# Steve Wegman

South Dakota Public Utilities Commission

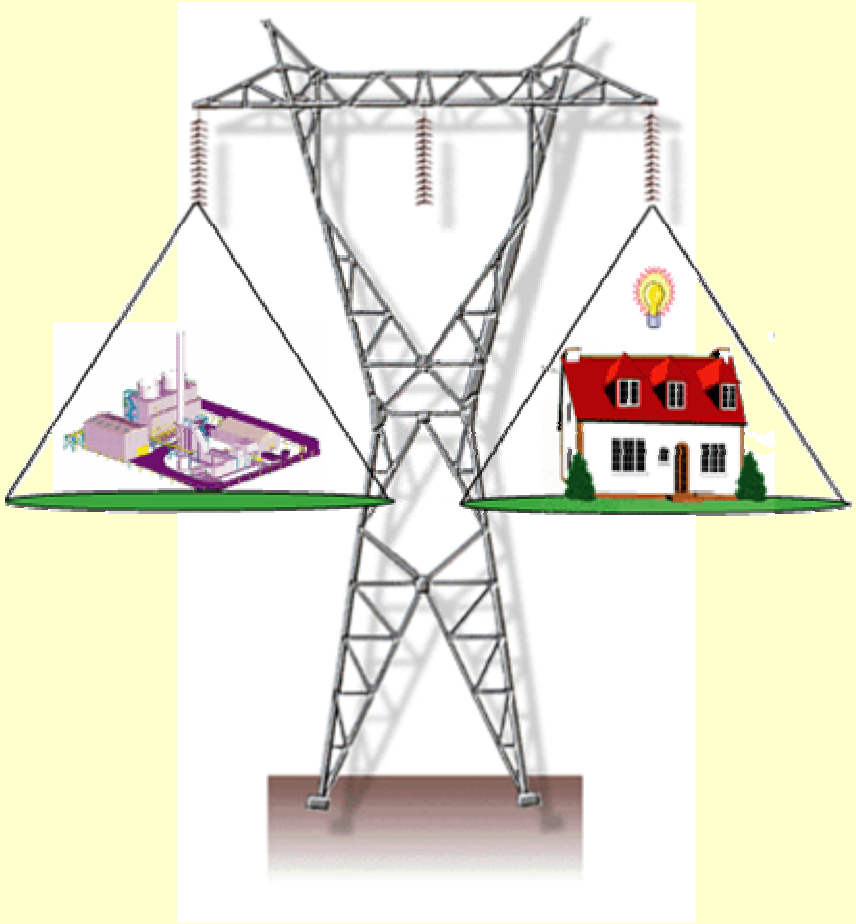
State Capitol

Pierre, SD

605-773-5797

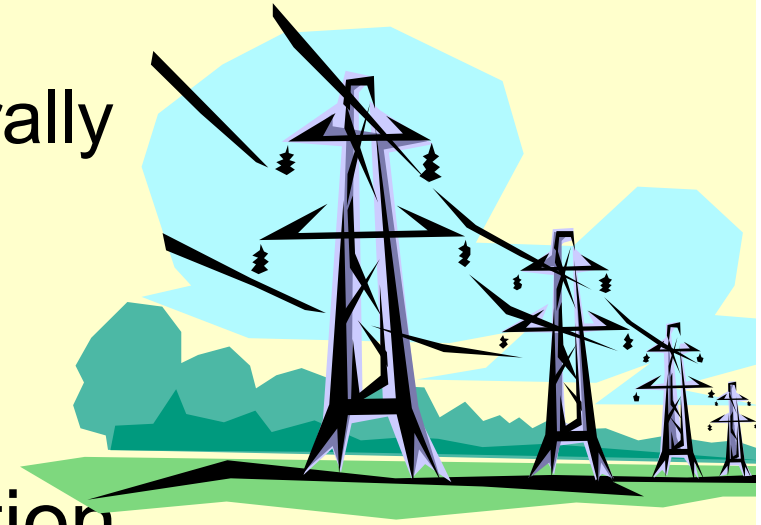
# Electricity

- Can’t be stored
- It is delivered the instant it is needed
- Transmission carries electricity from the generating plant to distribution points



# Transmission

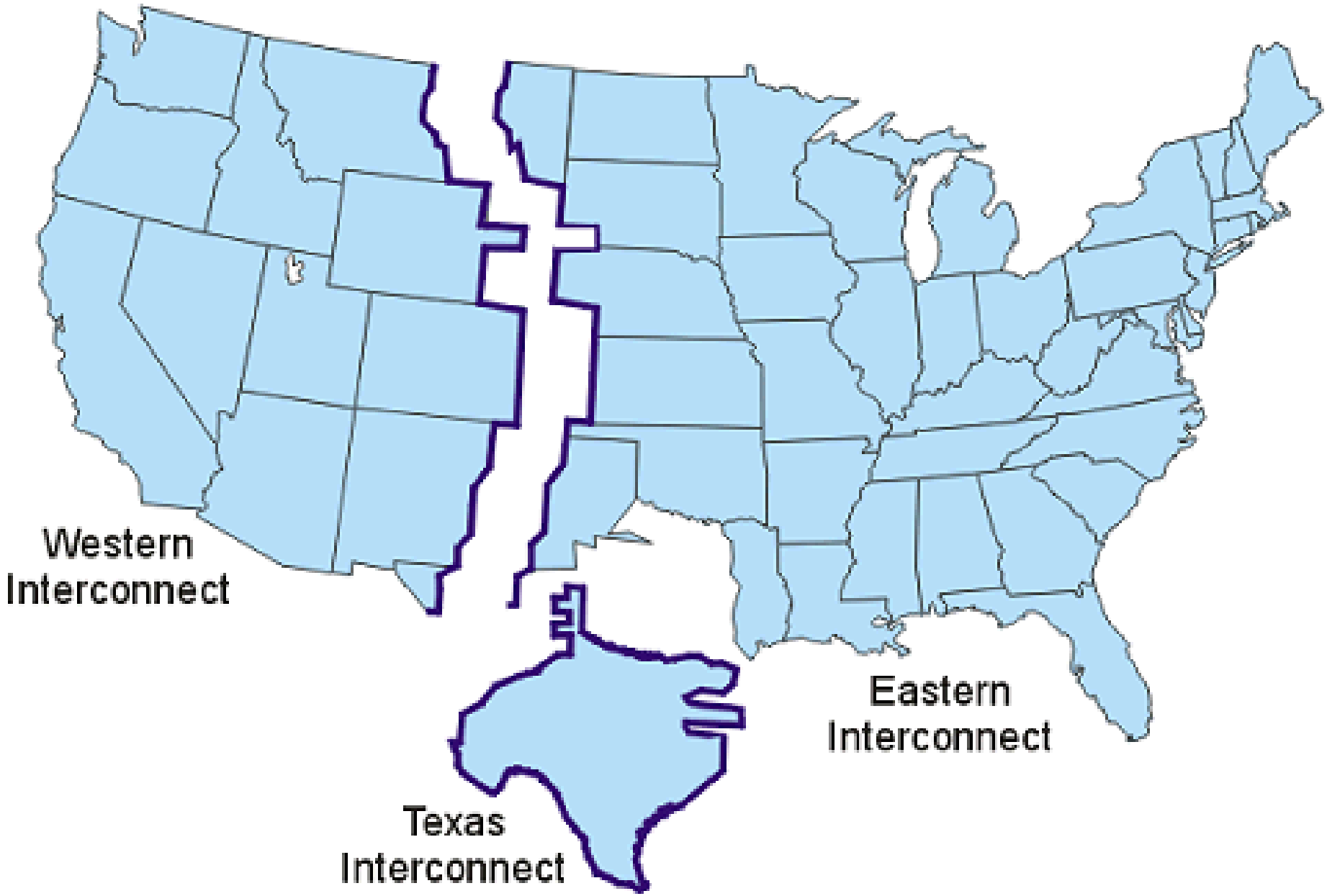
- Transmission – Used for bulk power transfers
  - 230 kV and higher is generally transmission
  - Between 230 k V & 115 kV maybe transmission
- Sub-transmission/distribution
  - Below 115 kV is generally not transmission

