APPA Operations Update:
Tools You Can Use to Build a Strong and Competitive Electric Utility

Michael J. Hyland, P.E.
Senior Vice President
American Public Power Association

Michigan Municipal Electric Association

October 8-11th, 2019
 Traverse City Light & Power, MI
Today’s Agenda

• Introduction
• Who is APPA
• APPA’s Strategic Initiatives
• Engineering & Operations Strategic Projects
• Q&A
APPA Members

• 1400+ public power utilities
• Retail service in 49 states
• Very large to very small systems
• Median size: 1,977 meters
• 14.4% of sales to electric consumers
Public Power By Location
Public Power and Cooperative Utilities by Customer Class

- More than 100,000
- 40,001 to 100,000
- 20,001 to 40,000
- 10,001 to 20,000
- 4,001 to 10,000
- 2,001 to 4,000
- 1,001 to 2,000
- 11 to 1,000
- 0 to 10

Cooperative (orange) vs. Public Power (blue)
Seven External Initiatives

- Communicate the value of public power
- Address technological change
  Public Power Forward
- Address adverse impacts of federal regulation
- Improve physical preparedness/reliability, cyber & physical security,
- Focus on research and development
- Help meet utility workforce challenges
- Promoting association excellence
Engineering & Operations: We’re not your Daddy’s APPA…

- Safety
- Cybersecurity
- Reliability
- Smart Energy
- R & D
- Mutual Aid
Reliability = Operational Excellence
RP₃ Current Designees

State Representation of RP₃ Designated Utilities

274 Designated Utilities

Nationwide 274 Designated Utilities
*Numbers indicate RP₃ utilities with designations beginning in 2017, 2018 and 2019.
Why is $\text{RP}_3$ Important?

Electric Utility Losses by Group from EIA - 861

- All Retail utilities - 4.91%
- Public Power utilities - 4.35%
- RP3 Members - 3.83%
Why is RP₃ Important?

Fitch Group: RP3 vs Non-RP3 Ratings as Percent of Total

NOTE: Fitch Ratings were found for 71 non-RP₃ utilities and for 62 RP₃ utilities.
<table>
<thead>
<tr>
<th>Michigan Activity – RP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay City Electric Light and Power</td>
</tr>
<tr>
<td>Hillsdale Board of Public Utilities</td>
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<tr>
<td>Lansing Board of Water &amp; Light</td>
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<td>Marquette Board of Light and Power</td>
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<tr>
<td>Coldwater Board of Public Utilities</td>
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<tr>
<td>Grand Haven Board of Light &amp; Power</td>
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<tr>
<td>Lowell Light and Power</td>
</tr>
<tr>
<td>Traverse City Light &amp; Power</td>
</tr>
<tr>
<td>Holland Board of Public Works</td>
</tr>
<tr>
<td>Zeeland Board of Public Works</td>
</tr>
</tbody>
</table>
What is the eReliability Tracker?

- The eReliability Tracker is a web-based application that helps over 425 public power utilities record, track, and analyze outage data.
- National, regional, and utility size-based benchmarking data.
- Eligibility to receive a certificate recognizing excellence in reliability.

![Top 10 Circuits Ranked by Outage Count]

<table>
<thead>
<tr>
<th>Circuit Name</th>
<th>Substation Name</th>
<th>Number of Outages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit 4</td>
<td>Central Substation</td>
<td>4</td>
</tr>
<tr>
<td>NS Circuit 1</td>
<td>North Substation</td>
<td>3</td>
</tr>
<tr>
<td>NS Circuit 1 Gold Hill</td>
<td>North Substation</td>
<td>2</td>
</tr>
<tr>
<td>Circuit 2</td>
<td>North Substation</td>
<td>1</td>
</tr>
<tr>
<td>Circuit 5</td>
<td>Central Substation</td>
<td>1</td>
</tr>
</tbody>
</table>
Public Power Reliability is Superlative!

2016 EIA Reliability Data - SAIDI

- **All**: 314.26 minutes (430.98 with MED), 128.62 minutes (163.13 without MED)
- **Coop**: 430.98 minutes (282.74 with MED), 163.13 minutes (132.92 without MED)
- **IOU**: 282.74 minutes (132.92 with MED), 132.92 minutes (117.73 without MED)
- **Public Power**: 117.73 minutes (54.73 with MED), 54.73 minutes (54.73 without MED)

*Average of SAIDI With MED (IEEE) vs. Average of SAIDI Without MED (IEEE)*
Public Power Reliability is Superlative!

