

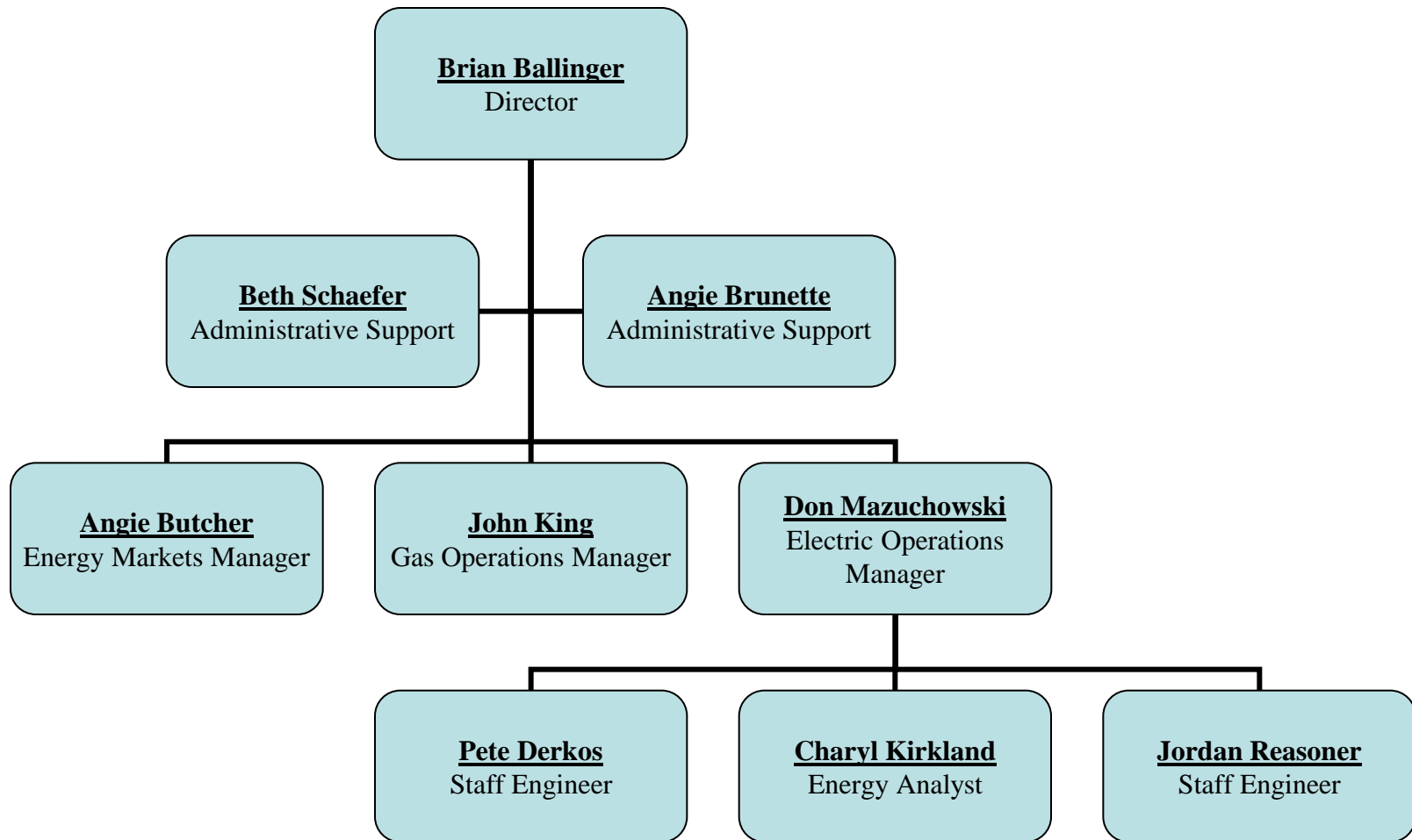


Commercial and Technical (Supply and Voltage) Quality

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Operations and Wholesale Markets Division



