MidwestISO
Energizing the Heartland

Midwest ISO Planning Approach

EE 590 Introduction

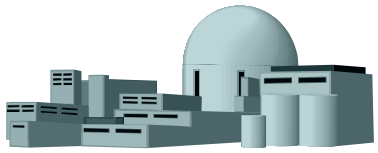
September 15, 2008

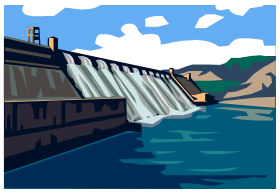
Outline

- Development of Regional Transmission Organizations (RTO)
- What is an RTO?
- What Is the Midwest ISO trying to accomplish in Planning?
- Questions?

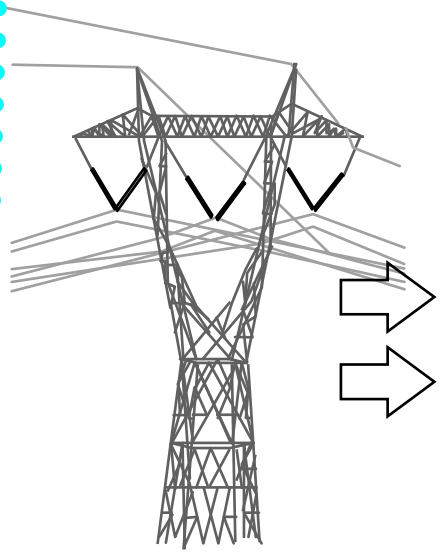
MidwestISO
Energizing the Heartland

A Brief History of Electrical System

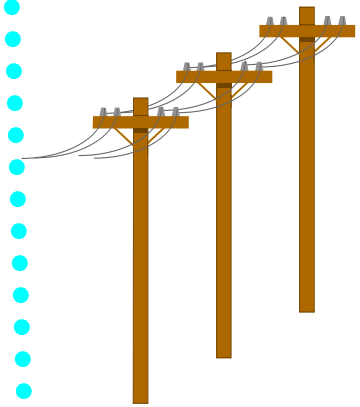




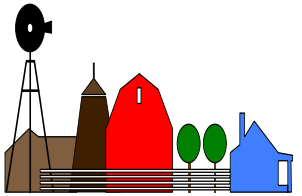
Multiple Sources of Generation



Interconnected Transmission System (Grid)



Distribution System



Customers

MidwestISO
Energizing the Heartland

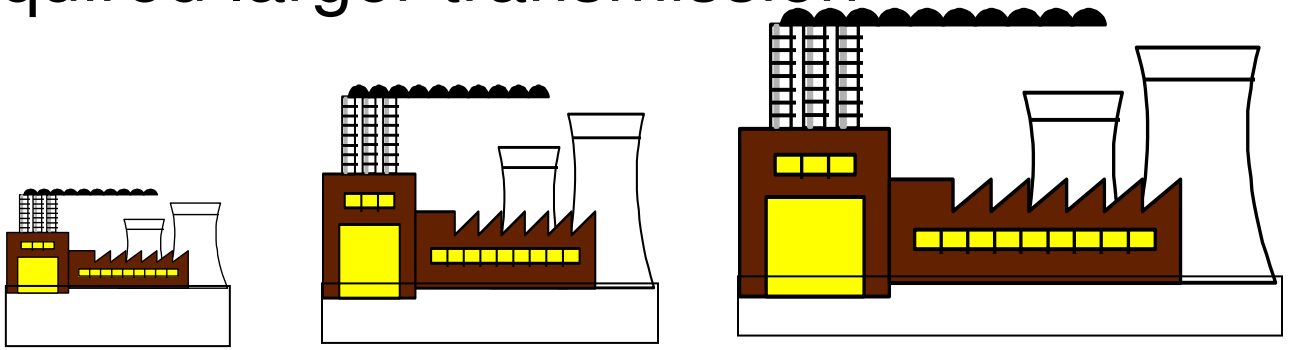
System Requirements

- **Energy on demand**
  - No viable storage technology
- **Adequate capacity**
- **Reliable delivery**
  - Large scale risks
  - Small scale risks
- **Public safety attributes**
  - Reliability
  - Physical contact

MidwestISO
Energizing the Heartland

System Development

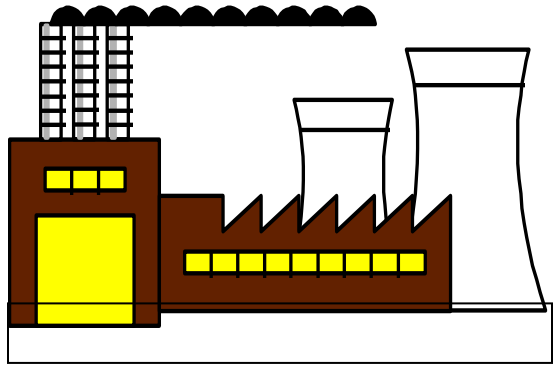
- **First electrification was small scale and local**
  - Transmission was in its infancy
- **Economies of scale in Generation Technology (1935-1970)**
  - Required larger transmission



MidwestISO
Energizing the Heartland

System Development

- **Large Generation Installations**
  - Required transmission solutions to distribute to loads and interconnections
- **Increased need to coordinate reliability between companies**
  - Blackouts (1965, 2003 Northeast Blackouts)
  - NERC (National Electric Reliability Council) is born

