Agenda

10:00 a.m. – 10:45 a.m.  Welcome & Tour

10:45 a.m. – 11:00 a.m.  Opening Remarks: Resiliency Matters

11:00 a.m. – 12:00 p.m.  Presentations:
                         Operations
                         Capital Projects

12:00 p.m. – 1:30 p.m.  Lunch & MISO Presentation

1:30 p.m. – 2:00 p.m.  Presentation:
                       Planning

2:00 p.m.  Closing remarks & depart for networking
Resiliency Matters

Resiliency: the ability of a power system to withstand or quickly recover from disruptive events such as a sudden wind storm or physical attack.

Our society depends on reliable electric power to drive the economy.

Increasing demands and threats pose a challenge.

Proactive and collaborative planning is the key to ensure a resilient system for the benefit of customers.
Topics

• System Stats (upgrades, load, generation)
• Summer Assessment
• Impact & Risk Management
• MACE Program
System Upgrades

**METC System**
1. Newton 138 kV (Coldwater)
2. Ash Road 138 kV (Coldwater - Moore Rd)

**ITCT System**
1. Stone Pool (Cato - Midtown)
2. Skylark (Northeast - Sloan)
3. Hilton Road (Lincoln - Northeast)
4. Cyril (Caniff - Mack)
5. Mercury (Arctic - Crestwood)
6. Toll Road (Station & 1 Line)
7. Southfield – Quaker 120 kV (Cable)
ITCT Load Forecast

- ITCT summer 2018 forecasted peak load 11,342 WM
- About 6% higher than 2017
- About 9% lower than the 2011
- 10,361 MW on May 29th ~ 600 MW lower than all time May peak (2006)
METC Load Forecast

- METC 2018 summer peak load forecasted to be ~ 8,828 MW
- Slightly lower than the 2017
- About 12% lower than the actual 2011 peak
- 8,447 MW on May 29th ~ 900 MW higher than all time May peak (2006)
Changing Generation Mix

- About 294 MW of new generation has been connected (including uprates) since last summer.
  - Additional 1,328 MW with GIAs (signed or under negotiation)

- Significant retirements have occurred over the last several years however no new retirements / suspensions for this summer
Summer Assessment

- ITC performed independent system assessment for our Michigan systems
- Considered system normal and N-1 contingency analysis
  - MISO CSA case with projected SDX load & generation data
  - State estimator model also utilized
- Varying flows across system
- Known long-term outages considered
Summer Assessment Results

**Thermal Loading**

>95% of summer emergency rating:

- **Base Case**: None ✓
- **N-1**: None ✓
- **Additional Study**: None ✓

**Voltage Violations**

Outside of summer emergency limits:

- **Base Case**: None ✓
- **N-1**: None ✓
- **Additional Study**: None ✓
Summer Preparation

- Reviewed existing standing operating guides and updated as necessary
- Participated in MISO’s 2018 Coordinated Summer Assessment
- Summer assessment training to all operators is complete
- Meetings to review summer assessments with LDC’s
- Preventative maintenance including substation equipment inspections & bi-annual line patrols
With system improvement projects in place, well established maintenance practices and our Impact & Risk Management process, the ITC transmission systems are expected to meet projected summer demands for a wide range of operating conditions.
Process to efficiently and effectively perform the needed work on our facilities while managing the impacts that unintended events could have on our customers and the broader bulk electric system.
Impact & Risk Management | Key Components

Four Key Components:

1. Identify possible unintended outcomes
2. Manage risk of realizing unintended outcomes
3. Identify impact of realizing unintended outcome
4. Manage potential impact

Safe & Reliable
**Impact & Risk Management | Example**

**Relay Work**

- **Possible unintended outcome**
  - Unintentionally tripping breakers

- **System Impact**
  - Loss of ~ 500 MW of generation

**Risk management**
- Peer review
- Isolating work area

**Manage potential impact**
- Perform work at lower load levels or when the unit is scheduled off line
Impact & Risk Management | Example

**Transformer or Line Work**

- **Possible unintended outcome**
  - Loss of remaining transformer or line (drop ~50 MW load)

- **System Impact**
  - Loss of ~50 MW of load

- **Risk management**
  - Peer review
  - Isolating work area
  - Reviewing inspection records

- **Manage potential impact**
  - Perform work at lower load levels
  - Development of restoration plans
• The world is not one big road --- we don’t have an infinite bus

• System is planned to a finite number of scenarios considering a defined set of Planning Criteria (ITC & NERC)
  ➢ Bookend

• System is operated to an infinite number of scenarios
  ➢ Changes from day to day
Market Analysis and Congestion Evaluation (MACE)

- ITC developed program to help monitor congestion in our footprints and act on that information when possible.
- Continually evolving work in progress since early 2013
MACE Program | Why...Customer Impact

- Increased awareness on the impact our outages (planned and unplanned) can have on congestion & our customers
- Reduce congestion impact while still completing work necessary for reliability
- Improve overall transmission system utilization (maximize delivery)
Calculated cost of congestion is just a benchmark using MISO’s binding constraint report \((\text{Flow} \times \text{Shadow Price})\).