Electric Operations Responsibilities

- Electric Distribution Reliability
- Power Quality
- Summer Readiness
- Electric Complaints
- Electric Service Area disputes
- EMF Concerns
- Stray Voltage Issues
- Pole Attachment Issues
- Emergency Operations
- Transmission Planning

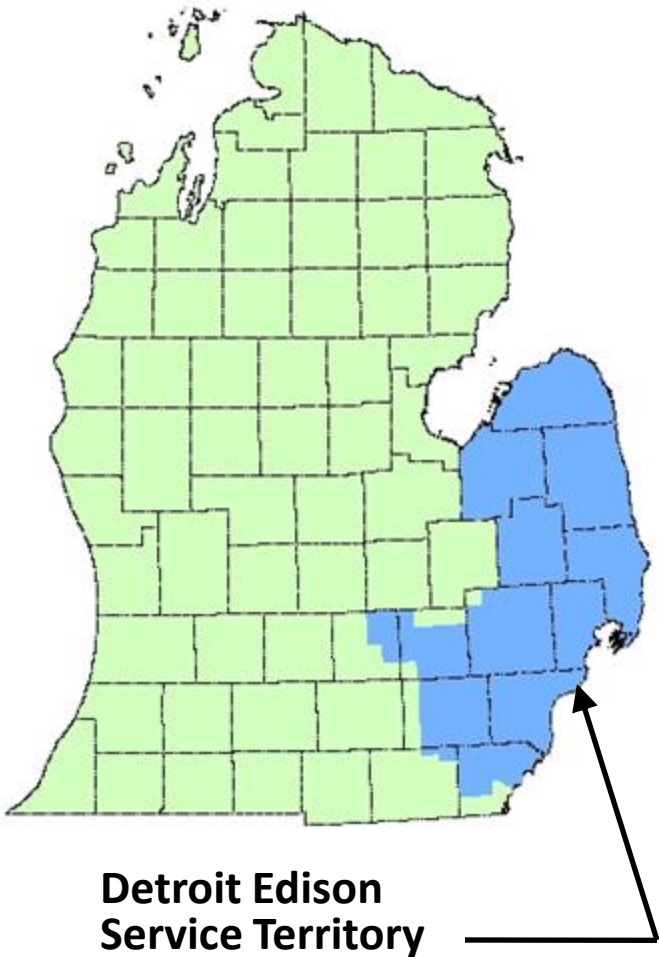
Transmission Companies must conform to:

- Federal Standards in providing safe and reliable power
- Federal Standards
 - NERC-North American Electric Reliability Corporation
 - NESCC-National Electrical Safety Code

Michigan Utilities

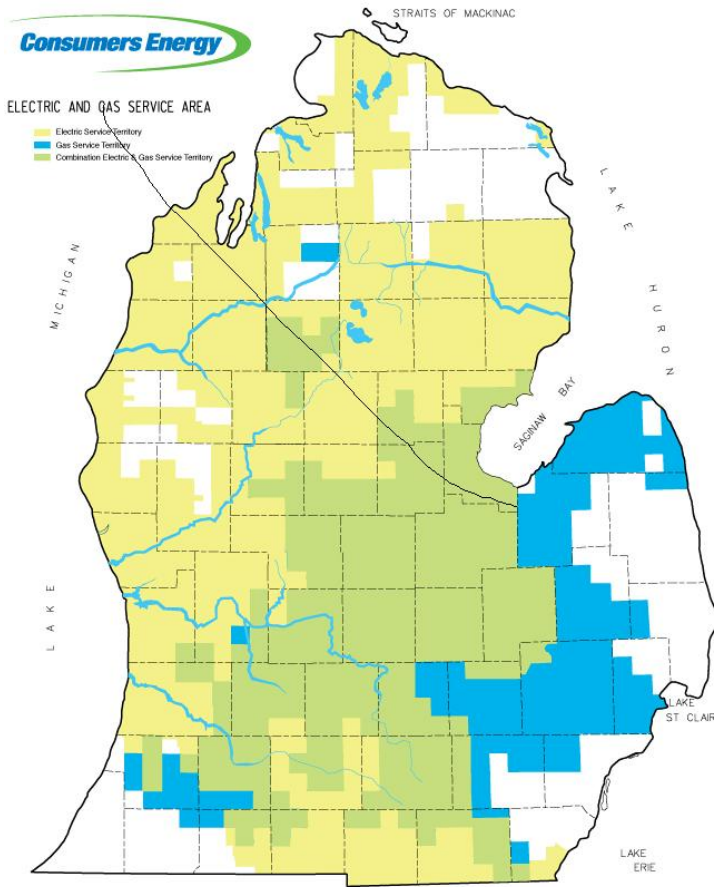
- Nine Private Owned Electric Utilities (Investor Owned)
- 10 Rural Electric Cooperatives (aka:“Co-ops”)
- 44 Municipal Electric Utilities (aka:“Munis”)-not regulated by MPSC
- Three Transmission Companies-partially regulated by MPSC