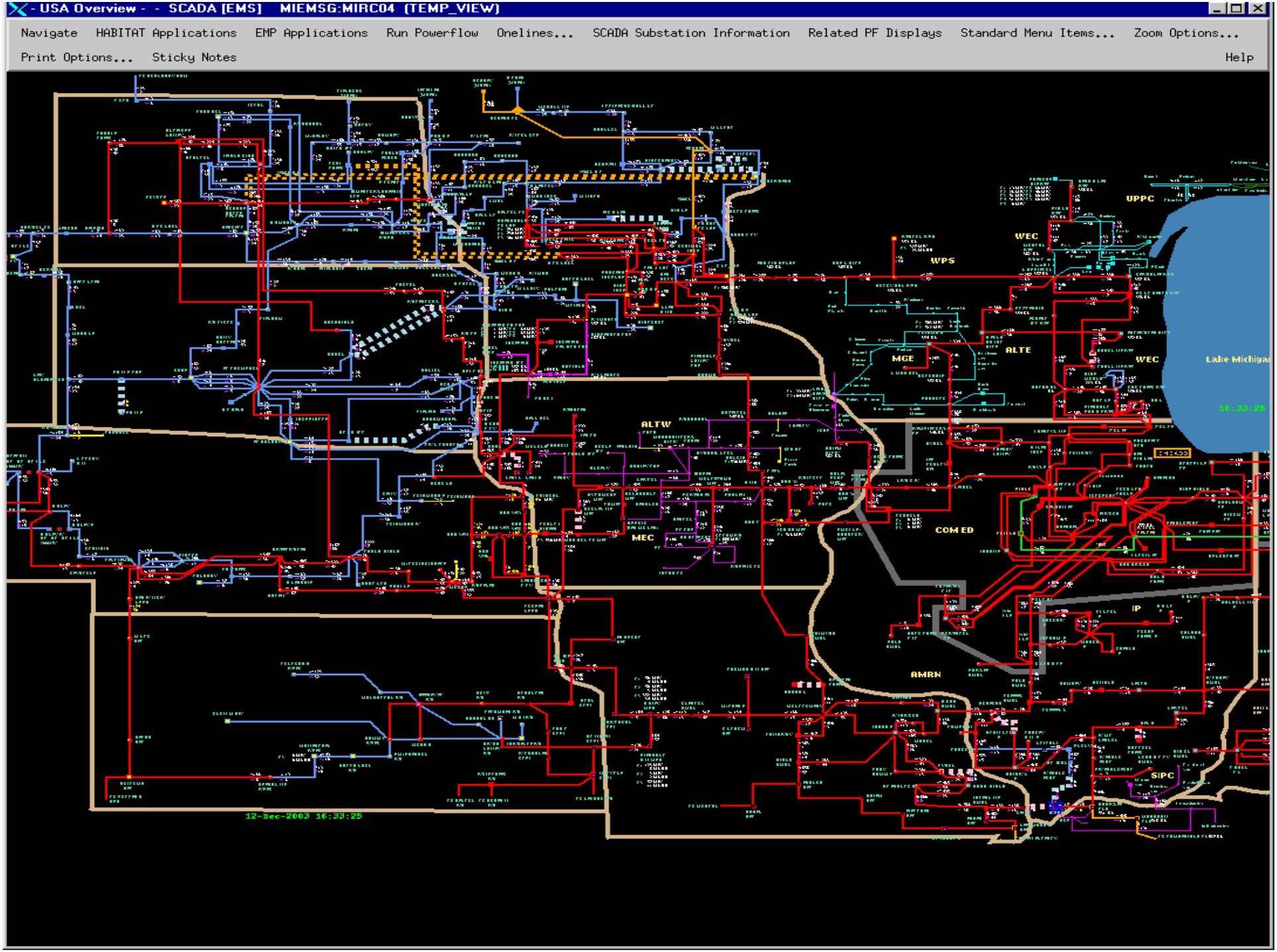


MidwestISO
Energizing the Heartland

System Development

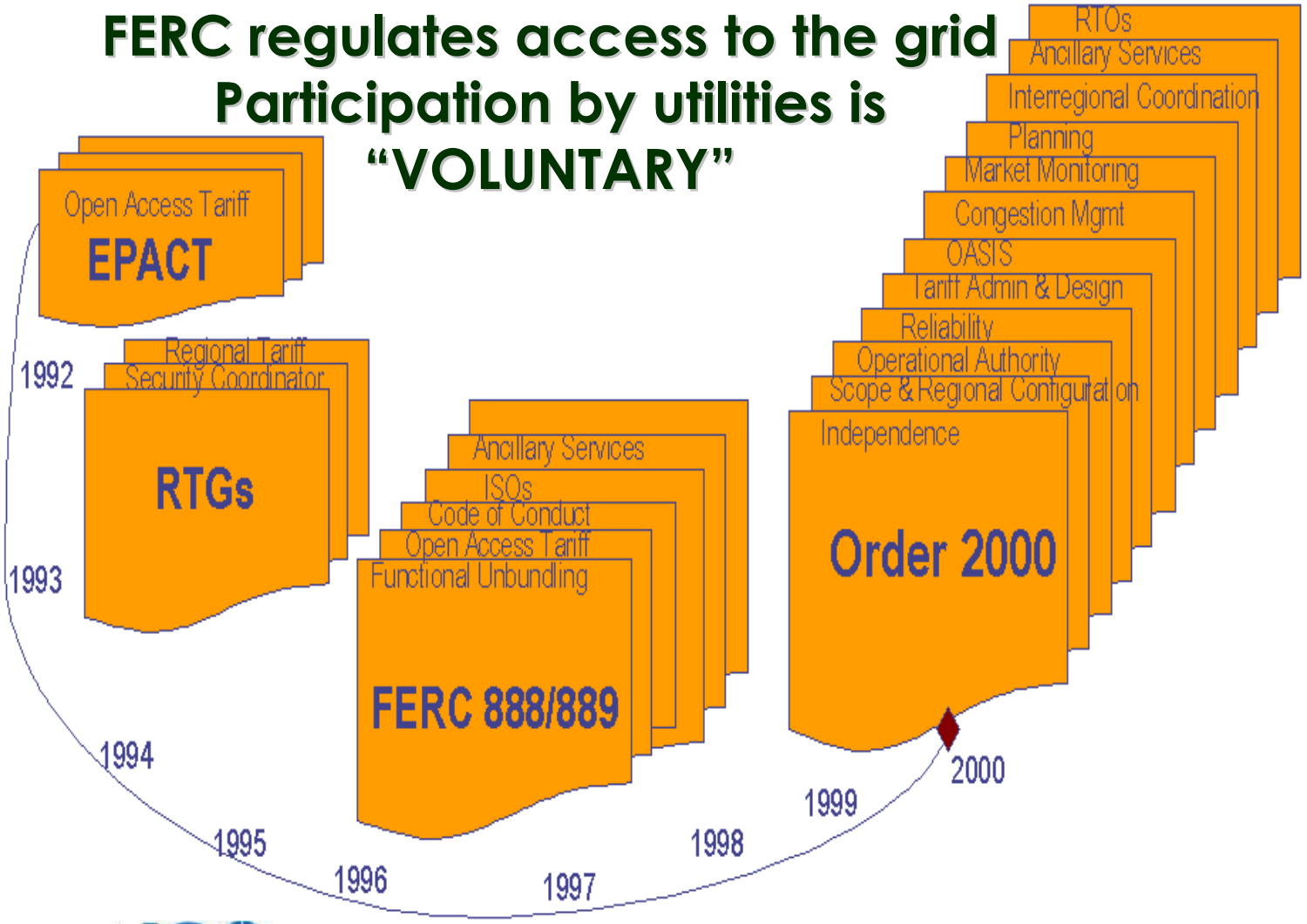
- **Generation economies of scale peaked in the early 1980's**
  - Transmission construction also became difficult
  - Regulatory compact was damaged
    - Cost over runs, demand forecasts, environmental movement opposition…
- **Energy trades increased in volume**
  - Long before RTO regulations, utilities began exchanging power for economic reasons
  - Wholesale competition added to the number of players and the volume of transactions
  - Transmission systems grew in importance
  - Complaints at FERC of market power manipulation