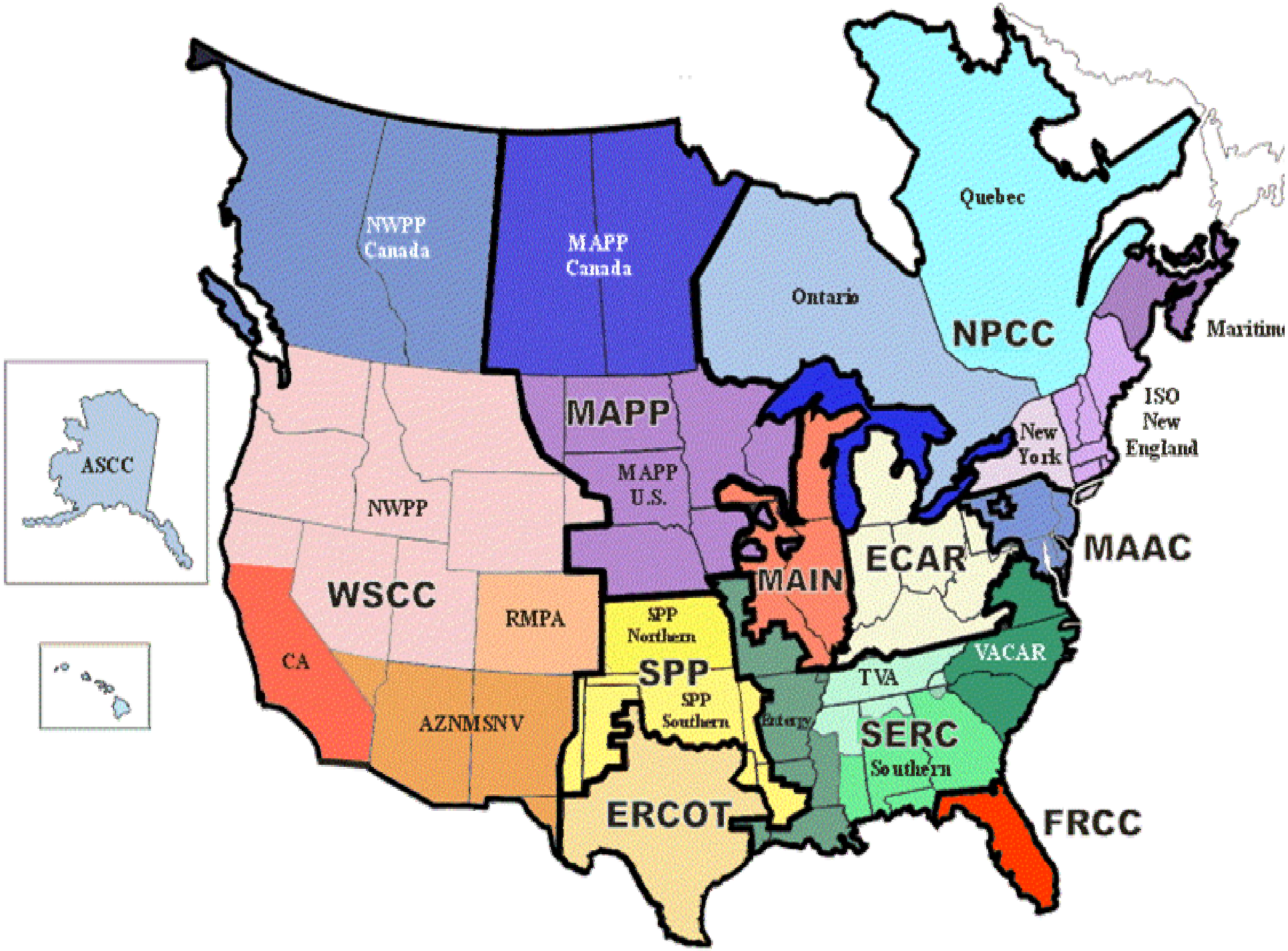


# Transmission's Role

- To reliably deliver electricity to distribution systems
- To connect utilities together to enhance reliability
- To accommodate economic exchanges of electricity (wholesale market)

# North American Electric Power Grids




NWPP
Canada
MAPP
Canada
Quebec
Ontario
NPCC
Maritime
ISO
New
England
New
York
MAPP
MAPP
U.S.
NWPP
ASCC
MAIN
ECAR
MAAC
WSCC
RMPA
SPP
Northern
VACAR
CA
SPP
TVA
SPP
Southern
Entergy
SERC
Southern
AZNMSNV
ERCOT
FRCC

# MAPP Region

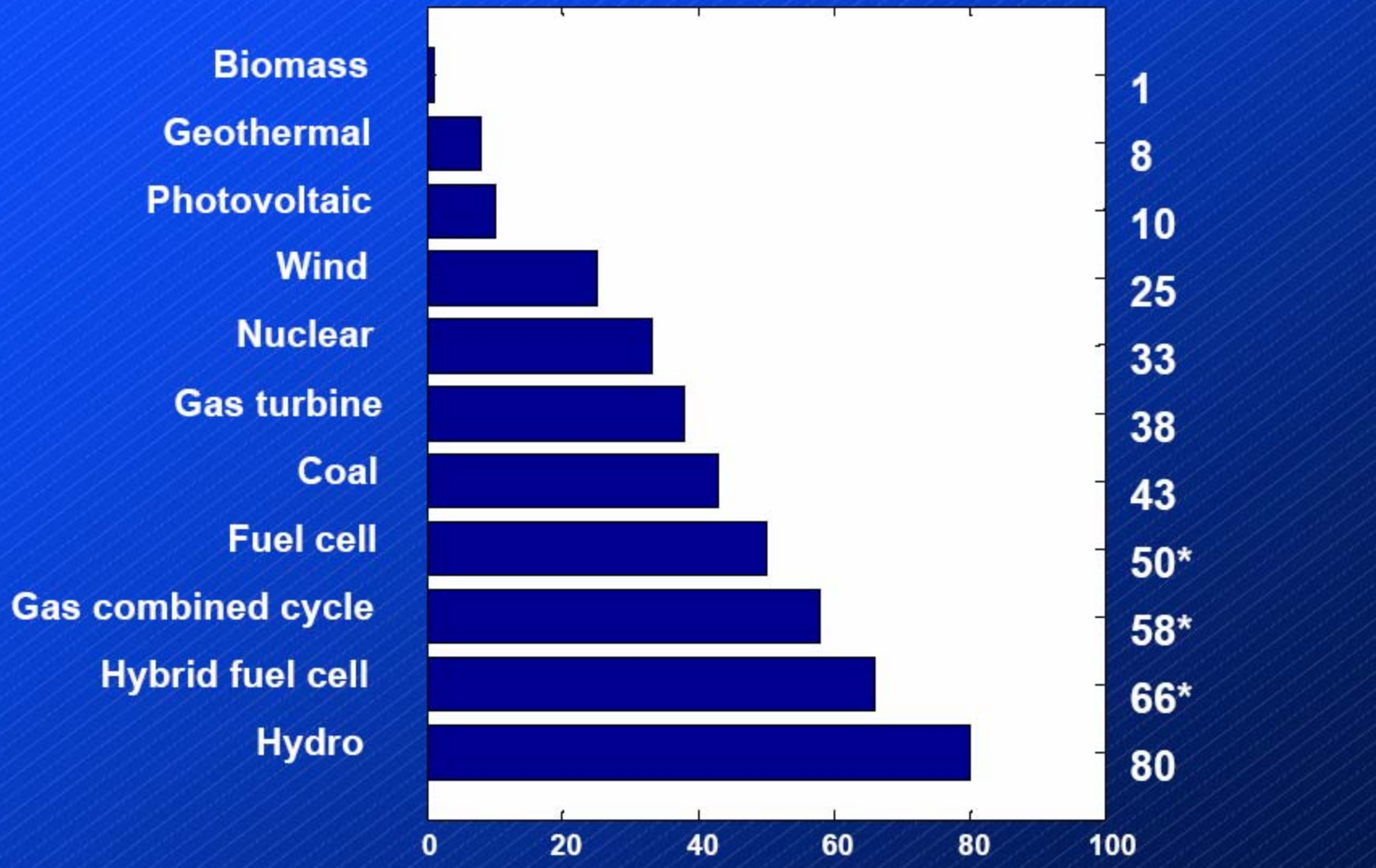

Facts about MAPP

- MAPP founded in 1965
- MAPP has over 100 Members
- Total generation capacity of approximately 42,000 MW
- MAPPCOR incorporated in 1990, not-for-profit contractor to MAPP

Diversity of Members

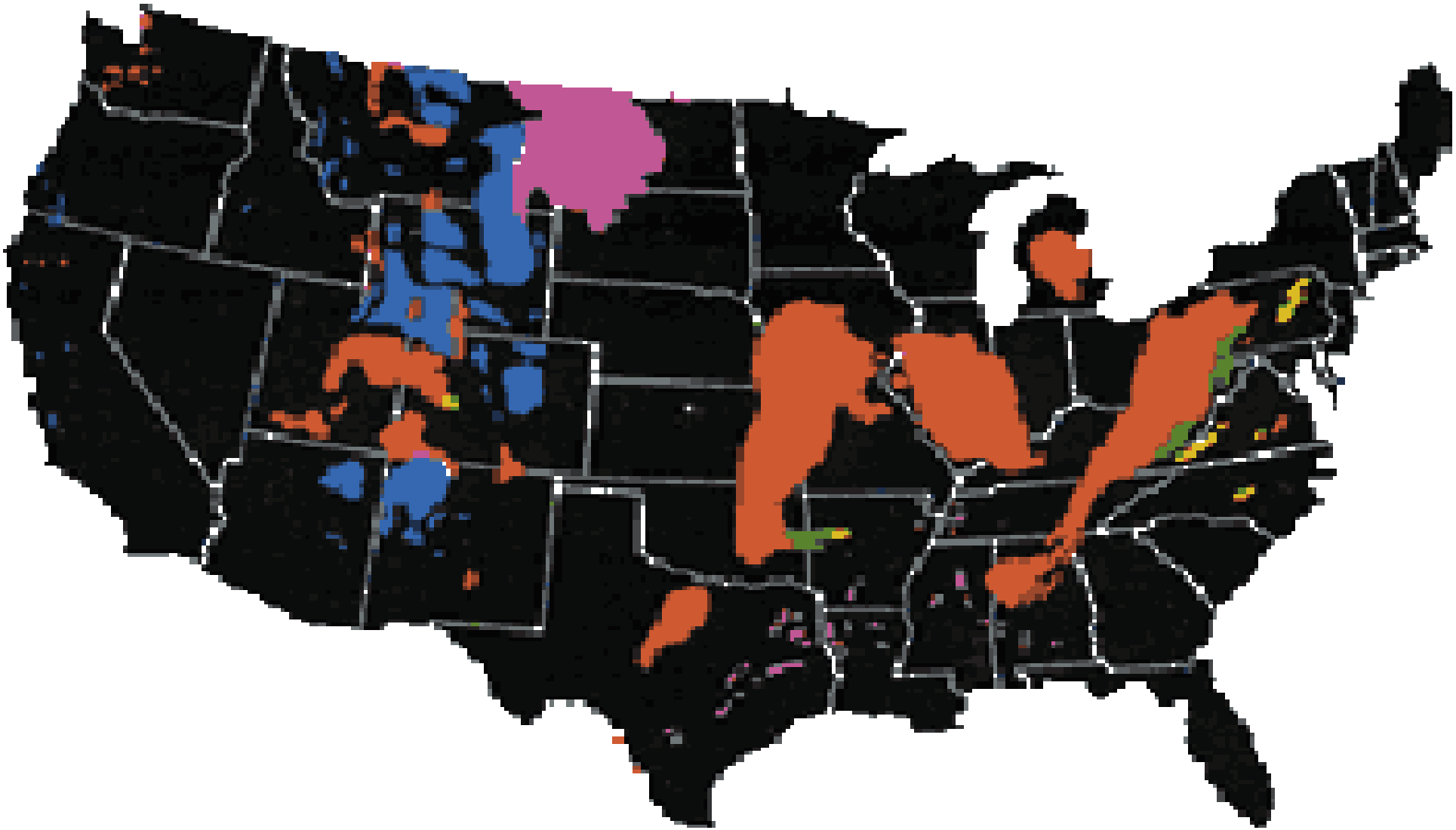
- Cooperatives
- Municipals
- Public Power Districts
- Investor Owned
- Independent Power Producers
- Power Marketers
- Federal Agency
- Canadian Crown Corporations