Detroit Edison Statistics



Service area square miles	7,600
Number of customers	2,100,000
Number of Substations	678
Number of substation transformers	1,630
Number of Distribution circuits	2,800
Miles of subtransmission circuits (OH & UG)	3,535
Miles of distribution circuits (OH & UG)	41,989
Number of poletop transformers	291,052
Number of URD transformers	128,579
Number of wood poles	1,000,000

Consumers Energy Statistics



- Electric customers: 1.8 million
- Cities and Villages: 275
- Distribution system: 70,000 miles
- Transformers: 592,000

Consumer Energy's Generation

- 13 Hydro electric plants
- 14 fossil fuel plants
- 1 Pumped Storage generation facility
955 Megawatts(CE share)
- Several combustion turbine units
more than 20
- Total Generation capability
6,354 Megawatts

Regional Transmission Operators

- MISO- Midwest Independent System Operator
 - Controls 15 states and Canada including most of Michigan
 - PJM Interconnection
 - Controls a small portion of Southwest Michigan as well as 12 other States and the District of Columbia

Regional Transmission Companies

- Safe cost effective delivery of Electric Power
- Committed to Reliability
- Non-discriminatory operations and access to Bulk Power Transmission System
- Unbiased Regional Grid Management
- Operates a competitive wholesale electric market

Three Major Components of Electric Utility Industry

Transmission

Generation

Distribution

MPSC Website

- www.michigan.gov/mpsc
- Contains following Rules and Regulations
- Technical Standards for Electric Service
- Service Quality and Reliability Standards
- Stray Voltage rules
- Underground Line Extension rules
- Standards of Good Practice
- Transmission Line Certificates

Rules and Regulations

- Go to MPSC Website
www.michigan.gov/mpsc
- Click on Documents Library tab
- Click on Administrative Rules and Guidelines tab
- Click on Electric or General section

Technical Standards for Electric Service R460.3101-460.3908

- Rules established by MPSC to regulate Utility Operations
- Meter requirements
- Standards of good practice
- Extensions of Service
- Engineering
- Areas served by 2 or more utilities
- Safety
- Interruptions of service

Engineering

- Adopt National Electrical Safety Code as standard of good practice
- Utility inspection program must ensure safe and reliable operations
- Maintain adequate line clearance through the use of industry-recognized guidelines
- Meter testing requirements
- Establish 60 hertz as standard frequency

Engineering

- Establish standard voltage and limit variation of 120 volt system to 5%(+/- 6 volts)
- Safety regulations
- Reasonably avoid interruptions
- Restore service within the shortest time practical