MidwestISO
Energizing the Heartland


- USA Overview - - SCADA [EMS] MIEMSG:MIRC04 (TEMP_VIEW)
Navigate
HABITAT Applications
EMP Applications
Run Powerflow
Onelines...
SCADA Substation Information
Related PF Displays
Standard Menu Items...
Zoom Options...
Print Options...
Sticky Notes
Help
UPPC
WEC
WPS
MGE
ALTE
WEC
Lake Michigan
ALTW
MEC
COM ED
IP
AMRN
SIPC
12-Dec-2003 16:33:25

Open Access Transmission

FERC regulates access to the grid
Participation by utilities is "VOLUNTARY"



MidwestISO
Energizing the Heartland

Changing Regulation

- **FERC Order 2000 requests RTO's to control network**
  - Discrimination and market power concerns
  - Change market structure to bring transparency
  - Ration transmission capacity to highest value
  - Encourage transmission investment
- **Order 2000 prescribes Characteristics and Functions**
  - Is "voluntary" but coercive
  - Applies only to FERC jurisdictional utilities
    - Non-jurisdictional utilities encouraged to participate
  - Acknowledges regional attributes of transmission systems

MidwestISO
Energizing the Heartland

What is an RTO?

Goals for Regional Transmission Organizations

- **Independence**
  - Non-discriminatory open access to a large consolidated transmission system
  - Independent calculation of Available Transfer Capability/Available Flowgate Capability
  - Independent market monitoring and mitigation in place
- **Enhanced Reliability**
  - Better planning process for a large region, maintaining or improving reliability on a regional level
  - Allows the opportunity to provide and implement a long-term answer to managing congestion on the transmission grid
  - Improved maintenance and outage coordination

