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## ***Transmission Infrastructure Overview***

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*Dave Gates  
VP – Wholesale Operations*

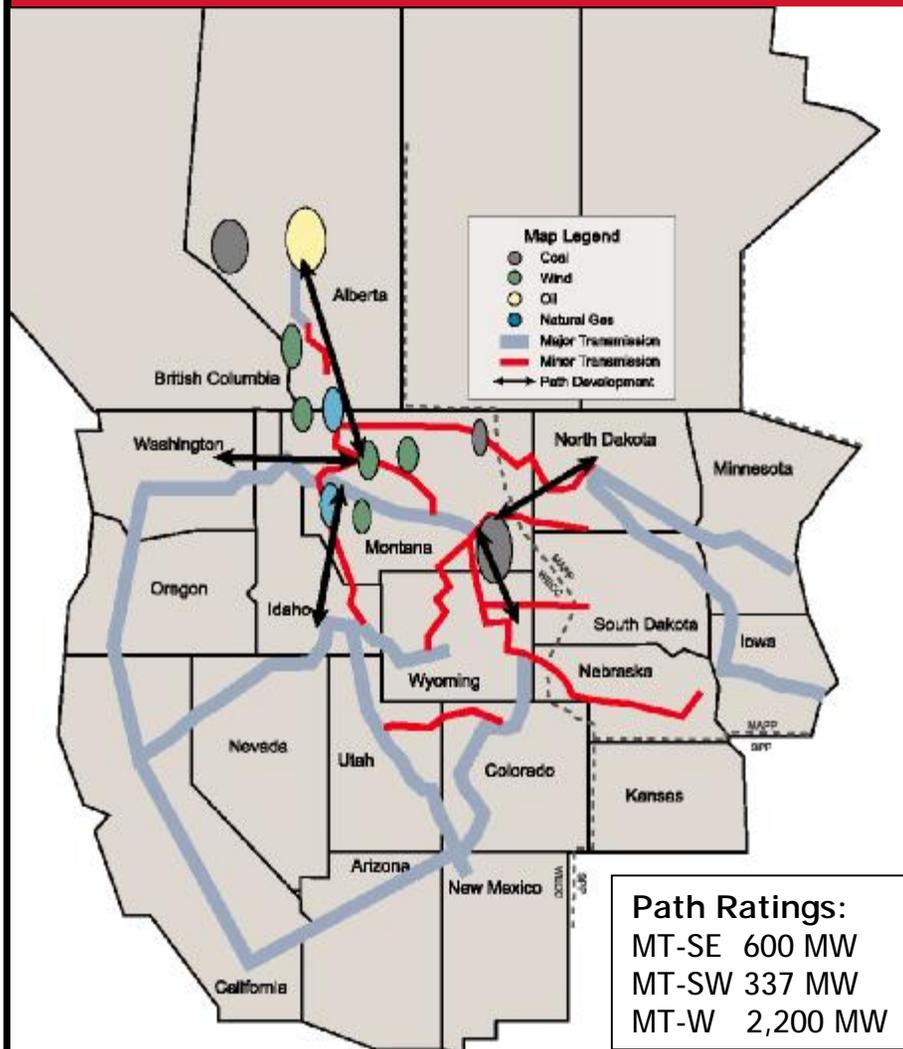
*Montana Governor's Energy Symposium  
October 18, 2005*



# ***The Use of Transmission Is Different Today***

- **The Chicken or the Egg Conundrum**
  - § Transmission and generation historically has been built concurrently
- **Regional Transmission Organization (RTO) Development**
  - § An uncertain future
- **Constraints/Path Ratings**
  - § The transmission grid was not designed for the type of interstate commerce we experience today
- **August 14, 2003 Eastern U.S. Outage – A Call for Action**
  - § Increased pressure on reliability by the North American Electric Reliability Council (NERC) and the Federal Regulatory Commission (FERC) – may further reduce path ratings
- **Stranded Generation**
  - § New projects may create additional wheeling on NorthWestern's system or may displace current generation forcing it to look for new markets