2018 EIA Reliability Data - SAIDI

<table>
<thead>
<tr>
<th>Category</th>
<th>Average of SAIDI With MED (IEEE)</th>
<th>Average of SAIDI Without MED (IEEE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>332.61</td>
<td>143.93</td>
</tr>
<tr>
<td>Coop</td>
<td>417.04</td>
<td>184.76</td>
</tr>
<tr>
<td>IOU</td>
<td>336.54</td>
<td>141.82</td>
</tr>
<tr>
<td>Public Power</td>
<td>169.19</td>
<td>59.04</td>
</tr>
</tbody>
</table>

Legend:
- Blue: Average of SAIDI With MED (IEEE)
- Red: Average of SAIDI Without MED (IEEE)
Map of regions
System Average Interruption Duration Index, SAIDI by Region

Average SAIDI per Region

<table>
<thead>
<tr>
<th>Regions</th>
<th>SAIDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>448.11</td>
</tr>
<tr>
<td>2</td>
<td>125.35</td>
</tr>
<tr>
<td>3</td>
<td>100.78</td>
</tr>
<tr>
<td>4</td>
<td>56.08</td>
</tr>
<tr>
<td>5</td>
<td>227.69</td>
</tr>
<tr>
<td>6</td>
<td>461.60</td>
</tr>
<tr>
<td>7</td>
<td>95.50</td>
</tr>
<tr>
<td>8</td>
<td>82.88</td>
</tr>
<tr>
<td>9</td>
<td>179.17</td>
</tr>
</tbody>
</table>

- **Avg SAIDI**
- **Avg SAIDI for All Utilities**
System Average Interruption Duration Index, SAIDI by Customer Size Classes

Average SAIDI per Customer Size Class

<table>
<thead>
<tr>
<th>Customer Grouping</th>
<th>Average Customers Served (Avg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>700</td>
</tr>
<tr>
<td>2</td>
<td>2,000</td>
</tr>
<tr>
<td>3</td>
<td>5,000</td>
</tr>
<tr>
<td>4</td>
<td>10,000</td>
</tr>
<tr>
<td>5</td>
<td>331,000</td>
</tr>
</tbody>
</table>

Avg SAIDI

Avg SAIDI for All Utilities
Squirrel Outage Patterns

SQUIRREL INDEX IN 2017

- Squirrel
Squirrel Outage Patterns

SQUIRREL INDEX IN 2018

- **January**
- **February**
- **March**
- **April**
- **May**
- **June**
- **July**
- **August**
- **September**
- **October**
- **November**
- **December**
Squirrel Outage Patterns

SQUIRREL INDEX IN 2018

- Squirrel
Outage Start Time

- **Frequency**
  - Y-axis: Frequency ranging from 0 to 3500
- **Hour**
  - X-axis: Hours from 0 to 23

The graph shows the frequency distribution of outage start times across different hours of the day. The highest frequency is observed between hours 8 and 10.
Figure 8
Top five customer-weighted occurrence rates for common causes of sustained outages for all utilities that use the eReliability Tracker Service²

<table>
<thead>
<tr>
<th>Cause</th>
<th>Occurrence Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree</td>
<td>1.2187</td>
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<tr>
<td>Unknown</td>
<td>1.0485</td>
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<tr>
<td>Squirrel</td>
<td>1.0099</td>
</tr>
<tr>
<td>Equipment</td>
<td>0.8259</td>
</tr>
<tr>
<td>Electrical Failure</td>
<td>0.579</td>
</tr>
</tbody>
</table>

Figure 11
Top five customer-weighted occurrence rates for common causes of momentary outages for all utilities that use the eReliability Tracker Service²

<table>
<thead>
<tr>
<th>Cause</th>
<th>Occurrence Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>0.1914</td>
</tr>
<tr>
<td>Utility Maintenance and Repairs</td>
<td>0.0578</td>
</tr>
<tr>
<td>Customer Service</td>
<td>0.0522</td>
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<tr>
<td>Equipment Replacement</td>
<td>0.0383</td>
</tr>
<tr>
<td>Equipment</td>
<td>0.038</td>
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</table>
## Michigan 2017 EIA and 2018 eRT Reliability Statistics

### SAIDI

<table>
<thead>
<tr>
<th></th>
<th>Coop</th>
<th>IOU</th>
<th>Municipal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Count</td>
<td>7</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>EIA National Reliability 2017 Data</td>
<td></td>
<td></td>
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<tr>
<td>Average of SAIDI With MED</td>
<td>443.115</td>
<td>602.005</td>
<td>139.830</td>
</tr>
<tr>
<td>Average of SAIDI Without MED</td>
<td>149.332</td>
<td>186.827</td>
<td>49.567</td>
</tr>
<tr>
<td>Average of SAIDI With MED Minus LOS</td>
<td>408.343</td>
<td>565.697</td>
<td>388.577</td>
</tr>
<tr>
<td>eRT Reliability 2018 Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average of SAIDI With MED</td>
<td></td>
<td></td>
<td>279.6</td>
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<tr>
<td>Average of SAIDI Without MED</td>
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<td></td>
<td>56.19</td>
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</table>