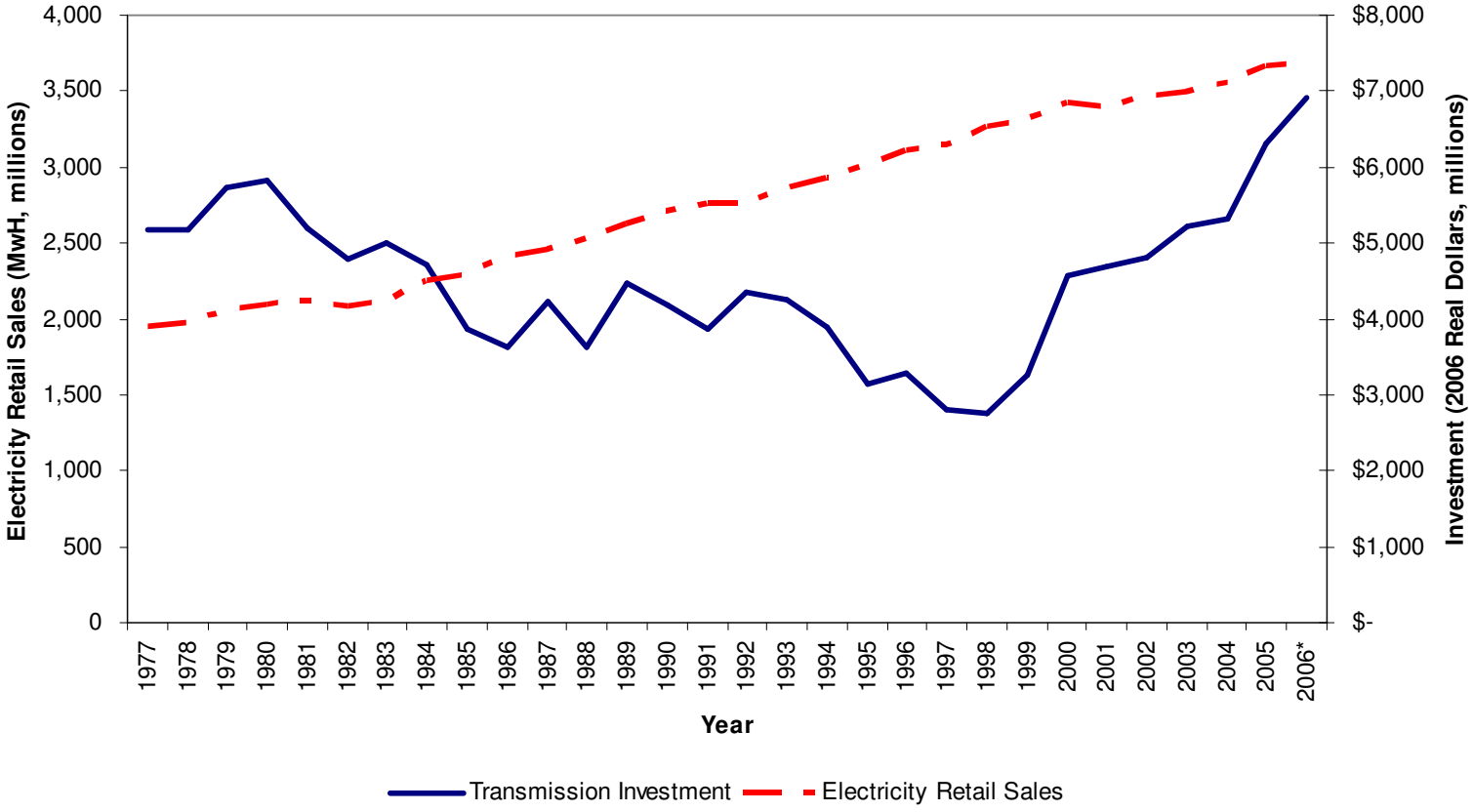
MidwestISO
Energizing the Heartland

Changing Regulation

- FERC Order 890 issued in early 2007
- Among other items provides for increased coordination, openness and transparency in transmission planning and requires compliance with nine principles
  - Coordination
  - Openness
  - Transparency
  - Information Exchange
  - Comparability
  - Dispute Resolution
  - Regional Participation
  - Economic Planning Studies, and
  - Cost Allocation

MidwestISO
Energizing the Heartland

Transmission Investment

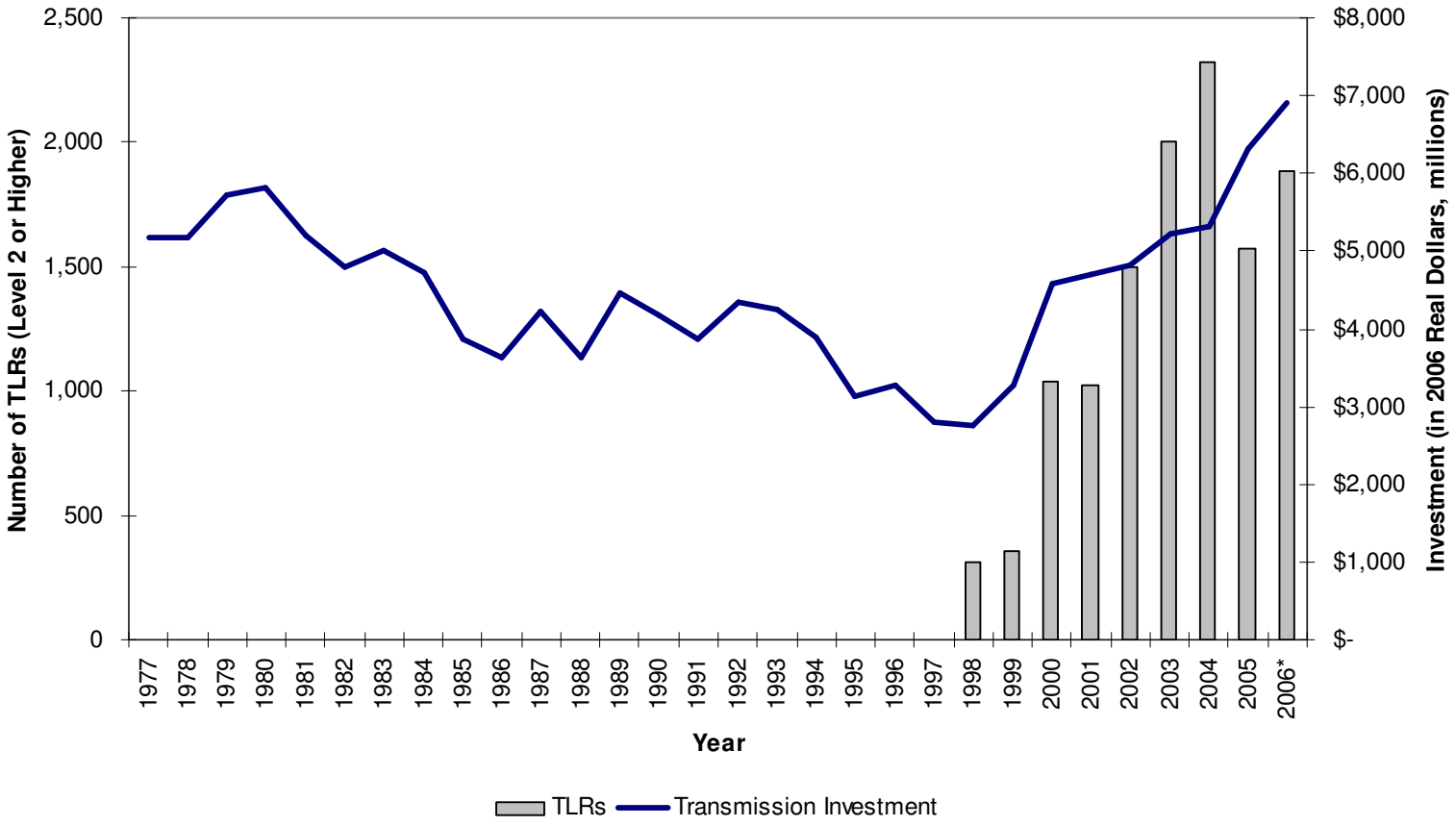


* - 2006 Investment number is a planned amount

MidwestISO
Energizing the Heartland

Sources: Retail Sales data from EIA U.S. Electric Utility Sales Data
Investment data from EEI 2006 Construction Expenditures Survey of Shareholder-owned electric utilities