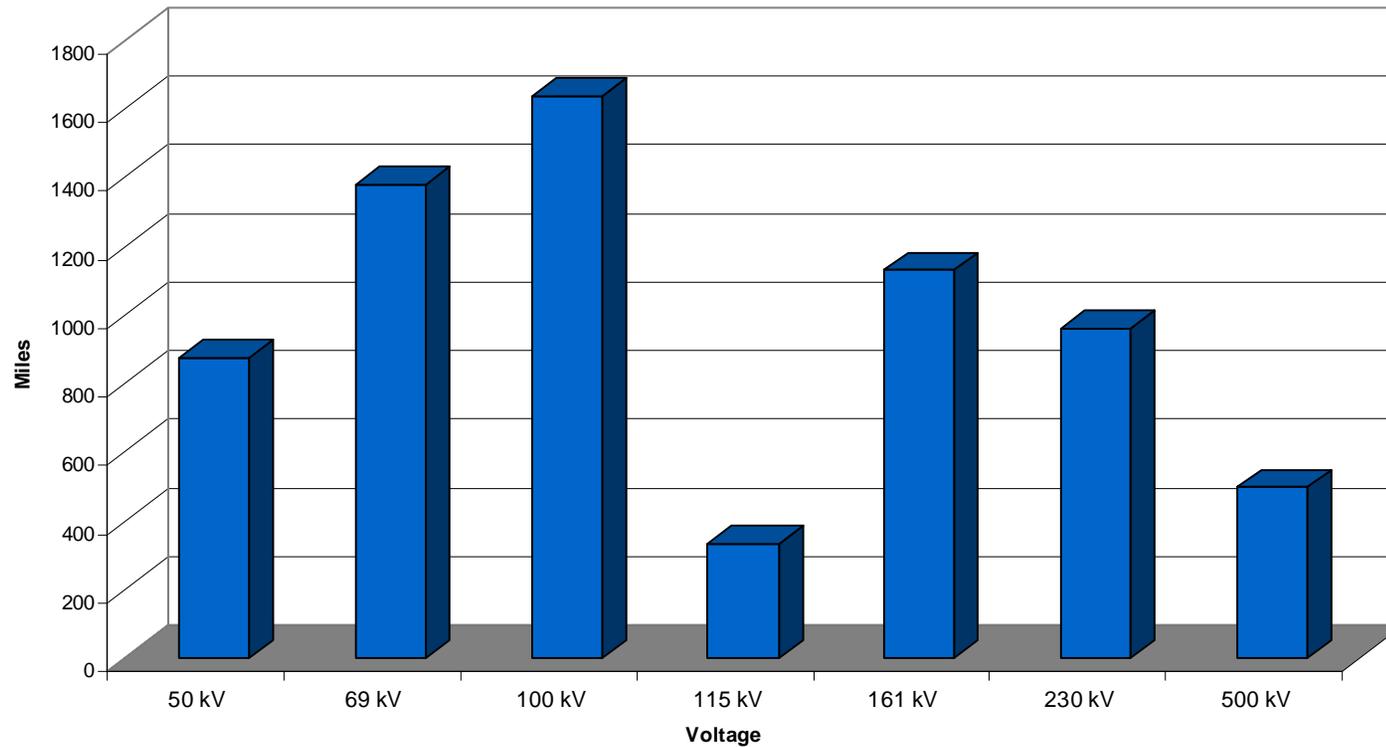
# The State of the Existing Transmission System



- No significant transmission built in the last 25 years
- New generation development could require significant enhancements to the system
- Transmission paths out of Montana are constrained for entities seeking firm transmission rights