# Technology efficiencies



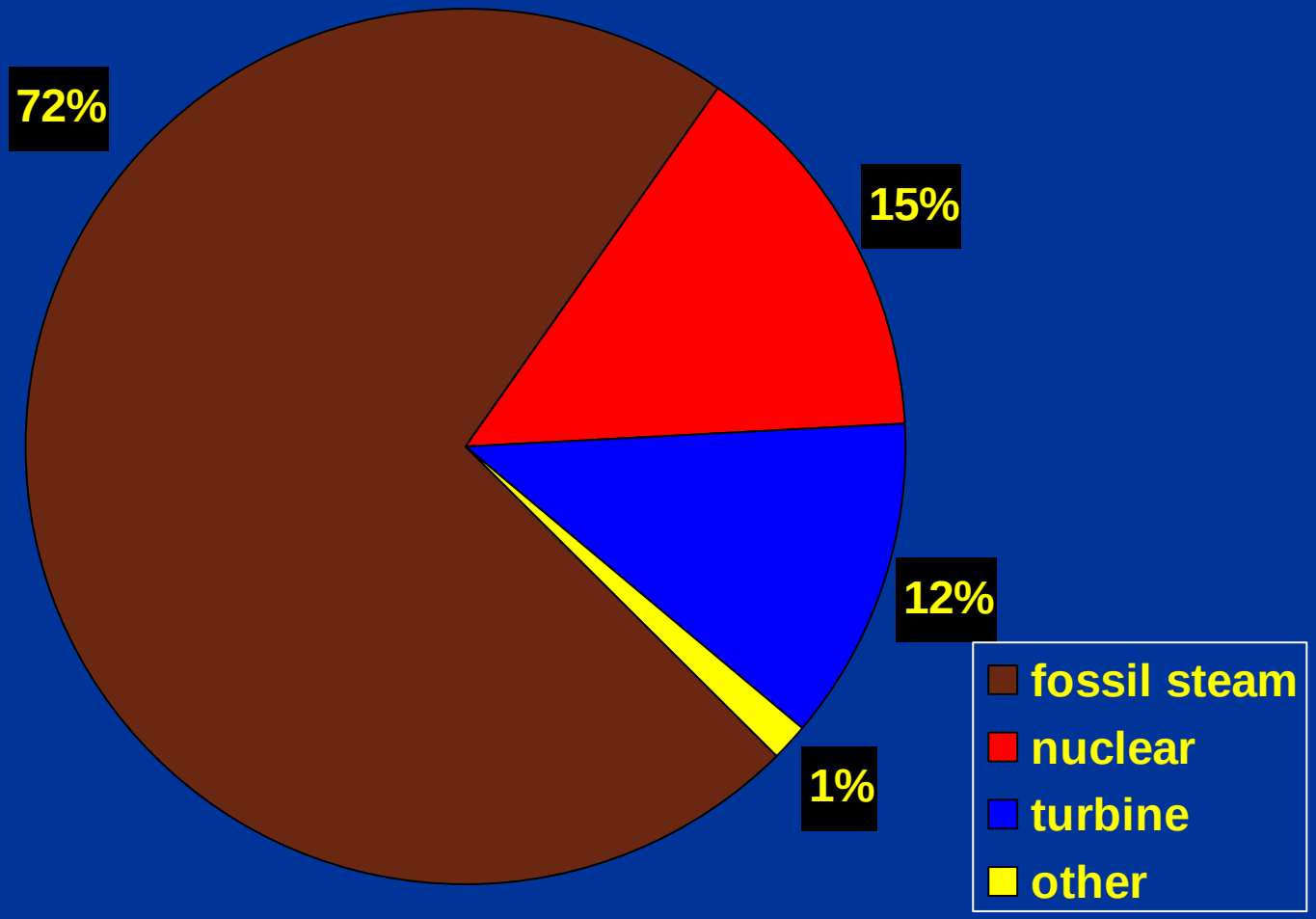

(*) DER efficiencies improve with heat recovery

# Coal Field in United Sates

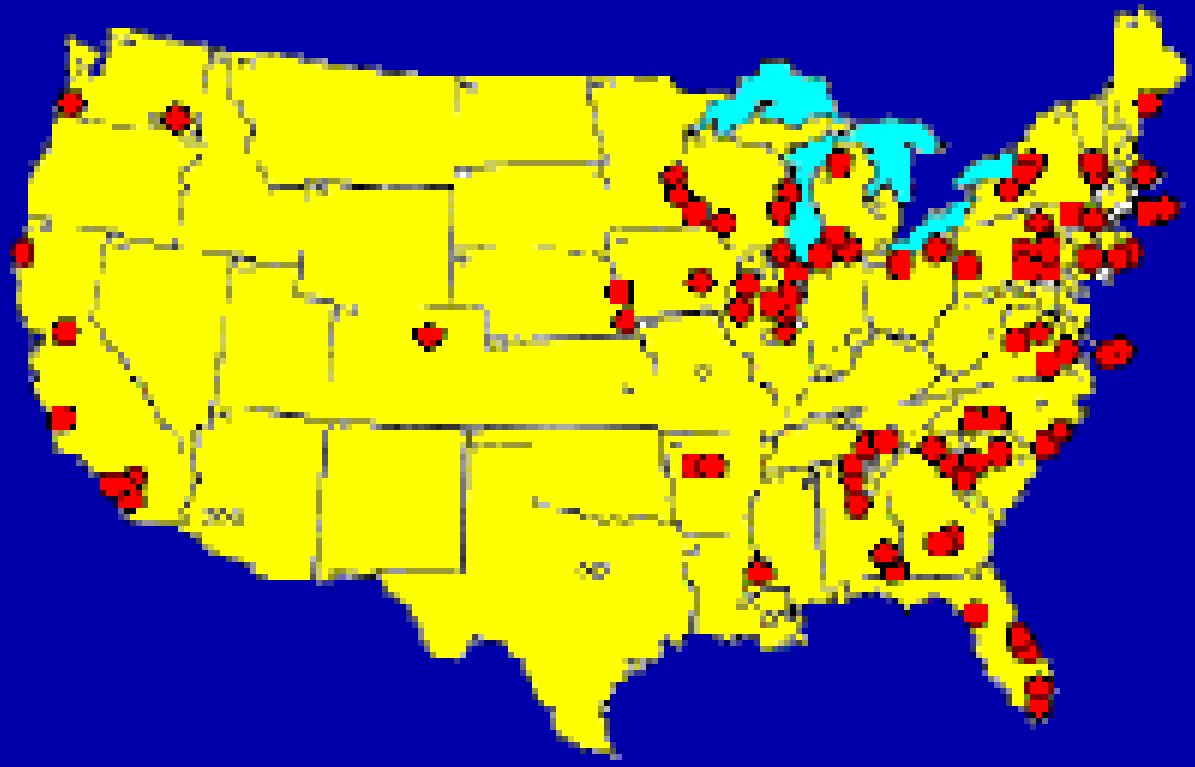


# Generation Capacity by Prime Mover

Electric Power



# US Nuclear Power Plants



# Generation in South Dakota (>10 MW)

| Name | Capacity (MW) | Category | Operator |
|---|---|---|---|
| Oahe | 714 | Hydro | WAPA |
| Big Bend | 536 | Hydro | WAPA |
| Big Stone | 472.6 | ST Coal | OTP |
| Fort Randall | 356 | Hydro | WAPA |
| Angus Anson | 229 | CT Gas | Xcel |
| Gavins Point | 113 | Hydro | WAPA |
| Watertown | 65 | CT Oil | MRES |
| Spirit Mound | 104 | CT Oil | BEPC |
| Huron | 49 | CT Gas | NWPS |
| Highmore | 40 | Wind | FPL |
| Lange PP | 40 | CT Gas | BHP |
| Aberdeen | 29.4 | CT Oil | NWPS |
| Lake Preston | 29.4 | CT Oil | OTP |
| Ben French | 25 | ST Coal | BHP |
| Huron | 14.8 | CT Gas | NWPS |
| Yankton | 11.42 | CT Gas | NWPS |
| Total | 2829 | | |