### SAIFI

<table>
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<th>Coop</th>
<th>IOU</th>
<th>Municipal</th>
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</thead>
<tbody>
<tr>
<td>Utility Count</td>
<td>7</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>EIA National Reliability 2017 Data</td>
<td></td>
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<tr>
<td>Average of SAIFI With MED</td>
<td>1.937</td>
<td>1.681</td>
<td>0.963</td>
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<tr>
<td>Average of SAIFI Without MED</td>
<td>1.359</td>
<td>1.126</td>
<td>0.573</td>
</tr>
<tr>
<td>Average of SAIFI With MED Minus LOS</td>
<td>1.784</td>
<td>1.538</td>
<td>0.959</td>
</tr>
<tr>
<td>eRT Reliability 2018 Data</td>
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<tr>
<td>Average of SAIFI With MED</td>
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<td></td>
<td>0.941</td>
</tr>
<tr>
<td>Average of SAIFI Without MED</td>
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CERTIFICATE
OF EXCELLENCE
IN RELIABILITY

This is to acknowledge that

has achieved excellence in reliability by significantly outperforming the electric industry national average as reported by the Energy Information Administration.

MARCH 1, 2018

Date

Michael J. Hyland
Senior Vice President,
Engineering Services

AMERICAN PUBLIC POWER ASSOCIATION
Powering Strong Communities
Michigan: “The Reliable State!”
Certificate of Excellence in Reliability Awardees:

- Bay City Electric Light & Power (2016 data)
- Coldwater Board of Public Utilities (2018, 2017, and 2015 data)
- Holland Board of Public Works (2018 data)
- Lowell Light & Power (2017 and 2016 data)
- Marquette Board of Light & Power (2018 and 2016 data)
- Sturgis Electric Department (2018 data)
- Wyandotte Municipal Services (2017, 2016, and 2015 data)
- Zeeland Board of Public Works (2018, 2016, and 2015 data)
- City of Calhoun (2017 and 2015 data)
- City of Cartersville (2016 data)
- City of Forsyth (2016 and 2015 data)
- City of Washington (2015 data)
Michigan eRT Activity

eRT Subscribers

- Bay City Electric Light & Power
- Coldwater Board of Public Utilities
- Hillsdale Board of Public Utilities
- Holland Board of Public Works
- Lowell Light & Power
- Marquette Board of Light & Power
- Marshall Electric Department
- Niles Utilities Department
- Union City Electric Department
- Village of Clinton
- Wyandotte Municipal Services
- Zeeland Board of Public Works
Safety Awards of Excellence

Total Entries per Year (2016)

Number of Respondents

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<tbody>
<tr>
<td>Count of All Respondents by Association Region (2016)</td>
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<tr>
<td>Total</td>
<td>208</td>
<td>166</td>
<td>183</td>
<td>211</td>
<td>222</td>
<td>237</td>
<td>251</td>
<td>210</td>
<td>227</td>
<td>241</td>
<td>248</td>
<td>277</td>
<td>278</td>
<td>216</td>
<td>235</td>
<td>236</td>
<td>257</td>
<td>277</td>
<td>282</td>
<td>289</td>
<td>291</td>
<td>259</td>
<td>264</td>
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Incidence Rate

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</thead>
<tbody>
<tr>
<td>Incidence Rate</td>
<td>9.2</td>
<td>8.5</td>
<td>8.5</td>
<td>6.64</td>
<td>9.9</td>
<td>8.91</td>
<td>8.52</td>
<td>8.69</td>
<td>7.88</td>
<td>7.54</td>
<td>8.16</td>
<td>7.18</td>
<td>7.14</td>
<td>6.78</td>
<td>6.74</td>
<td>6.39</td>
<td>6.36</td>
<td>5.46</td>
<td>5.48</td>
<td>5.58</td>
<td>4.69</td>
<td>4.75</td>
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</table>
Reportable Cases per Employee

- AVG of All Utility Submissions
- AVG of Consistent 5 Year Utilities

<table>
<thead>
<tr>
<th>Year</th>
<th>AVG of All Utility Submissions</th>
<th>AVG of Consistent 5 Year Utilities</th>
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<tbody>
<tr>
<td>2012</td>
<td>0.0318</td>
<td>0.0263</td>
</tr>
<tr>
<td>2013</td>
<td>0.0316</td>
<td>0.0251</td>
</tr>
<tr>
<td>2014</td>
<td>0.0313</td>
<td>0.0265</td>
</tr>
<tr>
<td>2015</td>
<td>0.0274</td>
<td>0.0211</td>
</tr>
<tr>
<td>2016</td>
<td>0.0250</td>
<td>0.0225</td>
</tr>
</tbody>
</table>