- Not true cost of congestion to customers

Customers hedge for congestion with a variety of tools:
- Day Ahead vs. Real Time, FTR’s, Virtual Transactions, etc.

Impossible for ITC to calculate true cost of congestion in our footprints.

However, benchmark indicates the magnitude of “unhedged” congestion and allows us to track trends.
• **Look Ahead: Outage Scheduling**
  - Monitor historical congestion trends
  - If feasible, rearrange outages
• **Real Time**
  - Discuss with MISO
  - Verify ratings (equipment & facility)
• **After the Fact**
  - Daily/weekly/monthly reporting
  - Deep dive on top 4 constraints
Questions?
CONNECTING
Energy Infrastructure
Capital Projects
Jason Sutton, Manager
Capital Projects
Alpine Interconnection

Highlights

• To interconnect WPSC Alpine Generator
• Built two new 138 kV rows at Livingston
• Rebuilt 3 miles of Livingston – Stover 138 kV line

• Started: Feb 2016
• Completed: May 2016
Amber – Donaldson Creek 138 kV Rebuild

Highlights

• 19.8 mile rebuild from 336 to 954 ASCR
• Future double circuit 138 kV capability
• Relieves shutdown plus contingency scenarios

• Starting: September 2018
• Completion: June 2019
Coldwater Interconnection

Phase 1

- New 138 kV substation, Newton
- New 3-mile 138 kV line from Newton to Michigan Ave substation

- Started: Q4 2016
- Completed: Q1 2017
Coldwater Interconnection

Phase 2

- New 138 kV substation, Wagner, to be cut into the Verona – Batavia 138 kV line
- New 13-mile 138 kV line from Newton to Wagner substation
- Michigan Avenue substation expansion

- Starting: Q4 2018
- Completion: Q4 2019
J340 Interconnection

Highlights

• To connect a new 100 MW wind farm, Apple Blossom, to the grid
• ITC constructed a new 6-mile 120 kV line to interconnect with Sempra

• Started: May 2017
• Completion: September 2017
• Final Configuration to be completed Q4 2018
Ludington Breaker Replacements

Highlights

• Replacing 13 345 kV circuit breakers
• 6 345 kV disconnect switches
• Mitigates transient voltage rises
• Replaces aging equipment

• Scheduled Start: 9/4/18
• Tentative completion: 12/31/2019
Network Upgrades Needed at Palisades

- Create a new 33 row to make room for new line to Segreto

- Construct a new 345 kV line to AEP’s Segreto Substation (Segreto 3)

- Create a new 23 row to allow Segreto 1 line to move off of row with Unit Generator
Verona – Batavia 138 kV Rebuild

Verona – Barnum Creek Rebuild
• 6.2 mile rebuild from 266 and 336 to 954 ASCR
• Future 230 kV double circuit capability
• Relieves shutdown plus contingency, and breaker failure scenarios
• Started April 2018 continuing through June 2018
• Resuming September 2018 through November 2018
Barnum Creek – Batavia Rebuild

- 15.6 mile rebuild from 266 to 954 ASCR
- Future 230 kV double circuit capability
- Reliability project

- Staring: January 2020
- Completion: December 2020 (breaking for the summer months)
Meyer EHV Station

Highlights

• New EHV substation
• Cuts into 2 345 kV lines, and 1 138 kV line
• To relieve outage plus contingency scenarios

• Starting: Q4 2018
• Completion: Q3 2019
Questions?
Lunch & MISO Presentation
CONNECTING
Energy Infrastructure
Future Planning Projects
John Andree, Manager, Planning
Topics

METC
• Alpena Area Projects – Long Rapids Station
• Alpena Area Projects – Long Rapids-Airport 138 kV #2
• Stronach 138 kV Breaker and a Half Station Rebuild
• Coldwater Phase 2 – Newton to Wagner 138 kV
• Wolverine Power Interconnection Projects
• Consumers Energy Interconnection Projects

ITCT
• DTE Interconnection Projects
• Croswell Interconnection
Alpena Area Projects – Long Rapids Station

MISO MTEP18 Project #13949

Tentative ISD 12/31/2021

Rebuild METC portion of Alpena 138 kV station to full breaker and a half configuration, higher in flood plane of dam

Increases reliability to Alpena Power connections, replaces aged equipment, allows connection of additional 138 kV lines
**Alpena Area Projects – Long Rapids-Airport 138 kV #2**

**MISO MTEP18 Project #3135**

Tentative ISD 12/31/2021

Rebuild METC Airport-Alpena 138 kV line to double circuit, add 2nd circuit between two stations.