# SD Load and Generation Energy Sales

**Generation by Fuel (GWhr)**

| Energy Source | 1993 | 1997 | 2002 | Growth Rate % (1993-2002) | 1993 % Share | 1997 % Share | 2002 % Share |
|---|---|---|---|---|---|---|---|
| Coal | 2,642 | 3,314 | 3,272 | 2.4 | 50.3 | 26.6 | 42.4 |
| Petroleum | 12 | 7 | 5 | −9.6 | 0.2 | 0.1 | 0.1 |
| Natural Gas | 11 | 117 | 86 | 26.2 | 0.2 | 0.9 | 1.1 |
| Hydroelectric | 2,591 | 9,012 | 4,354 | 5.9 | 49.3 | 72.4 | 56.4 |
| Other Renewables | 0 | 0 | 6 | na | 0 | 0 | 0.1 |
| Total | 5,256 | 12,450 | 7,722 | 4.4 | 100 | 100 | 100 |

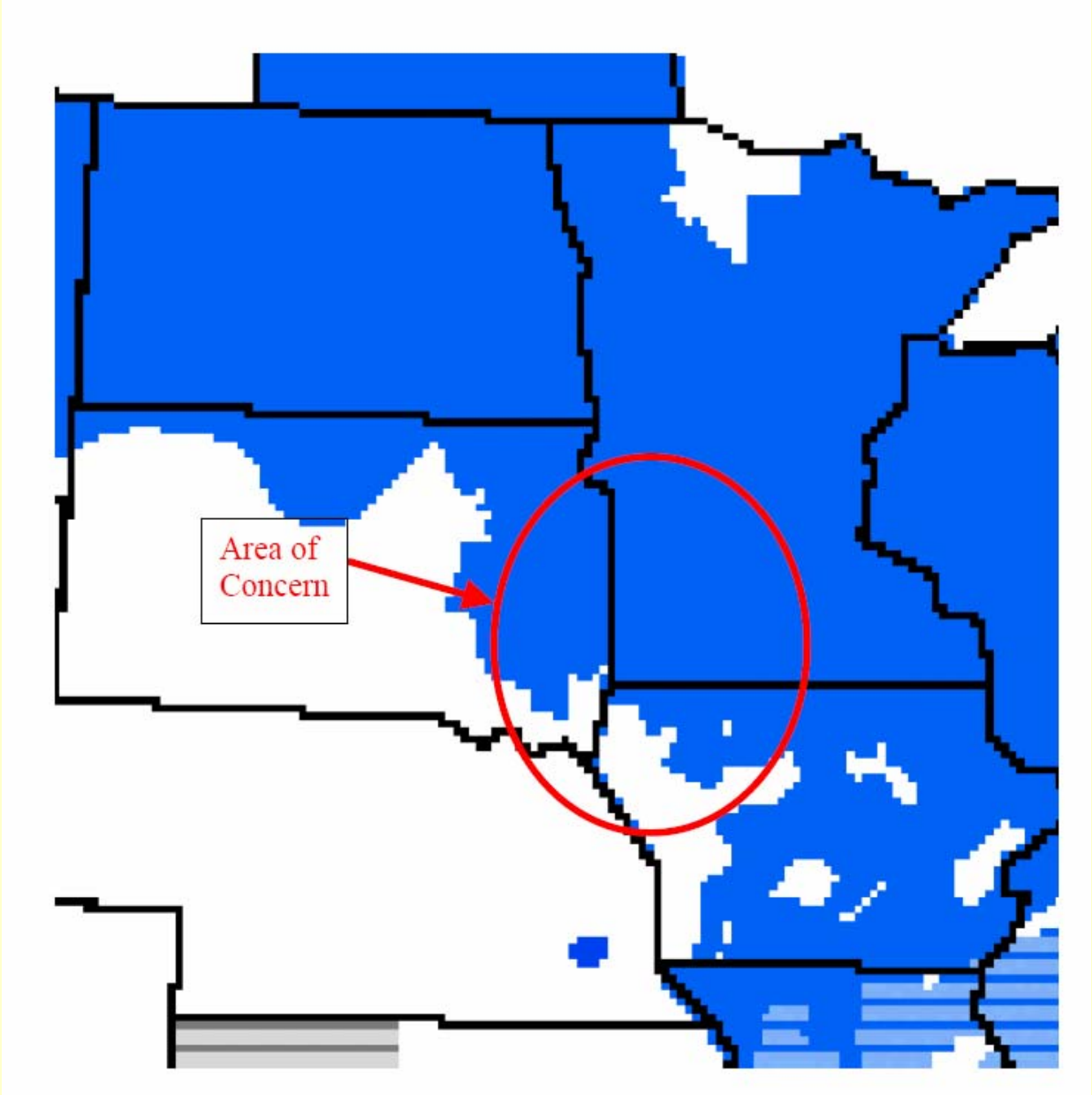
**Retail Sales by Customer Sector (GWhr)**

| Sector | 1993 | 1997 | 2002 | Growth Rate % (1993-2002) | 1993 % Share | 1997 % Share | 2002 % Share |
|---|---|---|---|---|---|---|---|
| Residential | 3,109 | 3,376 | 3,733 | 2 | 45 | 43.4 | 41.8 |
| Commercial | 1,621 | 2,207 | 3,062 | 7.3 | 23.5 | 28.4 | 34.3 |
| Industrial | 1,847 | 1,841 | 1,604 | −1.6 | 26.8 | 23.7 | 17.9 |
| Other | 327 | 349 | 538 | 5.7 | 4.7 | 4.5 | 6 |
| Total | 6,905 | 7,773 | 8,937 | 2.9 | 100 | 100 | 100 |

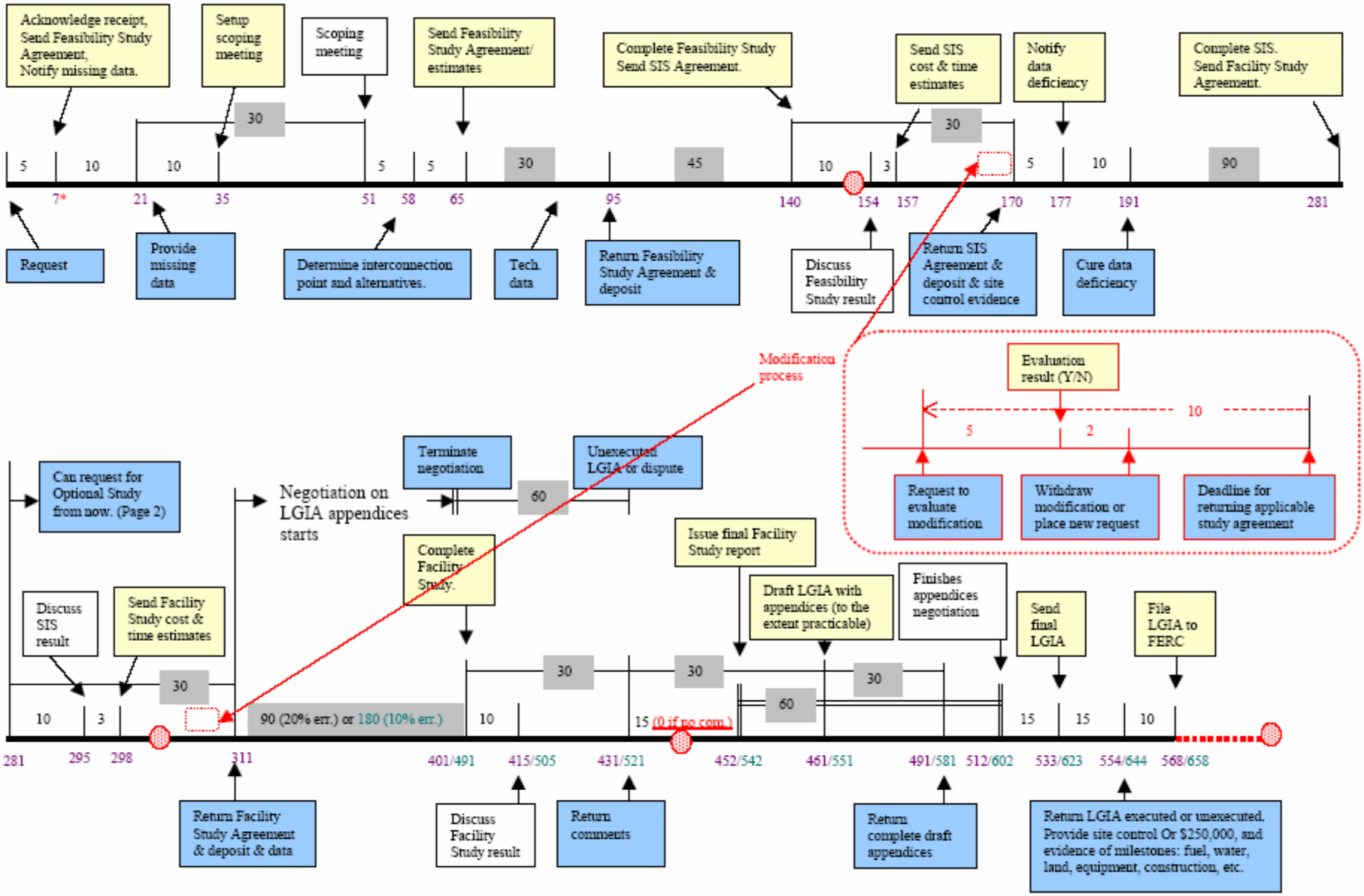
* From EIA State Electricity Profiles 2002

# MISO Queue

MISO has issued a statement indicating that there are too many requests in the queue for the system to handle. Upgrades will need to be made and studies will take longer than usual.