Transmission Investment



* - 2006 Investment number is a planned amount

MidwestISO
Energizing the Heartland

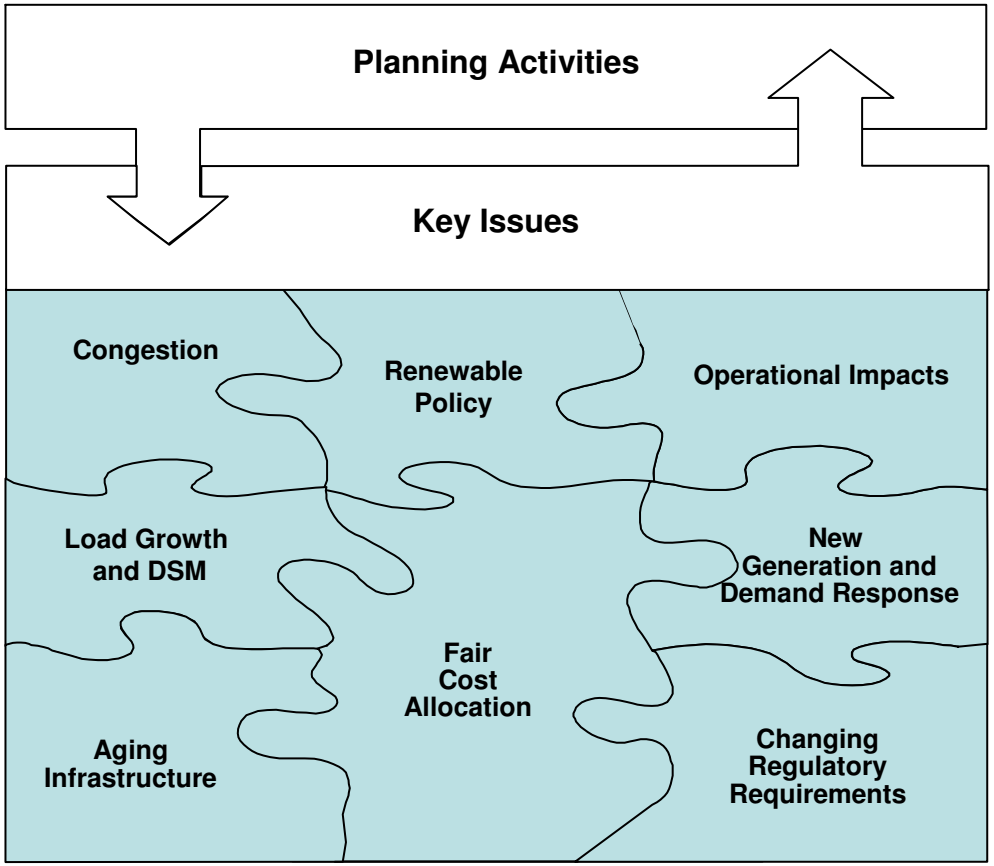
Sources: TLR data from NERC Transmission Loading Relief Procedure Logs
Investment data from EEI 2006 Construction Expenditures Survey of Shareholder-owned electric utilities

Planning Vision: Midwest ISO Board of Directors Planning Principles

- **Guiding Principle 1** – Make the benefits of a competitive energy market available to customers by providing access to the lowest possible electric energy costs
- **Guiding Principle 2** – Provide a transmission infrastructure that safeguards local and regional reliability
- **Guiding Principle 3** – Support existing state and federal renewable objectives by planning for access to all such resources (e.g. wind, biomass, demand side management)
- **Guiding Principle 4** – Create a mechanism to ensure investment implementation occurs in a timely manner
- **Guiding Principle 5** – Develop a transmission system scenario model and make it available to state and federal energy policy makers to inform the choices they face

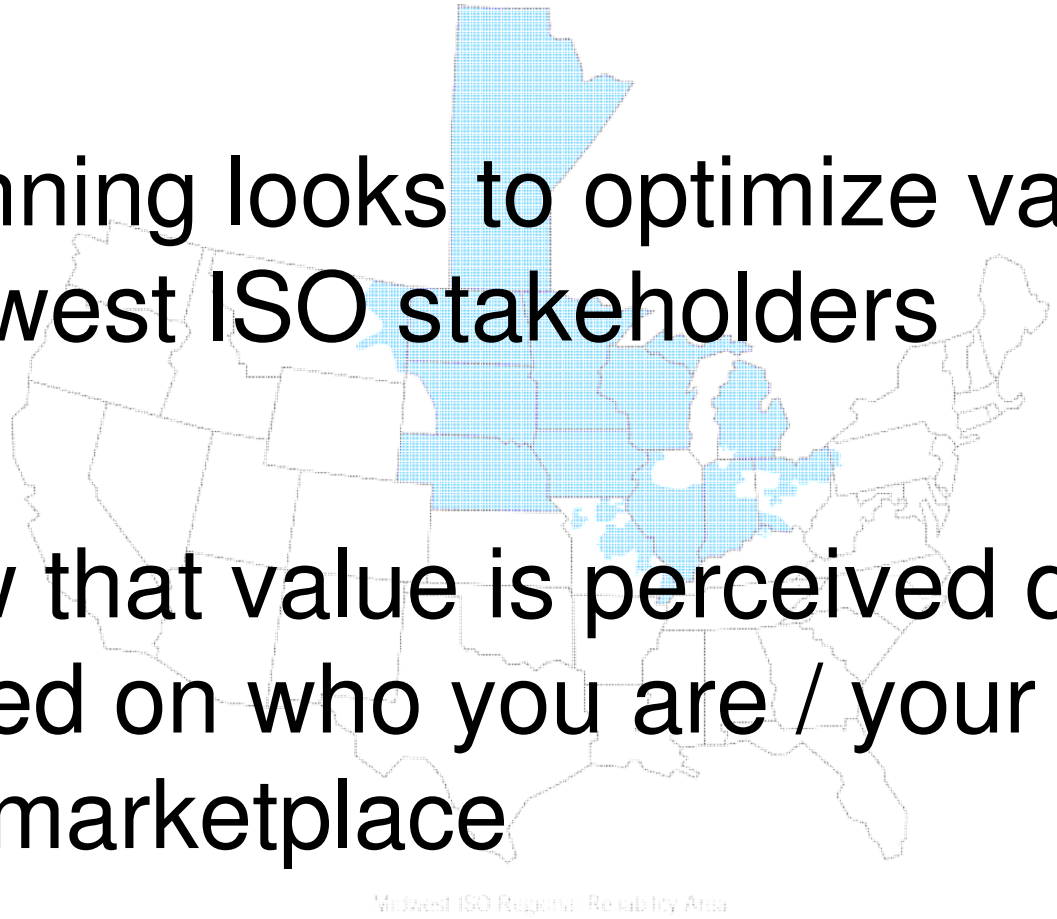
MidwestISO
Energizing the Heartland

Key Issues Impacting Transmission Planning



MidwestISO
Energizing the Heartland

The Underlying Question: Value for Whom?



- Planning looks to optimize value for Midwest ISO stakeholders
- How that value is perceived differs based on who you are / your role in the marketplace

MidwestISO
Energizing the Heartland

What Types of Questions Do These Issues Raise for Midwest ISO and Stakeholders?

- Is there a business case for increased transmission build?
- What type and location of transmission is required to effectively integrate wind from an operational perspective?
- Are we reflecting all the primary value drivers in our cost sharing methodology?
- Are we accurately capturing the value of benefits which may flow across borders?
- And many more…

MidwestISO
Energizing the Heartland

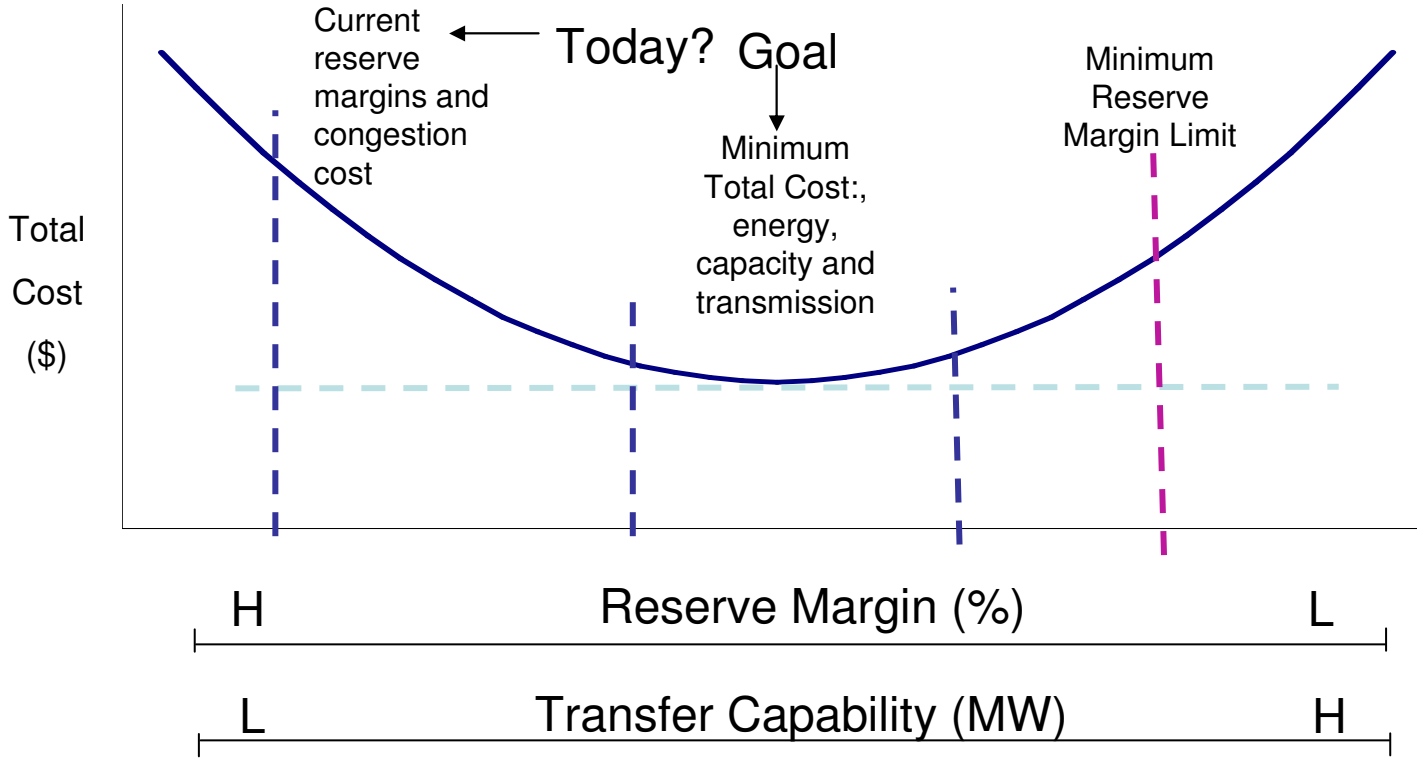
How Do Those Questions Affect the Midwest ISO Approach to Planning?