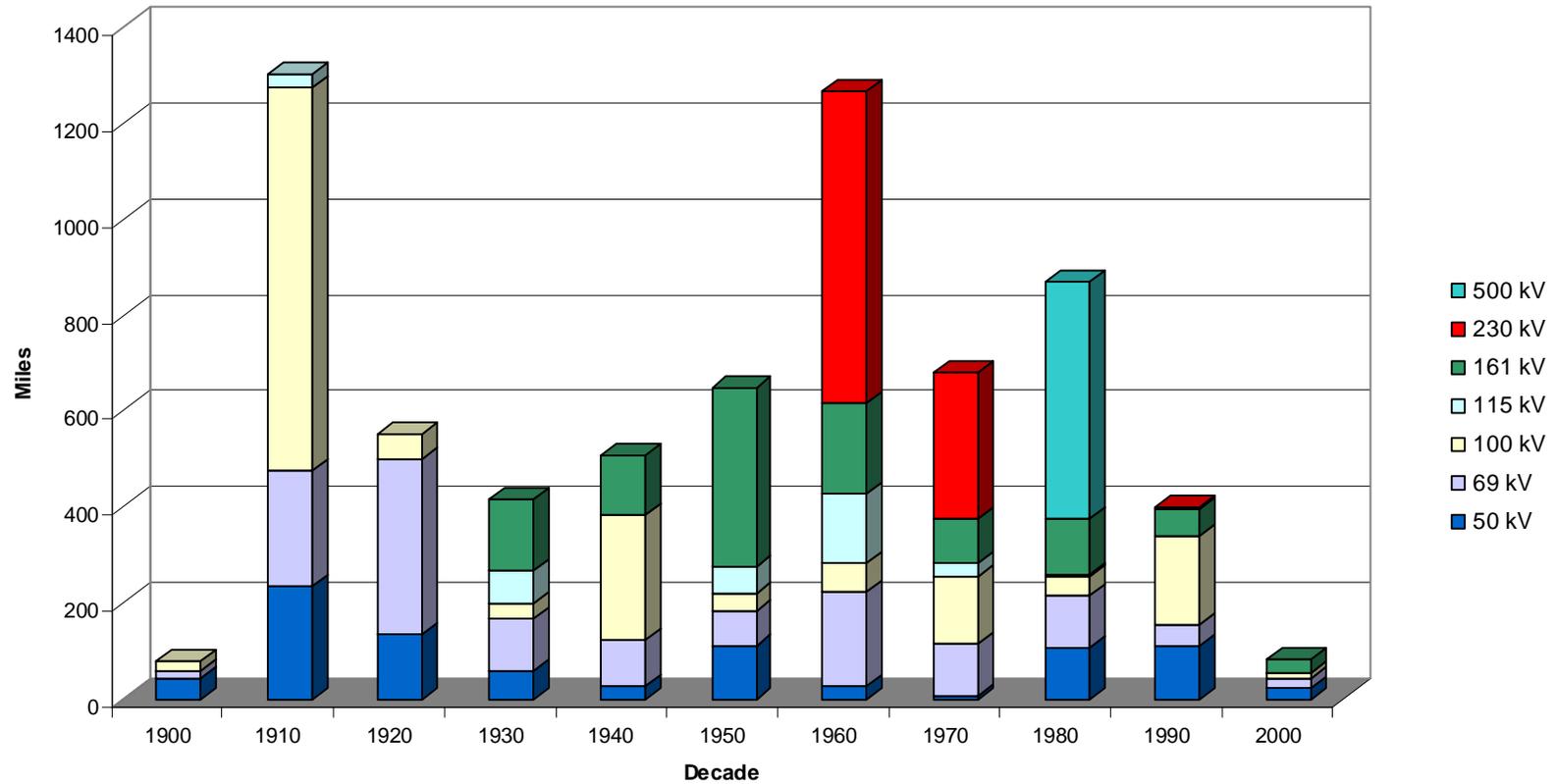
# NorthWestern Energy's Transmission System