# LARGE GENERATOR INTERCONNECTION PROCEDURES (Order 2003A)

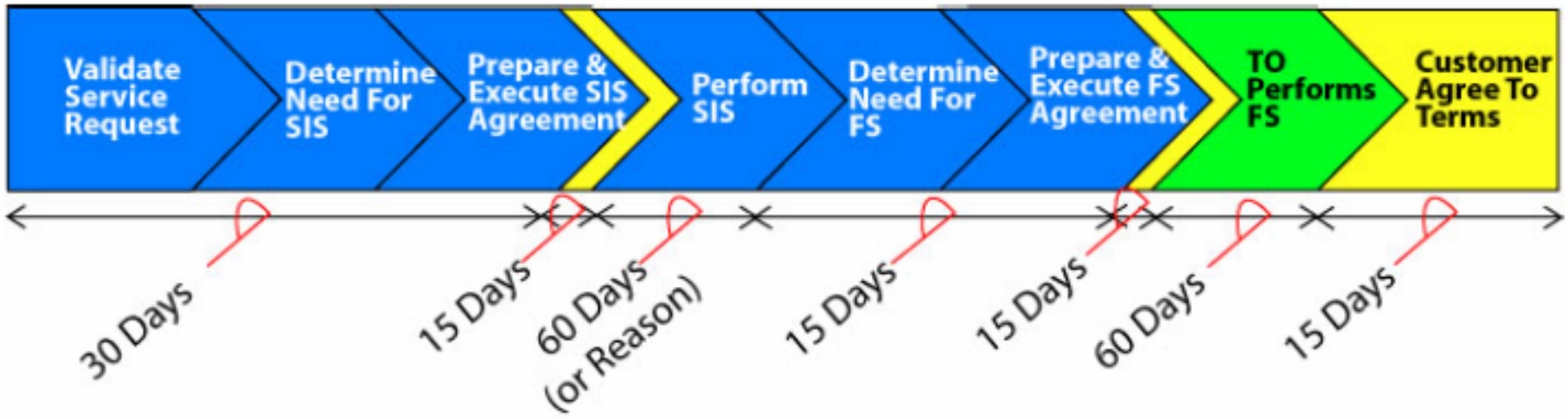



* Days information below the time line is estimated calendar days and is for information only. Many factors (e.g. optional process, early or delayed completion, holidays and weekends) can affect the actual days information.

# MISO Transmission Service Request Process

## TSR Process Overview

### Tariff Specified Times

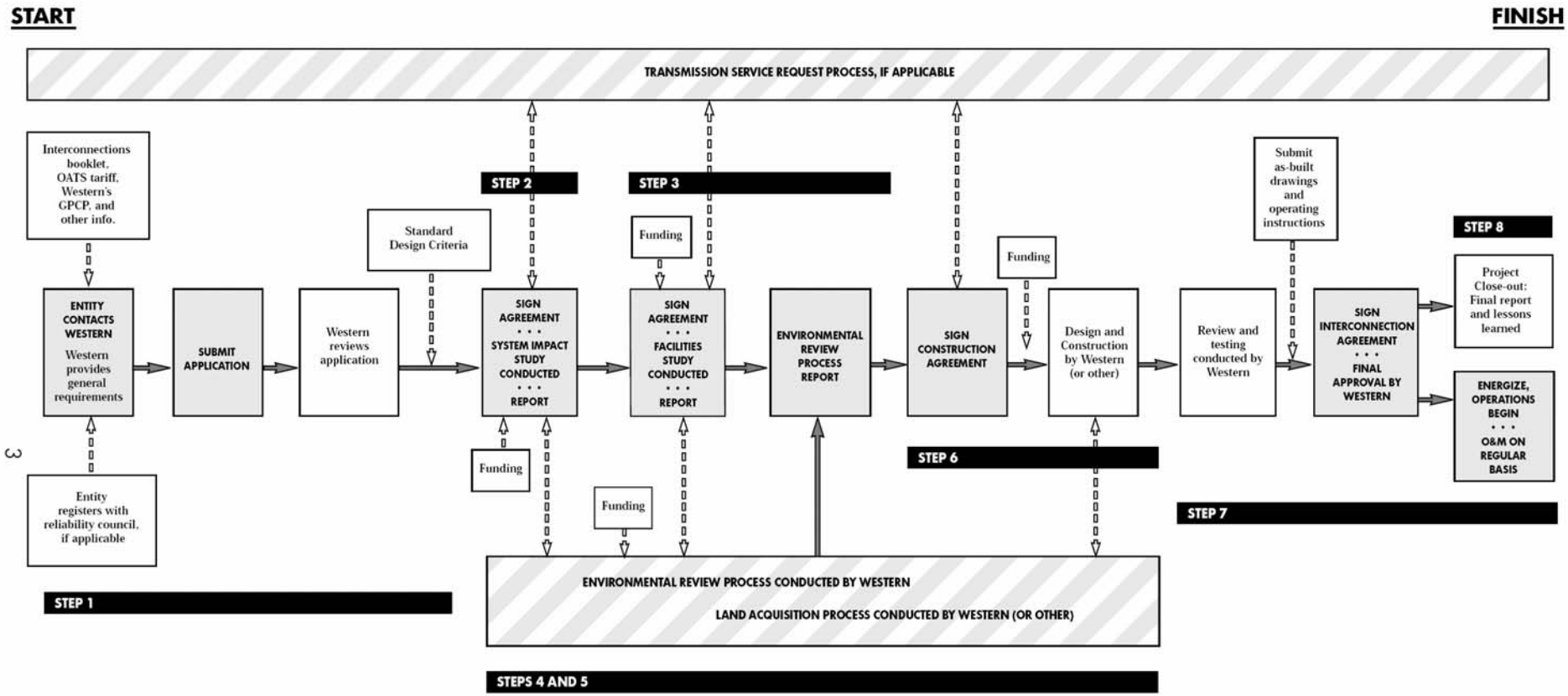



Delivery Service = 195 Days

# MAPP Process

- Request service
- Validate Request – 7 days
- MAPP Request Evaluation Process – 7 days
  - Determines impact on constrained paths and available ATC
- Execute System Impact Study Agreement – 15-30 days
- Perform System Impact Study – 60 days
  - Determines reliability issues
- Execute Facilities Study Agreement – 15-30 days
- Perform Facilities Study – 120 days
  - Determines upgrades needed to fix reliability issues

# WAPA Interconnection and TSR Process




**STEP 1.** Contact Western and submit application

**STEP 2.** System impact study and agreement

**STEP 3.** Facilities study and agreement

**STEP 4.** Environmental review process

**STEP 5.** Land acquisition process

**STEP 6.** Design and construction

**STEP 7.** Interconnection agreement, review and testing, and energize

**STEP 8.** Project close-out

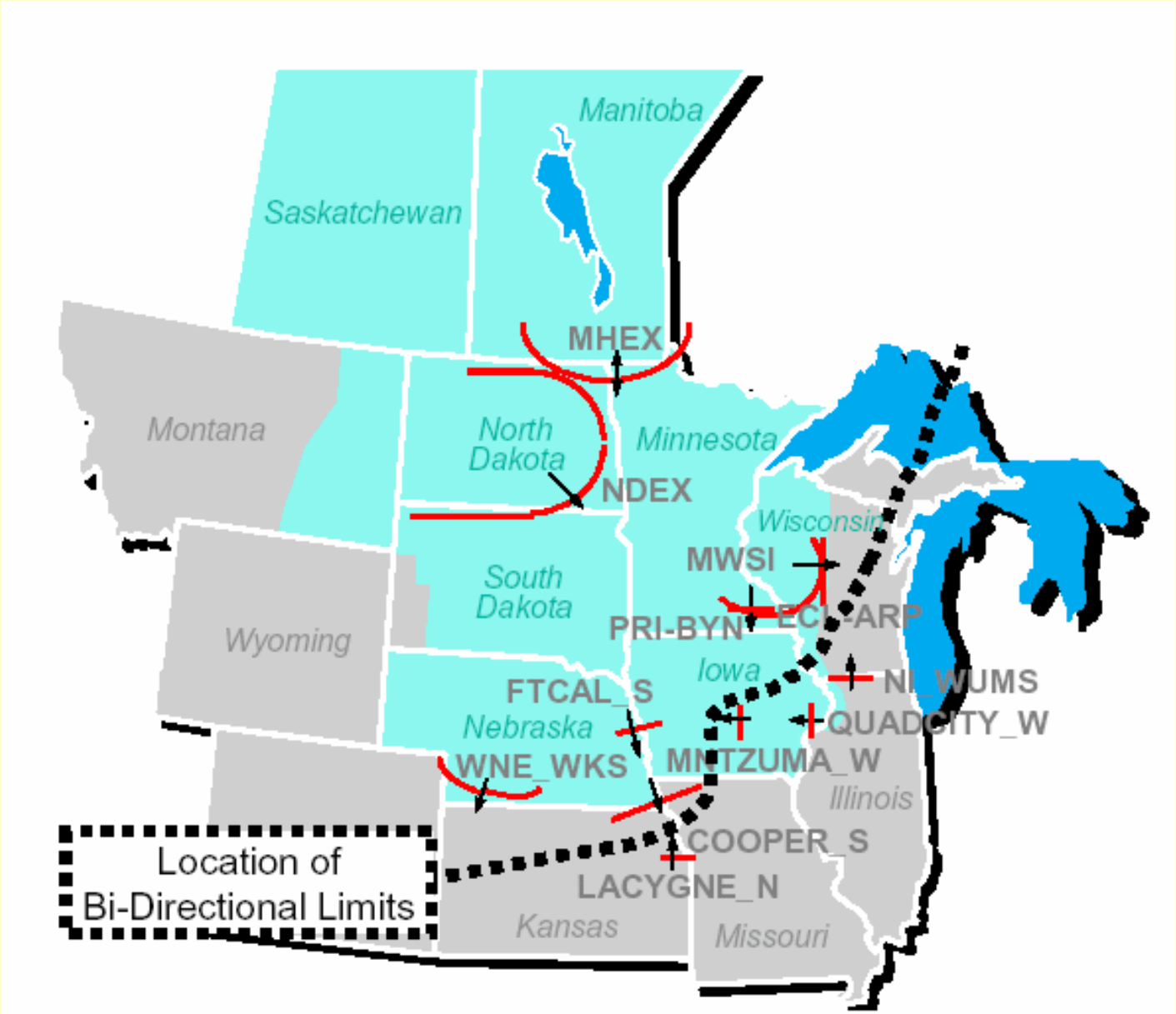
**LEGEND**

- Standard process flow
- Information, funding, or other input into process flow
- Milestone
- Supporting action process
- Separate but parallel process (transmission service, environmental review and land acquisition)

**NOTE:** This diagram shows the full standard process for interconnection in a general chronological order. In actuality, the steps may overlap, be consolidated or otherwise be expedited, when appropriate.

