


Montana-Dakota Utilities Co.

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A History of Upper Midwest Transmission System Development

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"The Grid"

- Regional electric providers have a history of cooperation to bring reliable, affordable electricity to towns and farms in the Midwest
- As our towns and farms have changed, so have the demands on "the grid"
- Cooperation and the challenges ahead are the story

In the beginning...

- Communities had generation and distribution systems
- Increased demand = increased generation
 - **Transmission** connected generation to communities
 - **Central coal-fired plants** replaced small town generators
 - Provided less expensive source of electricity
 - Increased service reliability

What about rural areas?

- Public Utility Holding Company Act (PUHCA) - 1935
- Required 'aid in contribution of construction'
 - Limited the ability of investor-owned utilities to serve rural customers
 - Led to the Rural Electrification Act and formation of rural electric cooperatives

The backbone of the “grid”

- Extra-high voltage systems of 115,000 and 230,000 volts
- Developed by U.S. Department of Interior, Bureau of Reclamation (USBR) in the '40s and '50s along with the dams on the Missouri

1947: Early cooperation...

- USBR and Montana-Dakota provided reciprocal transmission service to customers
 - USBR customers: rural electric co-ops
 - Montana-Dakota customers: franchised towns
 - Avoiding duplication of facilities
- Birth of the bulk transmission system in eastern Montana and western North Dakota

...and growth

- Three independent, separate electrical systems developed in the United States and Canada
 - **Eastern** Interconnection (east of North Dakota, South Dakota, Nebraska, Kansas and Oklahoma)
 - **Texas** Interconnection
 - **Western** Interconnection (remainder of U.S. and Canada)
- In ND: interconnections between Otter Tail Power, United Power (now Great River Energy), Northwestern Public Service and Minnkota

Utilities coordinate activities

- Mid-continent Area Power Pool (MAPP) formed in 1972 by upper Midwest and Canadian utilities
- Coordinate generation/transmission plans
- Established standards for generation reserves
- Led to jointly owned transmission and generation to serve each company's native load
- Local utility controlled their generation and transmission operation and planning

A changing paradigm...

- Federal Legislation
 - PURPA 1978
 - Required utilities to purchase and/or deliver power from non-utility generators
 - FERC Order 888
 - Required transmission be available to any generator or utility
 - Reciprocity required for utilities not under FERC jurisdiction
 - FERC Order 2000
 - Recommended formation of regional transmission organizations to control transmission service

...wholesale transfers

- FERC action supported wholesale power transactions in Midwest
- Increased demands on systems built to serve local loads

A regional RTO – MISO

- Midwest Independent Transmission System Operator (Midwest ISO)
- Formed in response to FERC Order 888; became an RTO per Order 2000
- Indiana headquarters; regional office in St. Paul
- Montana-Dakota, Otter Tail and Xcel are only North Dakota utility members

Who's a MISO member?

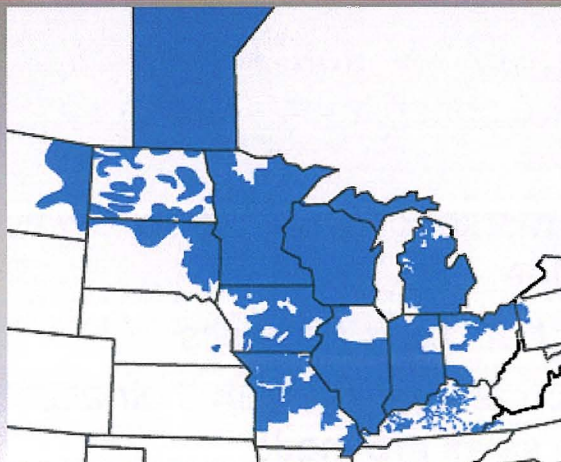
- FERC expectation for IOU's to join RTO
- Municipals, cooperatives, federal power agencies and independent power producers are not required to be MISO members
- Non-members can be- and are- *market* participants
- Creates a transmission patchwork

Midwest ISO (MISO)

- **What is the Midwest ISO?**

- Nonprofit organization
- 15 states and Manitoba
- 100,000 miles of transmission - 950,000 square miles
- Operational December 15, 2001
- First FERC approved RTO
- 30 transmission owners; 65 non-transmission owners

Midwest ISO (MISO)



Office locations: Carmel, Indiana; St. Paul, Minnesota

MISO's responsibilities

- Transmission **operation** for members
- Providing transmission **access**
- Transmission **expansion** planning for members and coordination with non-members
- Energy **markets**
- Transmission use changed from "local roads" to "superhighway"

The energy market..

- Energy can be **sold** and **purchased** as forward commitments or in a spot market.
- Spot market prices adjust every five minutes
- MDU both buys and sells
- Customers benefit from their assets when sales are made

What does MISO worry about?

- Cost allocation and recovery
- Allocation of benefits
- Revenue requirements
- Rate pancaking
- License plate vs. postage stamp rates

What drives transmission expansion?

- Generator *interconnection* requests
- Customer *load growth*
- North American Reliability Corporation's (NERC) *reliability criteria*
- Elimination of *constraints*
- Economic *power transfers*
- *Renewable energy objectives*

How are MISO costs shared?

- **Equally** between generator and transmission owners for generator interconnection upgrades (except for independent transmission companies)
- Upgrades for reliability, economic, and load growth are **shared** by the load of utilities who benefit
- In some instances **all** in MISO share cost

How much transmission is needed?

- Capacity to interconnect all queued generation
 - 83,000 MW of generation requesting interconnection
 - 64,000 MW: renewables in Dakotas and Minnesota
 - State renewable objectives: up to 40,000 MW
- Total MISO electric load is 120,000 MW
 - Interconnection requests equal 75 percent of existing load

What will this cost?

- Construction to interconnect all requested: **\$billions**
 - Will impact ratepayers
 - Transmission upgrades result in charges to utility customers where the generation interconnects
 - *Even if the load is elsewhere*

Other obstacles

- Wholesale power transfers require interstate transmission
- State siting rules vary
- Opposition in a neighboring state can halt interstate transmission construction

What does this really mean?

- Existing transmission adequate to serve existing load
- Transmission upgrades are necessary to move power to markets
- Investment recovery only allowed on “used and useful” - limits traditional utility interest
- States trump FERC

“The grid”

- Regulatory and economic factors greatly impact the ability of traditional utilities to construct transmission
- Recent federal directives have changed traditional business practice
- Your local utility will keep the lights on as these issues evolve!