NWE Transmission Miles by Voltage

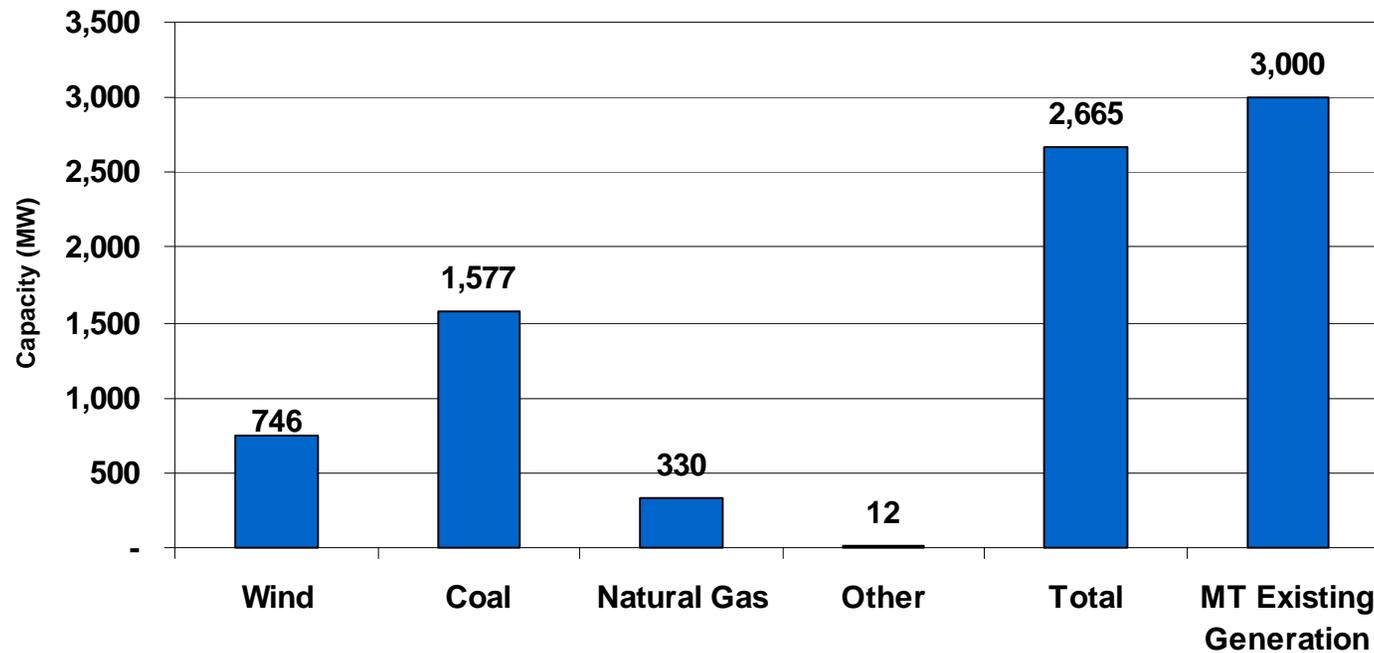


# NorthWestern Energy's Transmission System

NWE Transmission Miles by In-service