Service Quality and Reliability Standards

<u>Section</u>	<u>Performance Metric/Measure</u>	<u>MPSC Target</u>
(a)	Call Blockage Factor Percent of customer calls not answered	$\leq 5\%$
(b)	Complaint Response Factor Percent of customer complaints forwarded by MPSC responded to within 3 business days	$\geq 90\%$
(c)	Average Customer Call Answer Time Average time in seconds to answer customer telephone calls	< 90 seconds
(d)	Meter Reading Factor Percent of meters read within the billing period	$\geq 85\%$
(e)	New Service Installation Factor Percent of new services installed within 15 days	$\geq 90\%$
(f)	Wire Down Relief (Police/Fire Standing By) Percent cases with Police/Fire standing by relieved within: i) 240 minutes – metro area ii) 360 minutes— non-metro area	$\geq 90\%$
(g)	Service Restoration—All Conditions Percent of customers restored within 35 hours	$\geq 90\%$
(h)	Service Restoration—Normal Conditions Percent of all customers restored within 8 hours	$\geq 90\%$
(i)	Service Restoration--Catastrophic Conditions Percent of customers restored within 60 hours	$\geq 90\%$
(j)	Same Circuit Repetitive Restoration Percent of circuit elements with >5 outages in 12 month period	$\leq 5\%$

Institute of Electrical and Electronics Engineers(IEEE) Standard 1366-2003

- SAIDI- System Average Interruption Duration Index
- SAIFI- System Average Interruption Frequency Index
- CAIDI- Customer Average Interruption Duration Index
- SAIDI, SAIFI AND CAIDI are normally reported by utilities with and without “major event days”

SAIFI

- SAIFI represents the average annual number of interruptions per customer served. It is determined by dividing the sum total number of customers interrupted by the total number of customers served during the year.

$$\left(\frac{\text{sum total number of customers interrupted}}{\text{total number of customers served}} \right)$$

CAIDI

- CAIDI represents the average restoration time per outage. It approximates the average length of time required to complete service restoration. It is determined by dividing the total number of customer minutes interrupted by the total number of customers interrupted.

$$\left(\frac{\text{total number of customer minutes interrupted}}{\text{total number of customer interrupted}} \right)$$

SAIDI

- SAIDI represents the average annual number of minutes of interruption per customer served. It is calculated by dividing the sum of customer minutes interrupted by the total number of customers served.

$$\left(\frac{\text{sum of customer minutes interrupted}}{\text{total number of customers served}} \right)$$

Power Quality

- Utilities work with their customers to resolve problems
- Two largest utilities each have approximately 175 meters measuring voltages on large industrial customers continuously.

Power Quality

Category	Types	Typical Duration	Common Causes
Transients	Oscillatory, Impulsive	Less than 1 cycle	Lightning, Switching Loads
Short Duration Variations	Sags, Swells, Interruptions	Less than 1 minute	Faults, Motor Starting, Utility Protective Equipment
Long Duration Variations	Undervoltages, Overvoltages, Sustained Interruptions	Over 1 minute	Poor Voltage Regulation, Incorrect Transformer Tap Setting, Overloaded Feeder, Utility Equipment
Voltage Imbalance	—	Steady State	Unbalanced Loads, Equipment Failure
Waveform Distortion	Harmonics, Notching, Noise	Steady State	Electronic Loads
Voltage Fluctuations	—	Steady State	Arcing Loads, Loose Connections
Power Frequency Variations	—	Steady State	Poor Generator Control

The chart above is a summary of the terms described in IEEE-1159

Summer Readiness

- Meet with two largest utilities before summer begins
- All Utilities and Transmission companies report annually on expected load, capacities and reserve margin.
- MISO reports on reserve capacities before summer begins
- During summer receive weekly reports from two largest utilities on expected weather, peak demand, capacity available and reserve margin.
- During summer receive weekly call from two largest utilities to talk about weekly reports

Electric Operations

- 2009 Power Quality and Generation cost Efficiency report
- 2009 Pole Inspection report
- Update Emergency procedures
- Received a Stray voltage complaint
- Monitored rate cases