Changes:
- 2012: 17.38%
- 2013: 20.65%
- 2014: 15.15%
- 2015: 22.96%
- 2016: 9.78%
Average OSHA Incidence Rate

Year

2012
2013
2014
2015
2016

Average OSHA Incidence Rate (100 Workers)

AVG of All Utility Submissions

AVG of Consistent 5 Year Utilities

0
1
2
3
4
5
6

5.1872
5.1796
5.6282
5.4000
5.5052

4.2969
3.9418
4.7545
3.5443
4.7833

17.16%
23.9%
15.52%
34.37%
13.11%

0
1
2
3
4
5
6
Safety Awards of Excellence Data

Count of All Respondents by Association Region (2016)

Average and Median Incidence Rates by Association Region (2016)
RP₃ Application Data

Average OSHA Incidence Rate by Number of "No" Responses to Safety Questions on the RP3 Application for 2012-2016

Number of Questions Missed or Answered "No"

- 0 missed
- 1 missed
- 2 missed

Average OSHA Incidence Rate

- 5.318
- 5.840
- 8.064
RP₃ Application Data

Safety Index Over the Years

Incidence Rate (Per OSHA 300 Calculation)

Utility (numbers used to obscure individual data)
eSafety Tracker

- The eSafety Tracker will help utilities document and analyze safety-related events: Meetings, job briefings, injuries, near-misses, investigation reports
- Utilities will be able to run reports on their incident history
- Better data allows for a better understanding of root causes of incidents and allows deeper understanding of utility safety
- Better data collection on incidents should help improve safety rules through the APPA Safety Manual in the long run
Message of the Day at TESST APPA Utility

Be courteous. Never pile material in such a way that it will endanger a worker who has to work on it or will make a backbreaking job for the worker who breaks down the pile. Be sure to consider the strength of the support if you're piling material on a floor, platform or scaffold; the stability of the ground if you're piling a heavy load; and the height of the pile so it won't topple.

Welcome to the American Public Power Association’s eSafety Tracker service! Worker safety is at the core of a public power utility’s commitment to service, and we hope the Tracker will help improve safety at your utility. Tracking safety performance helps underscore a utility’s commitment to a culture of safety.

Allows ‘Leaders’ to set different daily messages regarding safety and safety culture
Meeting/Briefings: Record Meeting

- Create Meetings, keep track of:
  - Attendees
  - Presenters
  - Administrative notes
  - Date/time
  - Meeting Description/Details
Meeting/Briefing: Record Briefing

- Create Safety Briefings, keep track of:
  - Person(s) responsible
  - Job Description/ID
  - Date/time
  - Attendees
  - Work Location
  - Hazards Associated/Work Procedures involved
  - Checklists
• Checklists to walk through important PPE and situational awareness issues.
Incidents: Create New Incident

- Create Incidents (Injury, Near Miss, Property Damage, Investigation Report) keep track off:
  - Incident Type
  - Incident Name/Identifier
  - Date/time: Occurrence
  - Date/time: reported to superior
  - Address Locations
  - Weather conditions
115.5 Job Briefings

American Public Power Association safety resources on job briefings can be found at www.PublicPower.Org/Safety.

1. The employer shall ensure that the employee in charge conducts a job briefing with the employees involved before the start of each job. The job briefing will at least cover the following subjects and is recommended to be documented:
   1. Hazards associated with the job.
   2. Work procedures involved.
   3. Special precautions.
   5. Personal protective equipment (PPE) requirements.

2. If the work or operations to be performed during the work day are repetitive and similar, at least one job briefing shall be conducted before the start of the first job of each day or shift. Additional job briefings shall be held if significant changes that might affect the safety of the employees occur during the course of the work. Significant changes such as work tasks or hazards differing, or additional un-briefed personnel arriving to perform work at the job site shall be addressed with a job briefing.

3. A brief discussion is satisfactory if the work involved is routine and if the employee, by virtue of training and experience, can reasonably be expected to recognize and avoid the hazards involved in the job. A more extensive discussion shall be conducted if the work is complicated or extremely hazardous, or the employee cannot be expected to recognize and avoid the hazards involved in the job.

4. An employee working alone need not conduct a job briefing. However, the employee shall ensure that the tasks to be performed are planned as if a briefing were required.