Decade by Voltage



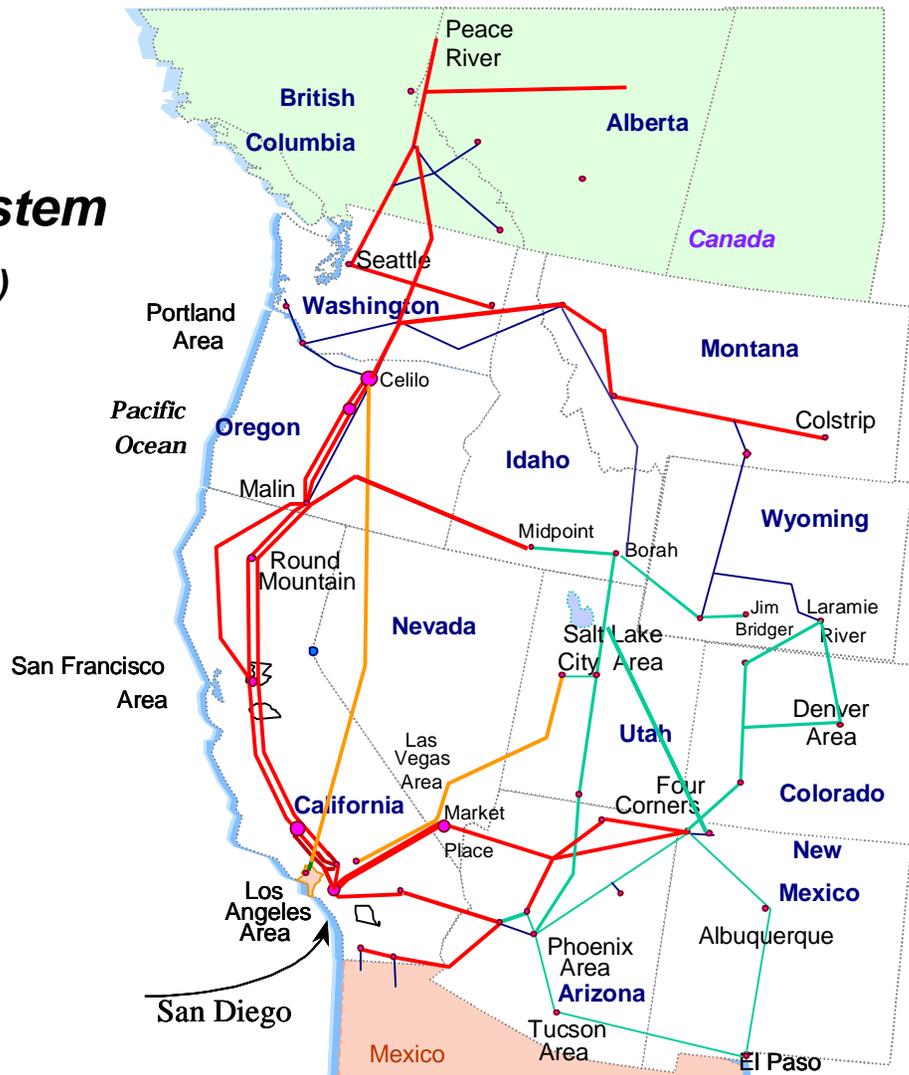
# Potential Generation Development



- New demands on the system will require system upgrades
