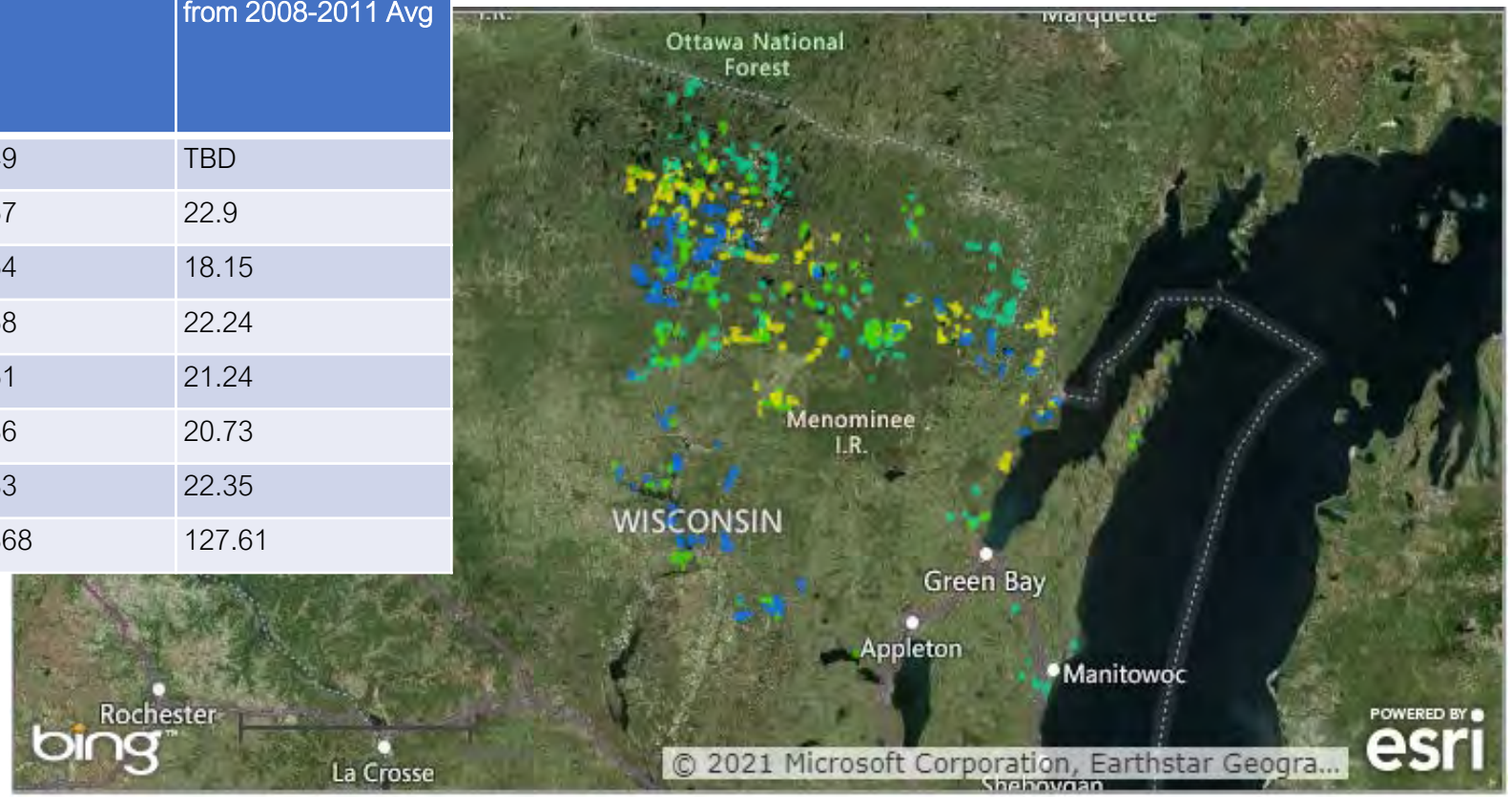
Year	Primary Circuit Miles	Actuals, Millions	SAIDI Improvement from 2008-2011 Avg
2020	247	$49	TBD
2019	344	$67	22.9
2018	313	$64	18.15
2017	348	$68	22.24
2016	211	$51	21.24
2015	210	$36	20.73
2014	185	$33	22.35
Total	1858	$368	127.61



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Martin Day

Administrator
Division of Energy
Regulation and Analysis

Martin.Day@wisconsin.gov

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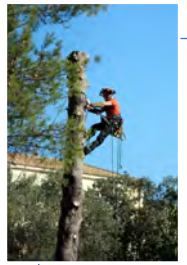
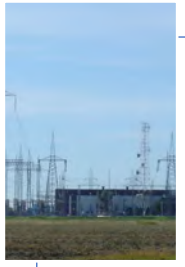
Reliability Improvement Efforts

Undergrounding



Tree trimming



Voltage conversion

AMI and outage management systems

Distributed automation

Fault locating devices

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NEW TECHNOLOGIES & GRID MODERNIZATION FOR RELIABILITY

Moderator Joy Wang

Engineer, Electric Operations Section

MPSC Michigan Public Service Commission

Amy Heart

Senior Director of Public Policy

sunrun

Paul De Martini

Managing Partner

NEWPORT CONSULTING GROUP

Jeremy Twitchell

Senior Energy Analyst

Pacific Northwest NATIONAL LABORATORY

Kiera Zitelman

Center for Partnerships & Innovation

NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS