Transmission
Transporting Energy by Wire

Matthew Stoltz
Basin Electric Power Cooperative
• Generation = 5000MW (700MW Wind)
• 2.8 Million Consumers
• 134 Member Cooperatives
• 2000 Miles of Transmission
Question: Who is the father of the today's electric transmission system?

1. Thomas Edison
   Direct Current “DC”
   50.0%

2. Nikola Tesla
   Alternating Current “AC”
   50.0%
Growing the Transmission Grid
The High Voltage “Grid”

West – East Split

Source: POWERmap, powermap.platts.com ©2009 Platts, A Division of The McGraw-Hill Companies
Economies of Scale

345,000 Volts

120 Volts
Transmission

Distribution
Powering the Upper Midwest...

Missouri River Dams

Lignite Power Plants
Typical Daily Electricity Demand By Hour

- **Peak Demand**
- **Intermediate Demand**
- **Base Demand**
Generation = Demand
No Storage Capability

The “GRID”
The Grid

*Pro’s*
- Reliable
- Redundant
- Accessible
- Access To Markets Nationwide

*Con’s*
- Everyone Is Connected – Problems Can Cascade
- Remote Congestion Can Limit Local Schedules
Regulation:

FERC: Regulates Interstate Electricity Transmission
State Public Service Commissions: Regulate Internal State Transmission

NERC: Sets Mandatory Reliability Standards
Energy Markets
Locational Marginal Prices - SPP.org
Expanding The Grid

- $125,000 per mile for 60,000 Volt lines
- $250,000 per mile for 115,000 Volt lines
- $500,000 per mile for 230,000 Volt lines
- $1,500,000 per mile for 345,000 Volt lines

- Transmission is ~7% of Average Electric Bill
Basin Completed
AVS-Neset 345KV Transmission Line
200 Miles Long, In Service 2015-2017
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