- Location of new projects can have a big impact on the system

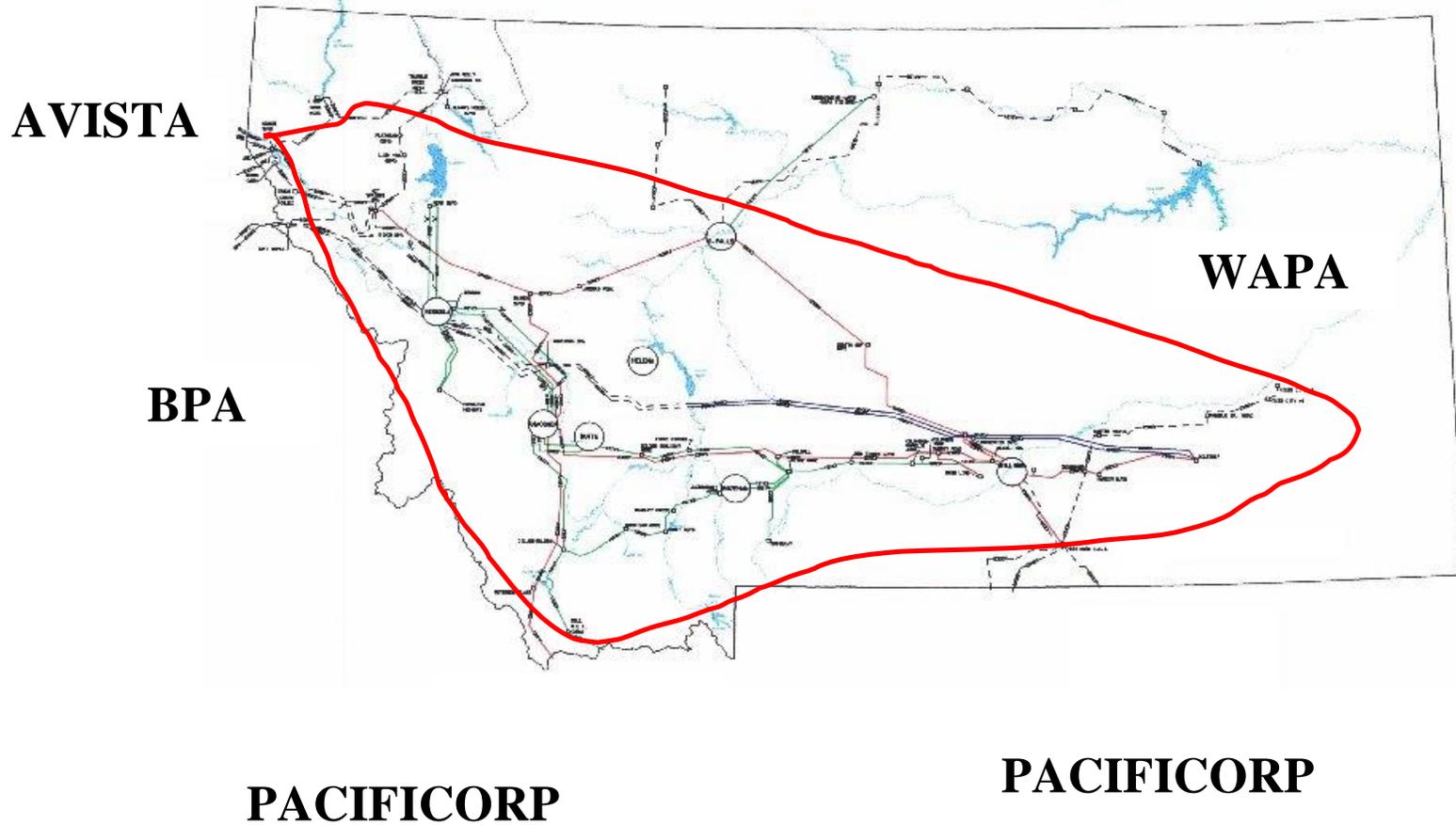
# Transmission Is Integrated Throughout the West