- Midwest ISO hypothesizes that the current transmission planning paradigm, based primarily on reliability assessment which minimizes transmission build, leaves value for consumers on the table
  - Current paradigm primarily relies on adding generation to support reserve margin requirements when confronted with increasing demand
  - Transmission may be a less expensive alternative
- To prove or disprove the hypothesis, the Midwest ISO must **add** tools to the planning toolkit to evaluate total value of transmission projects which meet longer term needs (i.e. 20 years)
  - The new tools and methods are not a replacement for reliability analysis in the short-term, nor economic and reliability analysis in the sub-20 year range

MidwestISO
Energizing the Heartland

Balancing Generation and Transmission Investment

Increased transfer capability, in conjunction with appropriately located generation, could allow for reduced reserve margins, and thus reduced overall cost

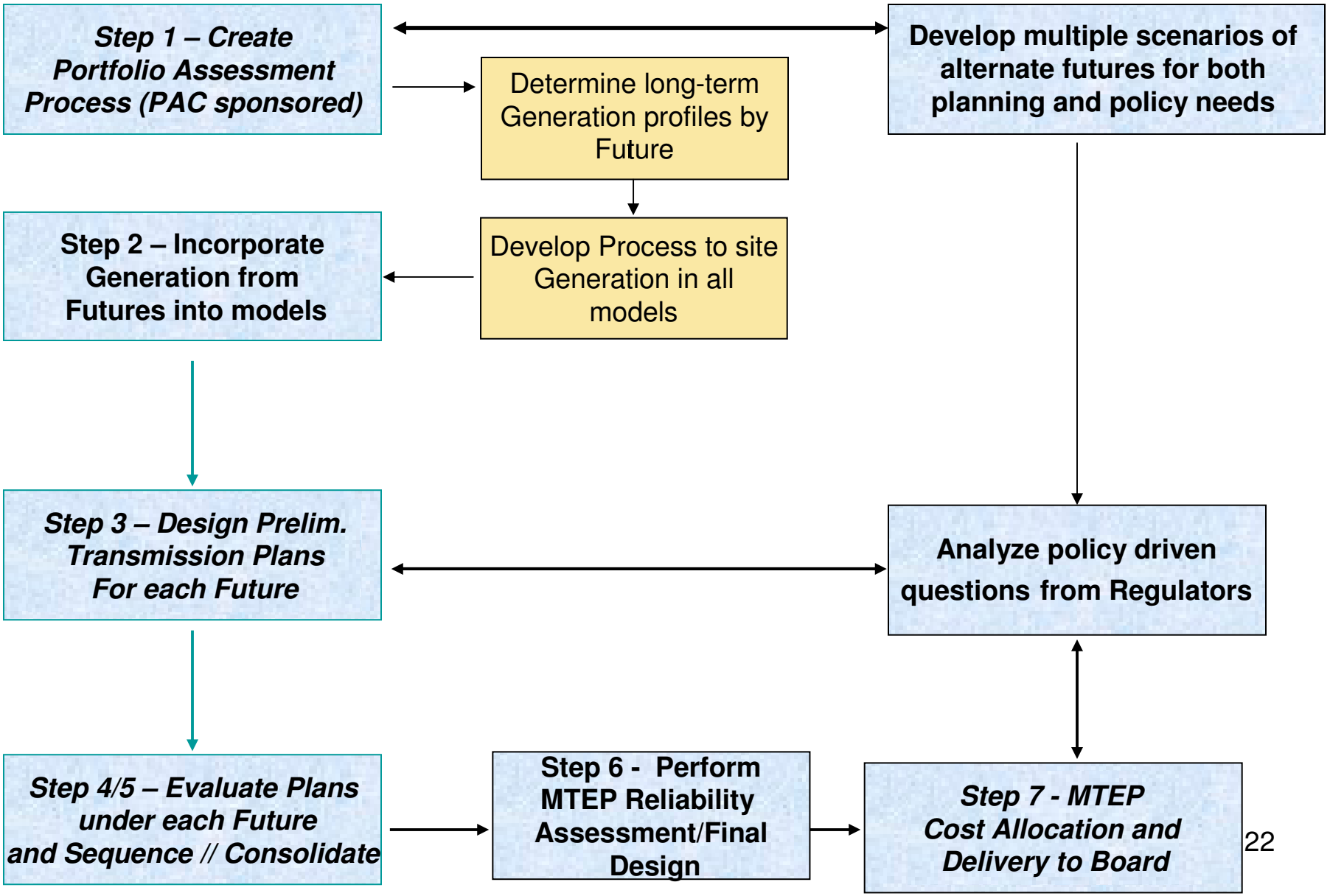


MidwestISO
Energizing the Heartland

How is the Midwest ISO Executing Long-Term Planning?

- Midwest ISO is approaching long-term planning from an integrated transmission planning perspective
  - The Midwest ISO models generation using generic supply and demand side resources and locations under several possible future scenarios because the information is not otherwise available
  - The objective of the analysis is to determine the transmission plan which will provide the most options to create value under whatever future supply and demand resource state exists (as determined by Integrated Resource Plans from Transmission Owners, Transmission Dependent Utilities and others)
- The result is not an Integrated Resource Plan
  - Integrated Resource Plans are at a detailed level and optimize generation resources within resource classes, fuel types, and specific locations as well as considering transmission, demand side management and other drivers
  - Integrated resource plans typically try to address specific policy objectives such as minimize environmental impacts, use of local resources, reliable electric service, diversify supply, increase efficiency, etc.