Alpena station fed from 3 138 kV METC lines (Karn to south, Riggsville to north, Airport/Mio to west).

Single or double outages can cause very low voltages in Alpena area.

Alpena (future Long Rapids) would now be fed from 4 sources, allowing METC more maintenance opportunities and providing Alpena and others in area improved reliability.
Stronach 138 kV Breaker and a Half Station Rebuild

MISO MTEP18 Project #13948

Tentative ISD 6/1/2021

Rebuild METC Stronach 138 kV station to full breaker and a half configuration. Connect new Consumers Energy 138 kV line from Boxboard and re-terminate all other 138 kV connections into new station.

Boxboard load and Filer City generation are currently fed from one 138 kV radial line. Maintenance outages on the line or at Stronach are very difficult to get.

New station is needed to connect new CE line to minimize outage duration during construction.

New station will allow future connection to a 2nd 138 kV line to Pere Marquette, which is being studied in a current MISO generation interconnection study as a needed upgrade.
Coldwater Phase 2 – Newton to Wagner 138 kV

MISO MTEP16 Project #10323

Tentative ISD 12/31/2019

Bring 2\textsuperscript{nd} feed to Coldwater’s Newton station by building a ~13 mile 138 kV line to a new station (Wagner) on the Verona-Batavia circuit.

Increasing load on the Coldwater system, along with the commercial nature of the load led Coldwater to request Newton be fed from 2 sources

Phase 1 of the project was completed in 2017. Phase 2 is currently in the right of way acquisition phase.
**Donaldson Creek (MTEP18 id 13953, 2019)**
- Add breakers to 138 kV station
- Connect two WPSC converted 138 kV lines to Rogers and Plains Jct.

**Sternberg (MTEP18 id 13957, 2020)**
- Convert existing station to ring bus
- Connect converted 138 kV WPSC line to Casnovia to Sternberg ring bus
- Improves Sternberg connection reliability to CE, WPSC and Grand Haven.

**Blendon (MTEP18 id 14060, 2020)**
- Purchase WPSC’s 69 kV ring bus station, convert to 138 kV
- Retire existing METC Blendon station
- Reconnect all METC, Zeeland and WPSC lines to station (WPSC to covert Blendon-Fairview to 138 kV)

**Bradley (MTEP18 id 14067, 2020)**
- WPSC rebuilding existing station nearby
- METC reconnecting lines to new station
- WPSC converting Bradley-Burnips-Fairview to 138 kV

WPSC multi-year project to convert parts of 69 kV system to 138 kV. Announced retirement of Grand Haven generation accelerated work at Blendon and Bradley.
Consumers Energy Interconnection Projects

Polkton (MTEP18 id TBD, 2020)
- New 138 kV station to connect 46 kV transformer
- Cut in Cobb to Tallmadge 138 kV circuit
- Ottawa County

Fieldstone (Henry) Substation (MTEP17 id 12385, 2022)
- New 138 kV station to connect a new industrial customer
- Cut in Gaines to Plaster Creek 138 kV circuit
- Kent County
State and Apex (MTEP15 id 9362, 2018-19)
• Two new stations to connect Ann Arbor & U of M load
• Two 120 kV overhead lines from Pioneer to State
• Two 120 kV underground lines from Phoenix to Apex
• Washtenaw County

Bartlett Substation (MTEP15 id 7892, 2020)
• New 120 kV general purpose station to feed the Pontiac area
• Cut in Bloomfield to Hood 120 kV circuit
• Oakland County

Nitro Substation (MTEP17 id 12443, 2020)
• New 120 kV general purpose station to feed the Northville area
• Connect to two independent 120 kV circuits
• Wayne County
Midas Substation (MTEP18 id 13646, 2019)
- New 120 kV general purpose station
- Cut in Robin to Wabash 120 kV circuit
- Lapeer County

Magneto Substation (MTEP18 id 15064, 2019)
- New 120 kV industrial station
- Cut in Quaker to Southfield 120 kV circuit
- Oakland County

Morton Substation (MTEP18 id 14924, 2020)
- New 120 kV general purpose station
- Cut in Douglass to Visteon 120 kV circuit
- Wayne County
Croswell Interconnection

MISO MTEP TBD

Tentative ISD 12/31/2020

Bring feed to Croswell system from Lee station, utilizing abandoned 120 kV right of way between Lee and Sandusky.

Croswell City Light and Power Looking for additional reliability of 120 kV connection to the ITCT system.

Tentatively utilizing abandoned 120 kV right of way ITCT owns for much of the 7.5 mile path between Lee and Croswell.
Questions?
Thank You for Attending