5. Refer to OSHA Best Practice: Job Briefings, OSHA Standard 29 CFR 1910.269(c), NFPA 70E 110.1(H) and NESC, ANSI C-2 2017 – Part 4.
DEED Safety Smart Video Series

- Based on old DEED Safety Videos
- New APPA DEED Program Grant ($87.7 K to MMUA)
- Filmed at MMUA and ECG
- Shorter in length.
Michigan Activity

2018 Safety Awards

- Bay City Electric Light & Power (Entrant)
- Coldwater Board of Public Utilities (Entrant)
- Grand Haven Board of Light & Power (Entrant)
- Hillsdale Board of Public Utilities (Entrant)
- Holland Board of Public Works (Entrant)
- Lowell Light & Power (First)
- Marquette Board of Light & Power (First)
- Sebewaing Light & Water Dept. (First)
- Traverse City Light & Power (Entrant)
- Zeeland Board of Public Works (Entrant, non-eligible)

E-Safety Tracker

- Traverse City Light & Power
Cyber & Physical Preparedness

- Help members develop “all-hazards” approach to disaster preparation and response
- Show federal policymakers public power’s commitment to security and mutual aid
- Strengthen government/industry partnerships
- Minimize new federal regulation
DOE Cooperative Agreement Overview

• In 2016 the Association partnered with the Department of Energy (DOE) on a 3-year, $7.5M Cooperative Agreement;

• Year 1 – Analysis and Data Collection
• Year 2 – Deployment and Resource Development
• Year 3 – Sustainability

Acknowledgment: These activities are based upon work supported by the Department of Energy under Award Number DE-OE0000811.
Cybersecurity Scorecard

• Use existing cybersecurity models to inform a product that is usable by all public power utilities

• Developed a self-assessment tool called the public power Cybersecurity Scorecard

• Usable by small to mid-sized public power utilities to start evaluating their cybersecurity program

• Also scalable where all public power utilities will find it useful

• Complete your assessment today: https://publicpower.axio.com/

Acknowledgment: These activities are based upon work supported by the Department of Energy under Award Number DE-OE0000811.
Scorecard Evaluations

Member Metrics as of 10/07/19

• 296 public power utilities participating
  - (2019 Goal is to reach 400 utilities out of the 700 identified targets)
• 603 foundational cybersecurity self-assessments from the 554 users
  - (14 Questions – 45 minutes)
• 142 completed a full C2M2 assessment
  - (312 Questions – 2-3 days)
Michigan Cyber Activity

- Bay City Electric Light & Power
- City of Charlevoix
- Coldwater Board of Public Utilities
- Grand Haven Board of Light & Power
- Holland Board of Public Works
- Lansing Board of Water & Light
- Lowell Light & Power
- Marquette Board of Light & Power
- Michigan Municipal Electric Association
- Michigan Public Power Agency
- Michigan South Central Power Agency
- Traverse City Light & Power
- Zeeland Board of Public Works
Overview of Mutual Aid Process and Available Resources

This material is based upon work supported by the Department of Energy under award number DE-OE0000757.

#PublicPower www.PublicPower.org
About APPA’s Mutual Aid Network

• Public power utilities have engaged in mutual aid for over 100 years, primarily through local, state and regional efforts

• Late 90’s: Created a one-page mutual aid agreement developed by APPA and National Rural Electric Cooperative Association (NRECA)

• Approximately 2,000 municipal and cooperative utilities have signed it from across the country

• Not designed for extensive mutual aid contracting
Public Power’s MAP
Mutual Aid Playbook

A Guide to Response and Recovery for the Nation’s Public Power Utilities

July 2014

#PublicPower www.PublicPower.org
The Network That Was

APPA Idle

Calls into APPA:
1. Damaged area
2. Offers to help

What are the needs?

Define needs

Pair with offers

Put out request for help to Mutual Aid list

NOAA expert

Fed. Input

Regional expert

APP connects the dots

Members reply

Anyone requesting?

No

Yes

None

Some needs
Public Power’s National Challenge

White House

Department of Energy (OE/ERO)

EEI (investor-owned utility trade org)

APPA

NRECA (co-op utility trade org)

State Associations

Independent Municipals

Joint Action Agencies

Munis
Formalizing Public Power’s Mutual Aid Processes

- APPA/NRECA Mutual Aid Agreement developed in 1999.
- Post-Sandy Hotwash with DOE and DHS in Jan. 2013.
- Mutual Aid “Committee of the Willing” formed in June 2013.
- Gap analysis conducted, Meeting with President Obama in May 2013.
Formalizing Public Power’s Mutual Aid Processes

- Mutual Aid Plan Framework developed
  - Jan. 2014
- Mutual Aid Playbook developed; presented to U.S. DOE Sec. of Energy
  - Sept. 2014
- Mutual Aid Playbook presented to new Deputy Sec. of Energy, Sherwood-Randall
  - April 2015