MTEP08 Process Flow



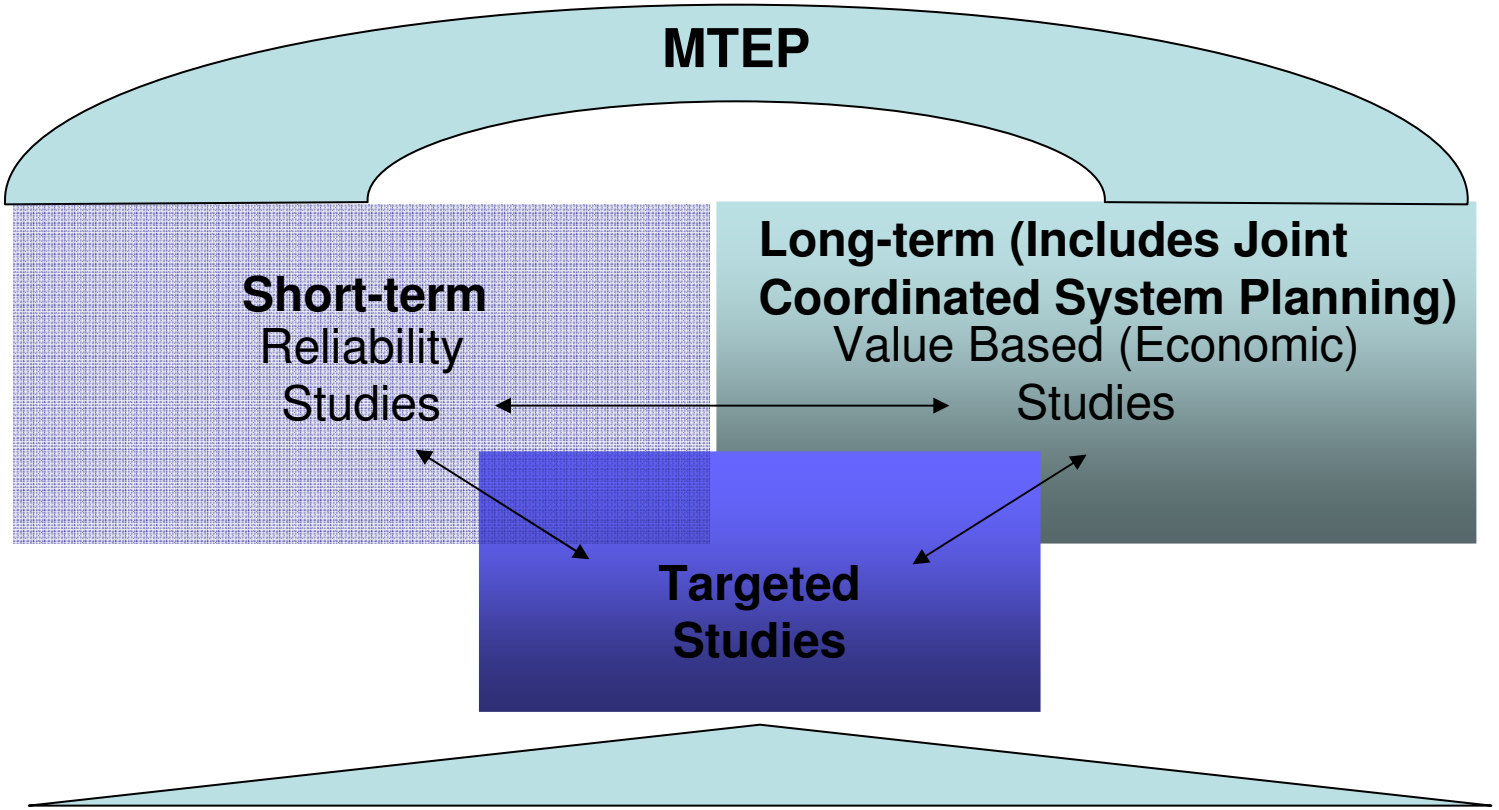
Planning Cycles

- Annual studies required by NERC
  - 5 Year NERC Reliability Standards (10 year screens)
- Varied
  - Targeted studies to address specific topics of concern (Regional Generation Outlet, Narrowly Constrained Area, Southwestern Indiana Economic Transmission, ITC 765, etc.)
- Multi-year analysis
  - 10-20 year Economic (value-based) studies required by FERC Order 890
  - Joint Coordinated System Plan

MTEP Report is an annual snapshot of current planning status and results of all completed planning studies

MidwestISO
Energizing the Heartland

How Do The Pieces Fit Together?



Project Identification by:

Midwest ISO
Load Serving Entities
Sub Regional Planning Meetings
Transmission Owners
Other Stakeholders

MidwestISO
Energizing the Heartland

Transmission Projects

- **Transmission projects that increase regional energy transfer capability are not well received**
  - Usually involves more than one state
  - Threatens the business models of traditional utility structures that rely on state cost recovery
  - Is greeted with hostility by public interest groups that don't see a direct benefit
  - Garners **Big Bad Headlines** for the utility and the regulators trying to serve the public interest

MidwestISO
Energizing the Heartland

Issue: Transmission Location and Jurisdictional Concerns

- **Significant transmission infrastructure is rarely contained within one State**
  - Adjacent States' Energy Policy rarely align
  - Definitions of Need are premised on traditional utility business models
    - Regional benefits outside of statutory jurisdictions often cannot be considered
  - Free Rider issues regarding who benefits and who pays

MidwestISO
Energizing the Heartland

Issue: Financial Concerns

- **Cost recovery is uncertain**
  - Transmission cost is predominately recovered in State regulated rates (90%+/-)
    - Who benefits and who pays often do not align causing recovery squabbles between states
      - A facility in state “A” that benefits customers in state “B” are paid for by customers in State “A” regardless of the FERC tariff
    - Rate freezes and linkages to other policy initiatives are common, causing reluctance to incur cost
- **Value is uncertain**
  - The economic life horizon for the facility and the depreciation life horizon do not match
  - Who knows what the landscape will look like in 40 or 80 years?

MidwestISO
Energizing the Heartland

Issue: Public Concerns

- **The public interest and the interested public rarely align**
  - Policy advocates seek to link transmission construction request with any and all other policy goals - “if we defeat this line”:
    - People will be forced to conserve
    - Or must use distributed generation
    - Or must use wind
    - Or will quit moving to the suburbs

MidwestISO
Energizing the Heartland

Conditions Precedent to Increased Transmission Build

- A robust business case for the plan
  - Need to demonstrate that the hypothesized benefits exist, including evaluation of alternatives
  - Regulators are the judge of the business case
- Increased consensus around regional energy policy
  - Does not exist today around wind, for example, across the Midwest ISO footprint
- A regional tariff that matches who benefits with who pays over time
  - For example, beneficiaries of wind may be due to public policy, rather than load flow or economic benefit analyses which are the current basis for cost allocation
- Cost recovery mechanisms that reduce financial risk
  - Investors in these projects need to be assured of cost recovery

MidwestISO
Energizing the Heartland