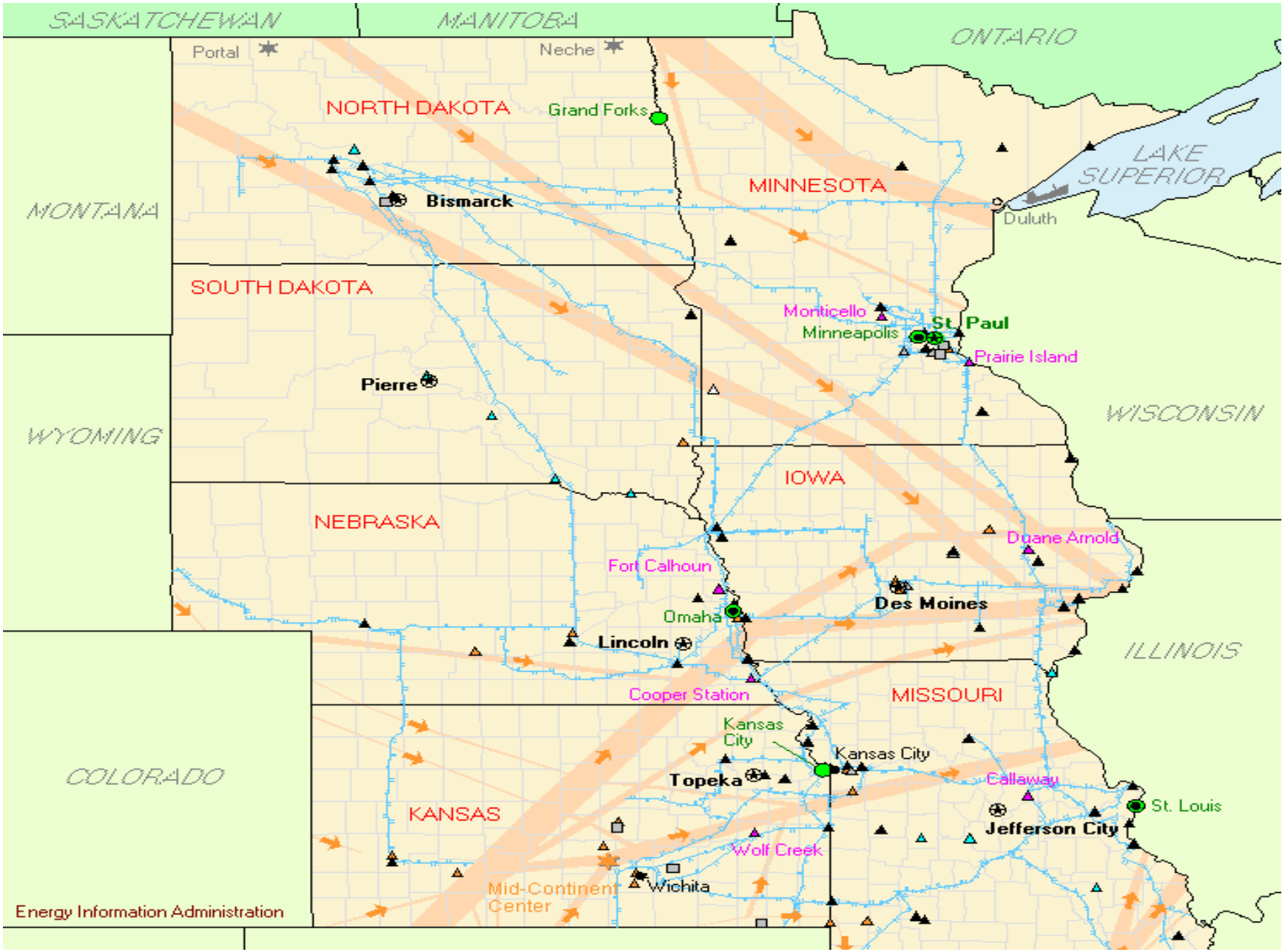
The interconnection process does not guarantee transmission service, which is a separate but parallel process detailed within Western's Open Access Transmission Service Tariff. It is not a substitute for formally requesting transmission service through the Tariff.

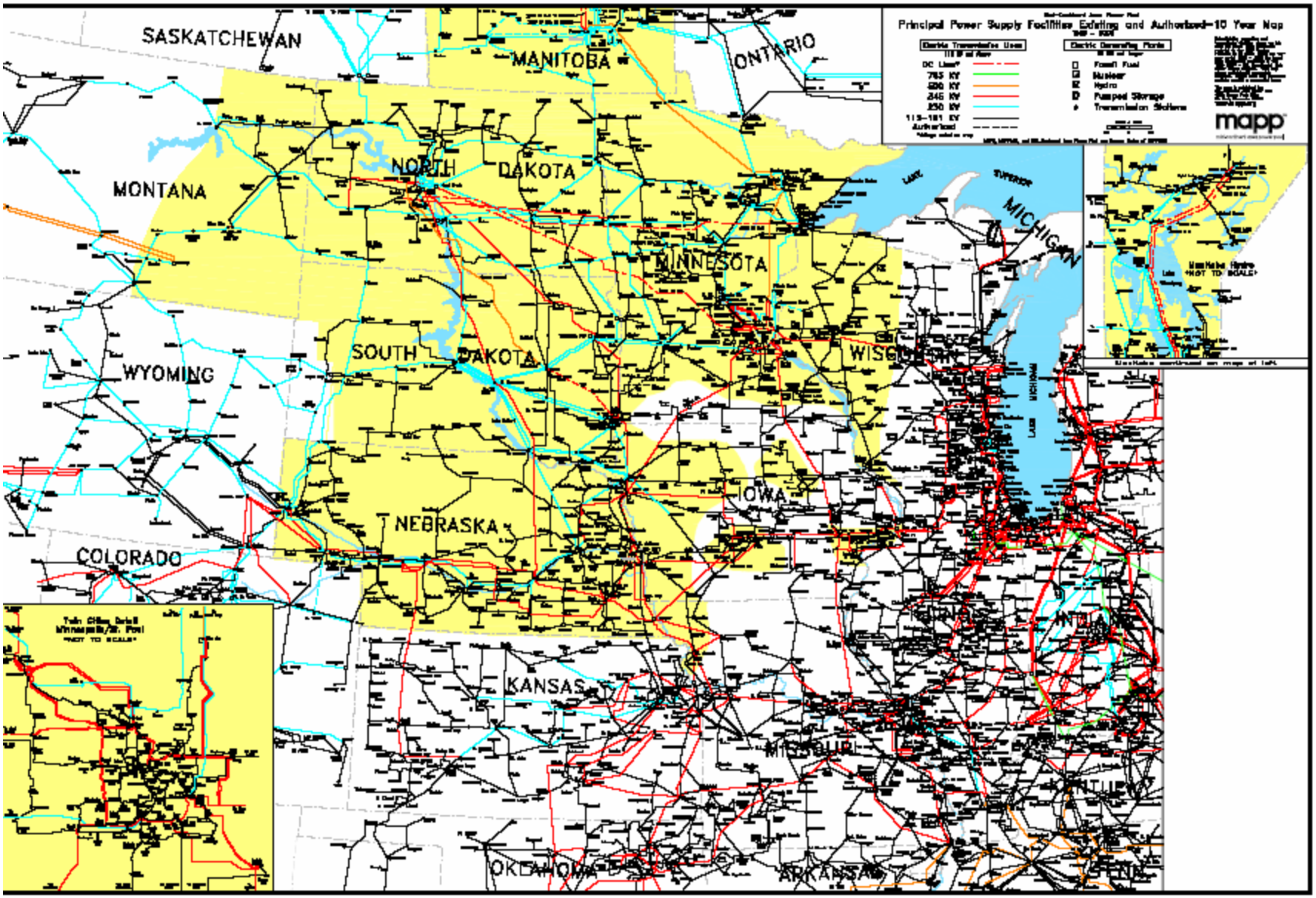
# MAPP Constraints



# Transmission Projects

- Split Rock to Lakefield 345 kV line
  - Associated with the Buffalo Ridge Wind
- White-Yankee-Buffalo Ridge 115 kV
  - Associated with the Buffalo Ridge Wind
- Watertown to Brookings to Sioux Falls 115 kV reconductor
  - Will be built to 230 kV standards for future upgrades
- Rapid City DC tie
  - 200 MW tie between the East and Western interconnects
  - Online in October of 2003