- Public Power’s Mutual Aid Network at DOE’s Clear Path II event
  - May 2014
- MAWG Committees formed
  - Oct. 2014
- Fall 2015
  - Identify gaps and continue to refine
  - Coordination with industry and gov’t partners
  - Media relations education
  - Exercise
MAWG Members
This material is based upon work supported by the Department of Energy under award number DE-OE0000757.
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# Steady State/Isolated Event

<table>
<thead>
<tr>
<th>Level</th>
<th>Tier 1: Utility Coordinator</th>
<th>Tier 2: Network Coordinator</th>
<th>Tier 3: National Coordinator (American Public Power Association)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0</strong></td>
<td>No outages</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>Isolated event</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Steady State

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0</strong></td>
<td>No outages&lt;br&gt;Update contact and resources lists and communicate periodically with network coordinator</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>Isolated event&lt;br&gt;Assess need, respond to event, and determine if escalation is needed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0</strong></td>
<td>Compile contact and resources lists from utilities within network</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>None generally, but may assist with information as requested</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0</strong></td>
<td>Maintain mutual aid playbook and listserv</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>Maintain mutual aid playbook and listserv</td>
</tr>
</tbody>
</table>
Local/State Event

Local/State Mutual Aid Activated

**Level**

**Tier 1: Utility Coordinator**
- Communicate needs and available resources to network coordinator and update periodically
- Manage response within their utility

**Tier 2: Network Coordinator**
- Monitor response
- May assist identifying available resources
- Inform APPA of response, potential needs, and if preemptive call is needed

**Tier 3: National Coordinator**
(American Public Power Association)
- Monitor conditions for possible escalation
- Monitor response to inform federal agencies
Regional Event

Tier 1: Utility Coordinator
- Communicate needs and available resources to network coordinator
- Periodic updates of needs and resources as response proceeds

Tier 2: Network Coordinator
- Assist identification of available resources
- May work with other network coordinators to mobilize needed resources

Tier 3: National Coordinator
(American Public Power Association)
- Host preemptive call with affected network coordinators
- Monitor response to inform federal agencies
National Event

Level

Tier 1: Utility Coordinator

• Communicate needs and available resources to network coordinator
• Multiple daily updates of needs and resources as response proceeds
• Manage local response

Tier 2: Network Coordinator

• Assist identification of available resources
• Work with other network coordinators and APPA to mobilize needed resources

Tier 3: National Coordinator (American Public Power Association)

• Available to coordinate response
• Inform federal agencies
The Battle Rhythm:

- 9:30 AM  APPA Mutual Aid Network conference call
- 10:30 AM  DOE/Industry “Unity of Effort” call
- 12:30 PM  FEMA VTC – All ESF’s call w/White House
- 1:30 PM  DOE/Industry “Unity of Messaging” call
- 2:00 PM  NBEOC call – now ESF 14
- 3:00 PM  Cross Sector Coord Council Call
- 5:30 – 6:00 PM ish DOE Secretary / Industry CEO call
Your APPA staff gets tired......and little goofy ......

Thus – the annual meme...
Storm Pirates

Barry, because a storm name of Barry...
No Poles for you!
All Mutual Aid,
All the time

I can haz ready for storm?
much restore,
so power.
I can has Hurricane?

Cat 5?
Hurricane mode engaged!
KEEP CALM AND RESTORE THE POWER
Electrical Outage Estimates – ANL FOUO
2017 Storm Season Timeline (Hurricanes)
2018 Storm Season Timeline (Hurricanes)
2018 Storm Season Timeline (Typhoons)
2018 Storm Season Timeline (Typhoons)

- Tropical Depression = ≤62 km/h (≤39 mph)
- Tropical Storm = 63-88 km/h (39-54 mph)
- Severe Tropical Storm = 89-117 km/h (55-73 mph)
- Typhoon = ≥118 km/h (≥74 mph)
Hurricanes Strength

SAFFIR-SIMPSON HURRICANE SCALE

STORM SURGE (ft)

WIND SPEED (mph)

PRESSURE (mbars)

CATASTROPHIC
EXTREME
EXTENSIVE
MODERATE
MINIMAL

DAMAGE LEVEL

Graphic Design By RL Shepherd
Storm Season Timeline

- **HARVEY (Cat. 4)**
  - Location: Rockport, Texas
  - Date: Aug. 25

- **NATE (Cat. 1)**
  - Location: LA/MS
  - Date: Oct. 7-8

- **IRMA (Cat. 4)**
  - Location: South Florida
  - Date: Sep. 10

- **MARIA (Cat. 4)**
  - Location: Puerto Rico
  - Date: Sep. 20
Storm Season Comparison: Harvey = Water