## WSCC Transmission System *(artist's conception)*



# NorthWestern Energy's Control Area

**ELECTRIC SYSTEMS MAP  
161KV AND HIGHER VOLTAGES**

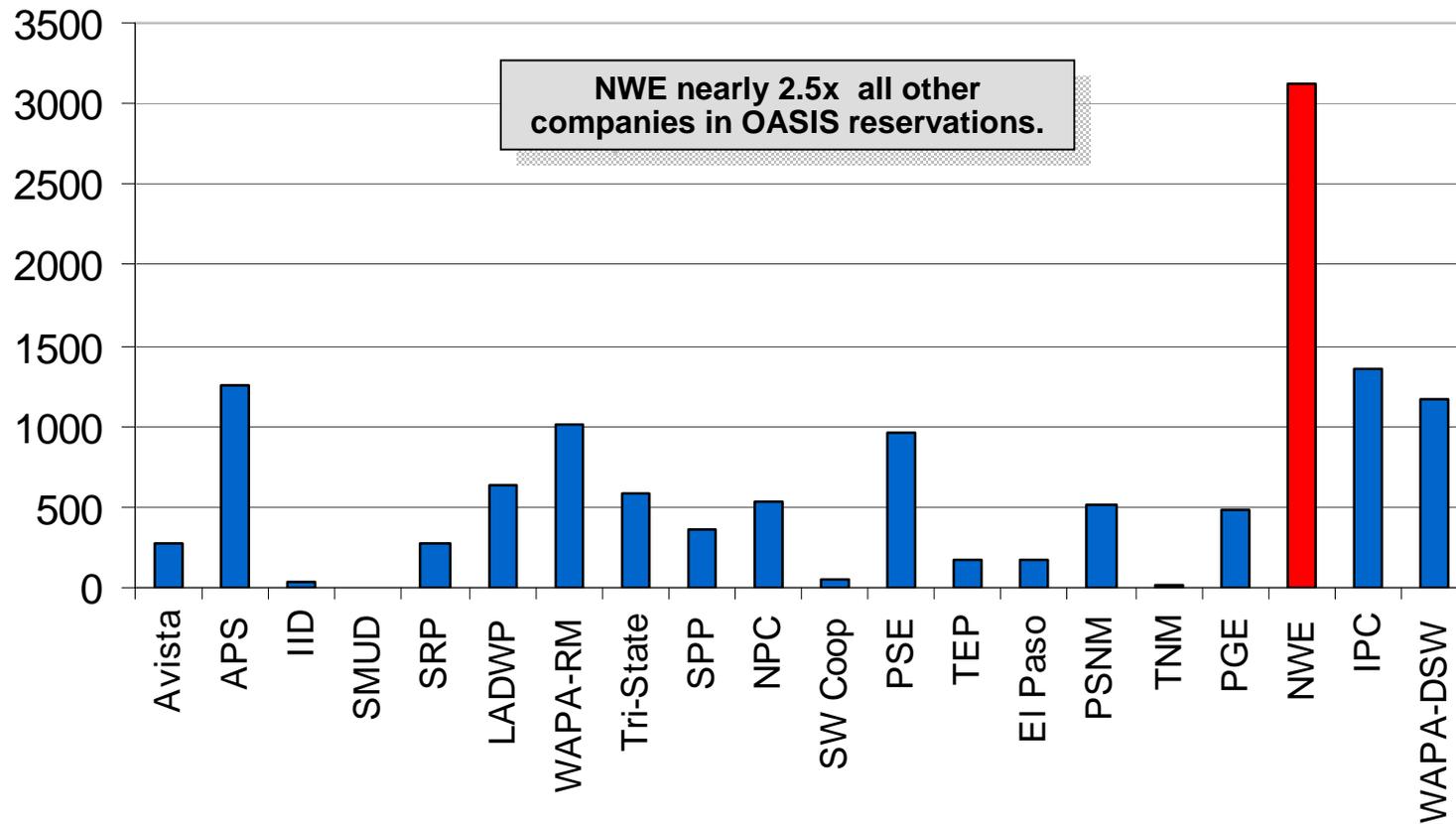


# ***NorthWestern Energy's Transmission System Is Unique***

- **Operate Control Area without dispatchable resources – must contract for services in the market place.**
- **Montana has Retail Access resulting in many “Network” customers comprising “Native Load”**
  - § **Most other Transmission Providers have one Network Customer**
  - § **Energy for these customers may come from different suppliers**
- **NWE has significant Point to Point Transmission Service requests compared to others in West**