SASKATCHEWAN
MANITOBA
ONTARIO
Portal
Neche
NORTH DAKOTA
Grand Forks
LAKE SUPERIOR
MONTANA
Bismarck
MINNESOTA
Duluth
SOUTH DAKOTA
Monticello
Minneapolis
St. Paul
Prairie Island
Pierre
WISCONSIN
WYOMING
IOWA
NEBRASKA
Duane Arnold
Fort Calhoun
Des Moines
Omaha
Lincoln
ILLINOIS
Cooper Station
MISSOURI
Kansas City
Kansas City
Topeka
Callaway
St. Louis
COLORADO
KANSAS
Jefferson City
Wolf Creek
Mid-Continent Center
Wichita
Energy Information Administration


Principal Power Supply Facilities Existing and Authorized–10 Year Map
2009 – 2018
Electric Transmission Lines
Electric Generating Plants
Fossil Fuel
Nuclear
Hydro
Pumped Storage
Transmission Stations
mapp
SASKATCHEWAN
MANITOBA
ONTARIO
MONTANA
NORTH DAKOTA
MINNESOTA
SOUTH DAKOTA
WYOMING
WISCONSIN
IOWA
NEBRASKA
COLORADO
ILLINOIS
INDIANA
KANSAS
MISSOURI
OKLAHOMA
ARKANSAS
LAKE SUPERIOR
LAKE MICHIGAN
Twin Cities Detail
Minneapolis/St. Paul
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Upper Peninsula Michigan
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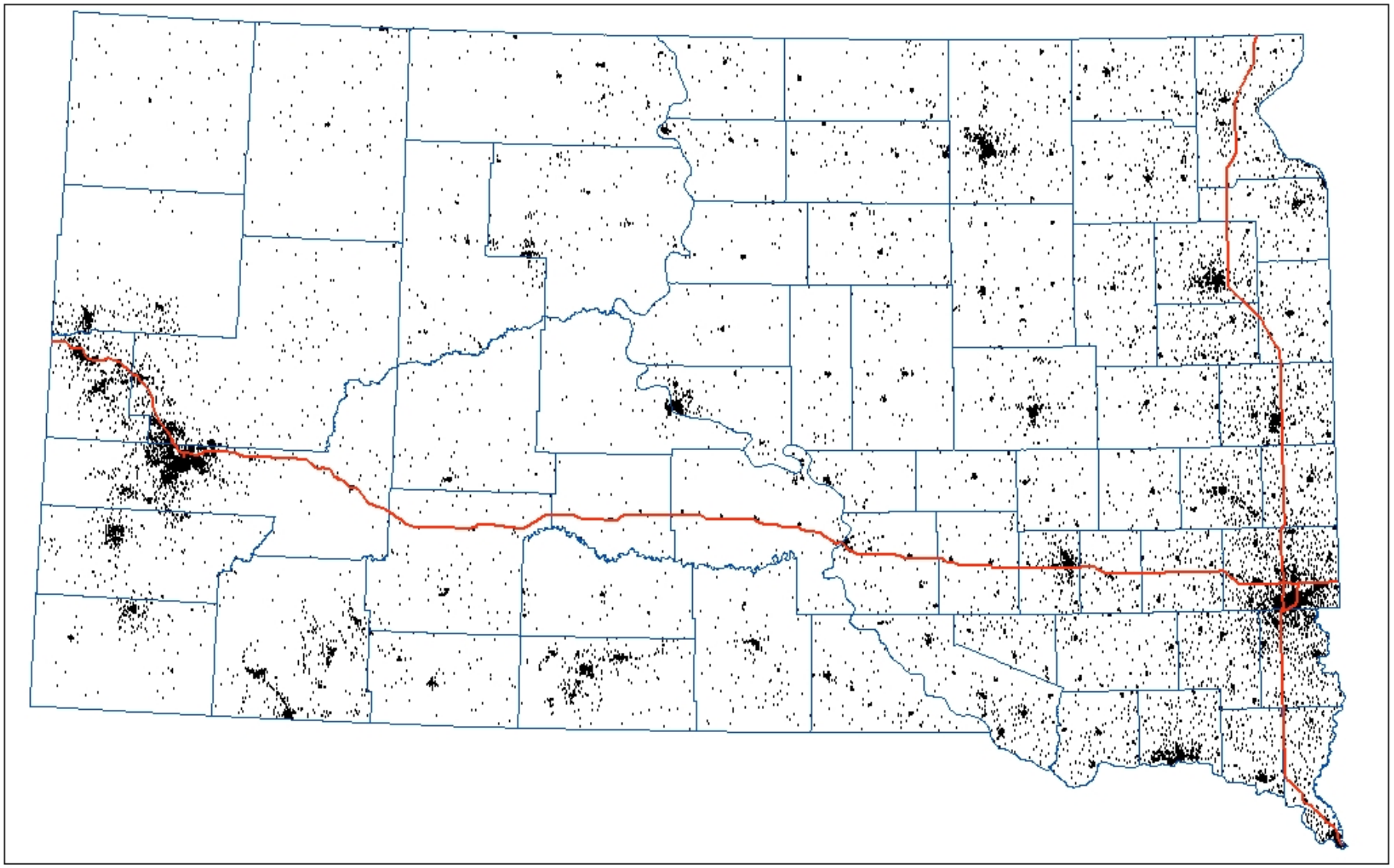
WAL*MART



# South Dakota Population Density

Interstates
Counties
Population Density
1 Dot = 15

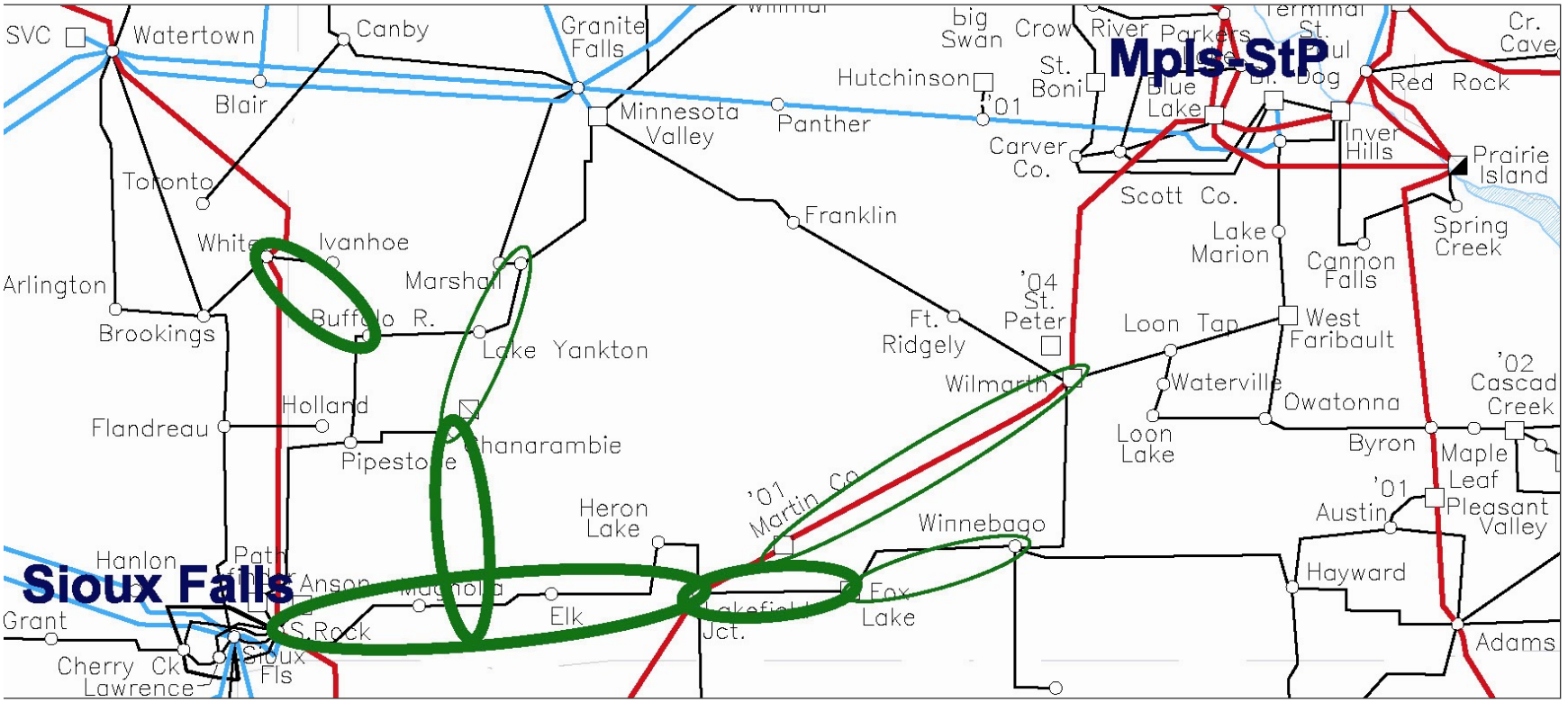
N

0 30 60 120 180
Miles

South Dakota GIS

# South Dakota Transmission Currently Why Do Problems Exist?

- Some utilities waiting to see how markets develop (MISO MMI)
- Some coops, munis do not have growing load – no need to upgrade transmission
- Uncertainty about transmission cost recovery
- Who pays for new transmission and who gets to use capacity on new lines?
- MN and IA developing wind in-state, rather than tapping higher class wind in Dakotas – want economic development benefits to stay in-state


Sioux Falls
Mpls-StP
SVC
Watertown
Canby
Granite Falls
Blair
Minnesota Valley
Panther
Hutchinson
'01
big Swan
Crow River
St. Boni
Blue Lake
Carver Co.
Scott Co.
Inver Hills
Prairie Island
Red Rock
Cr. Cave
Spring Creek
Cannon Falls
Lake Marion
Toronto
Franklin
Arlington
Brookings
Buffalo R.
Marshall
Lake Yankton
'04 St. Peter
Ft. Ridgely
Loon Tap
West Faribault
Wilmarth
Waterville
Owatonna
'02 Cascad Creek
Loon Lake
Byron
Maple Leaf
Pleasant Valley
'01 Austin
Holland
Flandreau
Pipestone
Chanarambie
'01 Martin Co.
Heron Lake
Winnebago
Hayward
Hanlon
Grant
Cherry Ck
Lawrence
Anson
S.Rock
Elk
Jct.
Fox Lake
Adams

# Does Wind Development Have Problems?

- Transmission constraints
- Economics
- Tax credits
- Changing regulatory issues
- Intermittent resource
- Renewable markets
- Technical/power quality
- Interaction between different parties

# Who Wants Wind Development?

- Interest in wind generation is rapidly growing
- Not sure how much, when, where and who
- Almost everyone wants part of the action
  - Landowners
  - Public
  - Wind Developers
  - Turbine Manufacturers
  - State/Federal
  - Utilities
  - Public/Utility Customers

# Questions Asked by Members/Public/Landowners

- How do I get wind turbines on my property?
- What is the annual lease payment per turbine?
- Should I sign an option and lease agreement?
- Have you heard of this wind developer and are they really building this project?
- Is it better for me to own the turbines, invest in a wind project, or just lease the land?