How the recent storms compare

<table>
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<tr>
<th>Storm</th>
<th>Peak rain total</th>
<th>Peak rain rate</th>
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<tbody>
<tr>
<td>Harvey</td>
<td>60.58 inches</td>
<td>5.8 inches/hour</td>
</tr>
<tr>
<td>Irma</td>
<td>20 inches</td>
<td>10.8 inches/hour</td>
</tr>
<tr>
<td>Maria</td>
<td>20 inches</td>
<td>6.4 inches/hour</td>
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</table>

Texas | Cuba | Puerto Rico

SOURCE: NOAA, NASA
Harvey
Harvey
Storm Season Comparison: Irma & Maria = High Winds (Cat 5 on SS Scale)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Hurricane</th>
<th>Season</th>
<th>Winds</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>mph</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>km/h</td>
</tr>
<tr>
<td>1</td>
<td>Allen</td>
<td>1980</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>305</td>
</tr>
<tr>
<td>2</td>
<td>&quot;Labor Day&quot;</td>
<td>1935</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>295</td>
</tr>
<tr>
<td></td>
<td>Gilbert</td>
<td>1988</td>
<td>185</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>295</td>
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<td>Wilma</td>
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<td>185</td>
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<td></td>
<td></td>
<td></td>
<td>295</td>
</tr>
<tr>
<td></td>
<td>Irma</td>
<td>2017</td>
<td>185</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>295</td>
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<td>6</td>
<td>Mitch</td>
<td>1998</td>
<td>180</td>
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<td>Rita</td>
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<td>180</td>
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<td></td>
<td></td>
<td>285</td>
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<td>8</td>
<td>&quot;Cuba&quot;</td>
<td>1932</td>
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<td></td>
<td></td>
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<td>Carla</td>
<td>1961</td>
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<td>Camille</td>
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<td></td>
<td></td>
<td></td>
<td>280</td>
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<td></td>
<td>David</td>
<td>1979</td>
<td>175</td>
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<td></td>
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<td>280</td>
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<td>Andrew</td>
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<td>175</td>
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<td>280</td>
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<td></td>
<td>Katrina</td>
<td>2005</td>
<td>175</td>
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<td></td>
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<td>Dean</td>
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<td></td>
<td>Maria</td>
<td>2017</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>280</td>
</tr>
</tbody>
</table>

For CONUS storms, we model for typical restoration of service ... and muni’s look good!
Not so easy on Island time...

Percent of customers with electricity after Irma and Maria
Puerto Rico's electricity recovery is stuck

Source: DOE, Status.pr
Why was USVI/Puerto Rico/CNMI/ASPA Different?
Mutual Aid – what we do best...but we can’t drive to the Islands....
Transportation/shipping issues...
IMT Team Assignments

Above logos correspond to regional IMT organization
Roof Top Pole Lines?
Aging equipment.....
Vegetation Management...?

Guying?

Pole Depth..?
Service drop.....
Renewable Generation?
Lets try Wind?

Naguabo, PR (Getty Images)
Spot generation...
Microgrids...

7 Mil/Day in fuel alone.....
Is there an easy fix?

- Pre-storm condition of assets matters…
  - Vegetation
  - Maintenance (including vehicles)
  - Construction (ex pole depth….)
  - Supply of materials
- Adherence to standards
  - Codes…..and other best practices.
- Need for collaboration
  - Mutual Aid…
    - Agreements in advance of storm
    - Better / more robust Mutual Aid agreements…..
- Conferences/education
- Sharing of Best Practices
  - FEMA ICS
  - Restoration leading practices
April – 2018
Rightsizing the workforce on Puerto Rico
2018 Storm Season

• Hurricane Florence
• Hurricane Michael
• Typhoon MangKhut
• Typhoon Yutu
2018 – Marketing of “Unity of Effort” across the electric industry

Hurricane Michael:
Mutual Assistance Is A Hallmark Of The Electric Power Industry

More Than 30,000 Workers Mobilized to Restore Power

As of 10/10/2018
Typhoon Yutu
Typhoon Yutu
New Last Year: Mutual Aid Commendation

Handed out over 350 to date!..........

MUTUAL AID COMMENDATION

Your Utility Name Here

In recognition of its support in electric power restoration efforts, the American Public Power Association recognizes Kissimmee Utility Authority for providing mutual aid assistance to Puerto Rico.