# NorthWestern Energy's Transmission System Is Unique

## Monthly Average OASIS Reservations



# Control Area/System Balancing

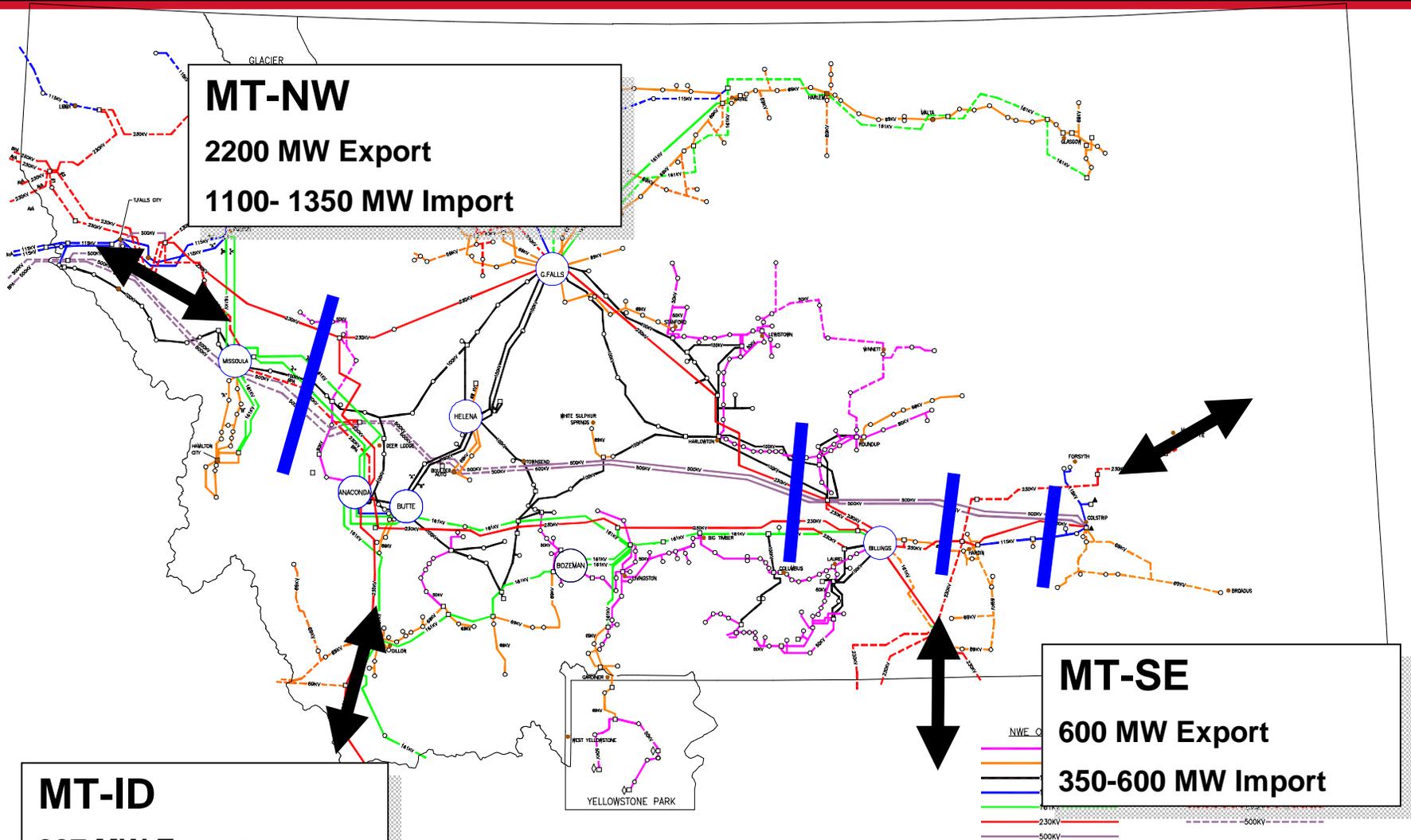
- **Obligation of Transmission Provider – supplier of last resort**
- **Real Time (Every Hour/Every Moment)**
  - § **Adjust Control Area load forecast**
  - § **Must balance available resources with forecasted load**
  - § **Request Control Area balancing service from provider**
  - § **Automatic Generation/Load Control – moment to moment**
  - § **Since NWE has no dispatchable generating resources, services are purchased in the market place to provide for:**
    - **Hourly Energy Imbalance Service**
    - **Load Following Services (moment to moment Automatic Generation Control)**

# Control Area Operation

## Balancing Supply and Demand

- **Pre-schedule**
  - § Customers and generators schedule expected generation and consumption for the next day or days ahead
- **Next Hour**
  - § Hour or hours ahead
  - § Operator (NWE) compares actual conditions to pre-schedule
    - If short, schedule energy in from imbalance provider
    - If long, schedule energy out to imbalance provider
- **Real Time**
  - § Intra-hour
  - § Can no longer change schedules
  - § Need a regulation resource (a.k.a. load following) to match supply and demand
  - § Signal exchanged every 4 seconds
- **All made more difficult without any internal resources**

# Existing Transmission System



# Use of Existing Transmission System

- While there has been no significant increase in high voltage-bulk transmission in Montana since the early 1980s, the use of the existing system has greatly increased:

## § Increased/new generation (on or nearly complete)

- Qualifying Facilities >100MW
  - Hardin -Coal 109
  - Judith Gap- Wind 150
  - Basin Creek- Natural gas 48
- >400MW Total

## § Significantly more generation planned

## § Must contract for System Balancing resources from outside Control Area

## § Load and generation patterns outside Montana has also changed causing additional actual energy flow on NWE system.

## § Growing loads in Bozeman, Missoula, Billings and other areas

## § Summer and Winter peaks near equal now

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# *Questions*

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