# Questions Asked by Developers

- How much will you pay for wind energy?
- Why don't you pay more?
- What is your tariff and do I have to pay for it?
- Can I wheel wind energy across your system and how much will it cost me?
- Why won't you work with us instead of them?
- How much capacity does your system have?
- And lastly . . .
  - What needs to be done to get a wind project built?

# Steve Wegman

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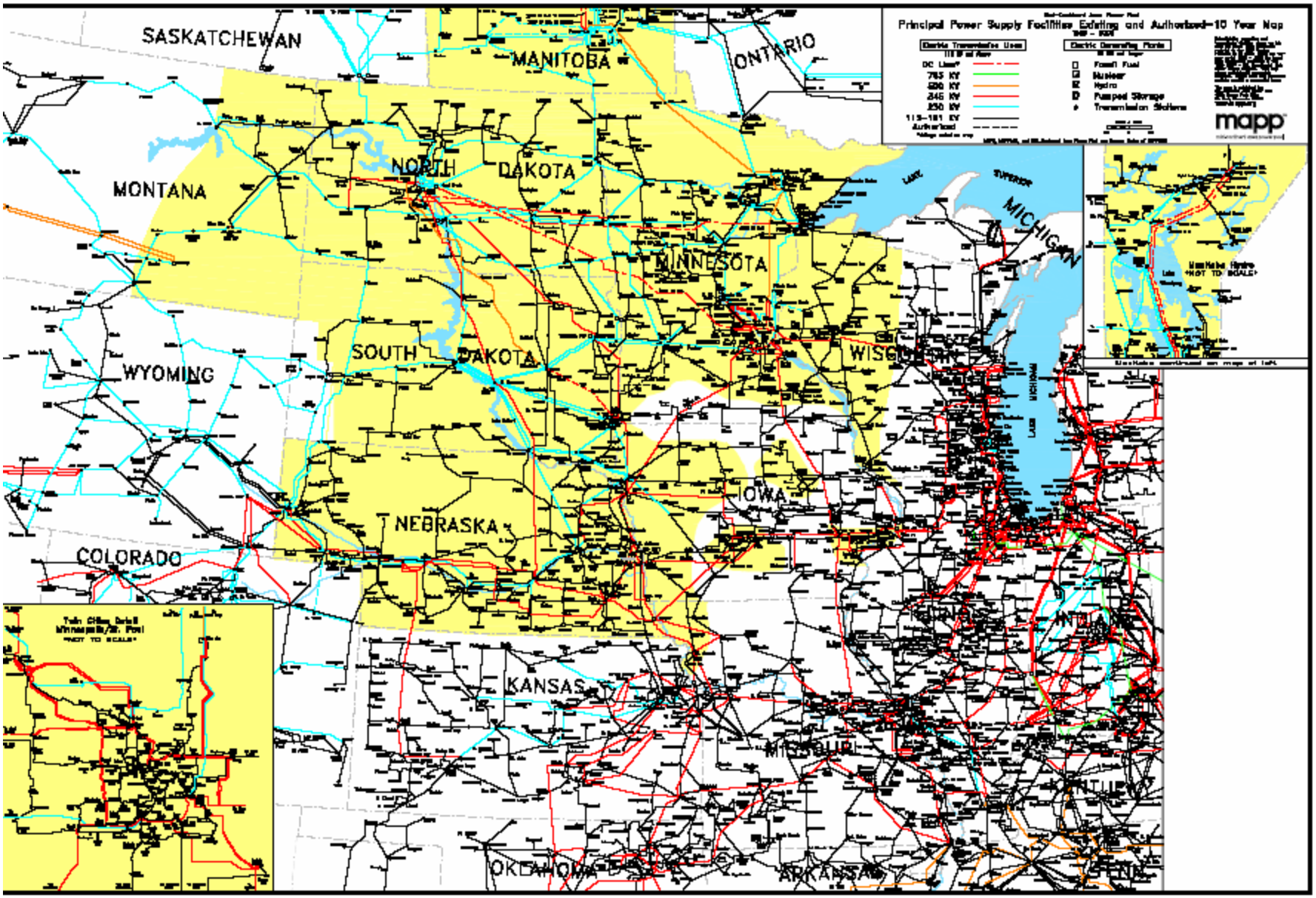
# What are the Challenges?

- Cheap competitive fuels
- Status Quo
- Who do we sell electons to?
- Where do ship the electrons to?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WISCONSIN
IOWA
NEBRASKA
COLORADO
ILLINOIS
INDIANA
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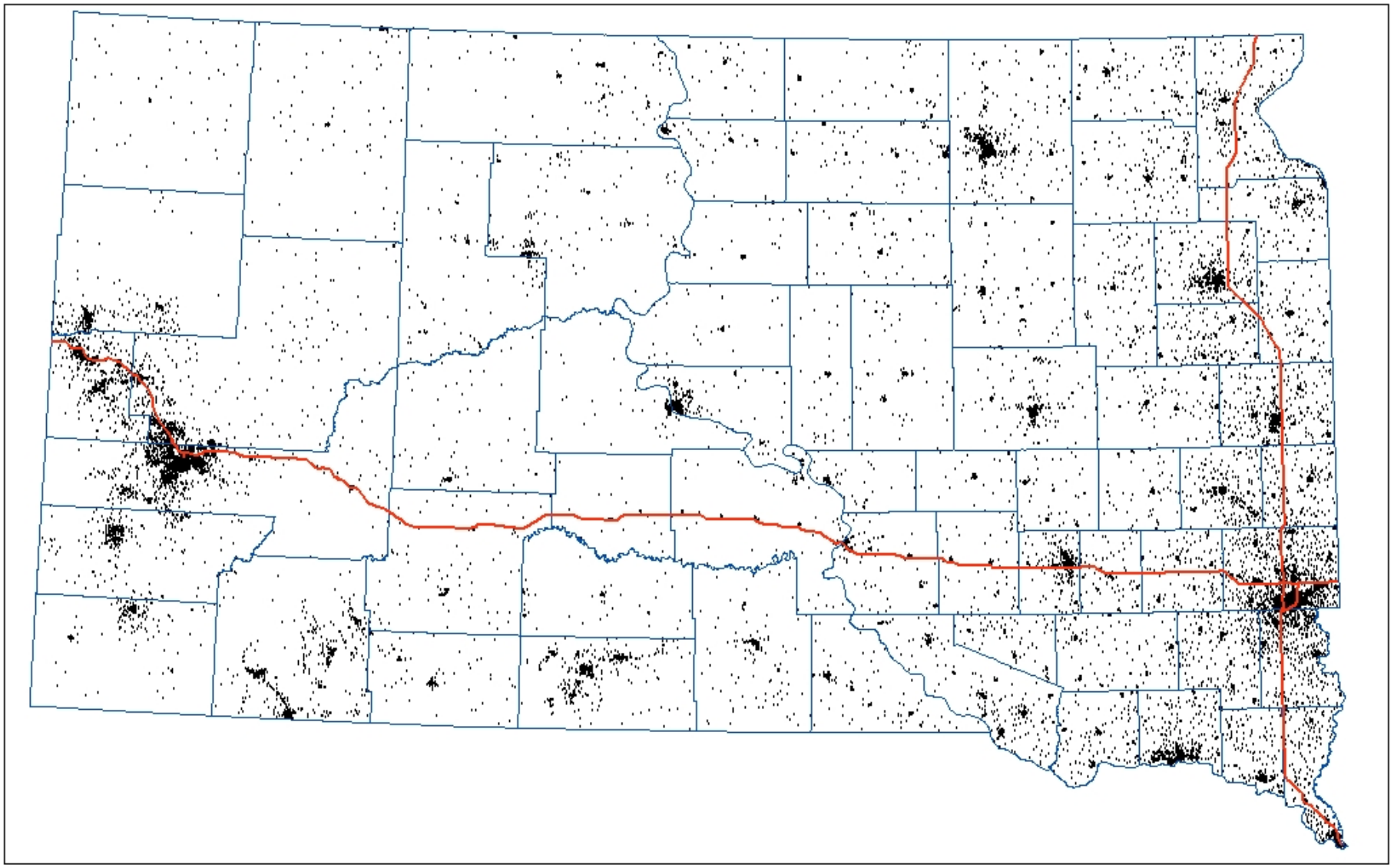

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