NOVEMBER 2017

Susan N. Kelly
President & CEO
<table>
<thead>
<tr>
<th>Utility</th>
<th>St</th>
<th>Utility - received aid</th>
<th>St</th>
<th>Nomination Received</th>
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<td>Coldwater BPU</td>
<td>MI</td>
<td>Ocala Electric Utility</td>
<td>FL</td>
<td>6/20/2018</td>
</tr>
<tr>
<td>Coldwater BPU</td>
<td>MI</td>
<td>City of Bartow</td>
<td>FL</td>
<td>6/20/2018</td>
</tr>
<tr>
<td>Coldwater BPU</td>
<td>MI</td>
<td>City of Clewiston</td>
<td>FL</td>
<td>6/20/2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td>City of Tallahassee Electric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coldwater BPU</td>
<td>MI</td>
<td>Utility</td>
<td>FL</td>
<td>6/20/2018</td>
</tr>
<tr>
<td>Coldwater BPU</td>
<td>MI</td>
<td>Homestead Energy Services</td>
<td>FL</td>
<td>6/20/2018</td>
</tr>
<tr>
<td>Coldwater BPU</td>
<td>MI</td>
<td>Orlando Utilities Commission</td>
<td>FL</td>
<td>6/20/2018</td>
</tr>
<tr>
<td>Coldwater BPU</td>
<td>MI</td>
<td>Consolidated Edison</td>
<td>#N/A</td>
<td>6/21/2018</td>
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<tr>
<td>Marshall Electric Dept.</td>
<td>MI</td>
<td>Consolidated Edison</td>
<td>#N/A</td>
<td>6/21/2018</td>
</tr>
</tbody>
</table>
Additional Resources

- Emergency Preparedness Tabletop Exercise-in-a-Box
- Storm Communications Toolkit
- FEMA Public Assistance & Hazard Mitigation Grant Programs Toolkit
- Restoration Best Practices Guidebook
- All-Hazards Guidebook
- National Exercises - Yearly

This material is based upon work supported by the Department of Energy under award number DE-OE0000757.
• 15,000 families without electricity
• (75% of US families with out access to electricity)
• 280,000+ Square mile territory
• <$12,000 median income

#LightUpNavajo
Thank You! 2019 Light Up Navajo Volunteers

City of Milford (DE)
City of Santa Clara (UT)
City of Scottsburg (IN)
City of St George (UT)
City of Wadsworth (OH)
Conway Corporation (AR)
Delaware Municipal Electric Corp (DE)
Farmington Electric Utility System (NM)
Grand River Dam Authority (OK)
Greenville Electric Utility System (TX)
Heber Light & Power (UT)
Lawrenceburg Municipal Utilities (IN)
Lehi City Power (UT)

Littleton Light Department (MA)
Murray City Power (UT)
Painesville Electric Department (OH)
Paxton Municipal Light Department (MA)
Piqua Power System (OH)
Rochelle Municipal Utilities (IL)
Sacramento Municipal Utility District (CA)
Salt River Project (AZ)
Sterling Municipal Light Department (MA)
Town of Smyrna (DE)
Washington City Power (UT)
West Boylston Municipal Light Plant (MA)
Light Up Navajo Stats

- 25 public power organizations
- 120+ volunteers
- 50+ miles of line built
- $272,360 donated
- $440,500 volunteer linework
- 233 families connected
INTRODUCTION TO SMART ENERGY USE

APPA recognizes that each utility has a unique set of characteristics, and that size, geographic region, and other factors play a significant role in determining the best path for utilities navigating the sea change in the electric utility industry.

- **APPA Members**
  - Looking for national initiatives
  - Desire for strong and practical program
  - Difficult to audit

- **APPA**
  - Provides path and recognition for member efforts in -- energy efficiency, clean energy, and sustainability
  - Help with initiatives at federal agencies
**SEP PROGRAM OVERVIEW**

What is the Smart Energy Provider (SEP) program?

“a best practices designation for the ‘greener’ side of utility operations”

1. National recognition of utility efforts and commitment to incorporating energy efficiency and sustainability while providing reliable electric service
2. Help public power utilities benchmark their work in this area against others in the industry
3. Provide a vehicle for peer evaluation based on a set of industry best practices
### SEP APPLICATION OVERVIEW

<table>
<thead>
<tr>
<th>Season</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>Application is due (May 15, 2019)</td>
</tr>
<tr>
<td>Summer</td>
<td>Grading meeting</td>
</tr>
<tr>
<td>Early November</td>
<td>SEP designation released at CCC meeting</td>
</tr>
<tr>
<td>December</td>
<td>Application release</td>
</tr>
</tbody>
</table>

- **SEP Review Panel**
  Conducts application reviews

- **Designation**
  - Two years period
  - Pass/fail system
  - (>70 points receive designation)
APPLICATION DISCIPLINES

- Smart Energy Information (20%)
- Energy Efficiency & Distributed Energy Resources (37%)
- Environmental & Sustainability Programs/Initiatives (23%)
- Communication/Education & Customer Experience (20%)
Michigan Activity in Smart Energy

- Holland Board of Public Works
- Zeeland Board of Public Works