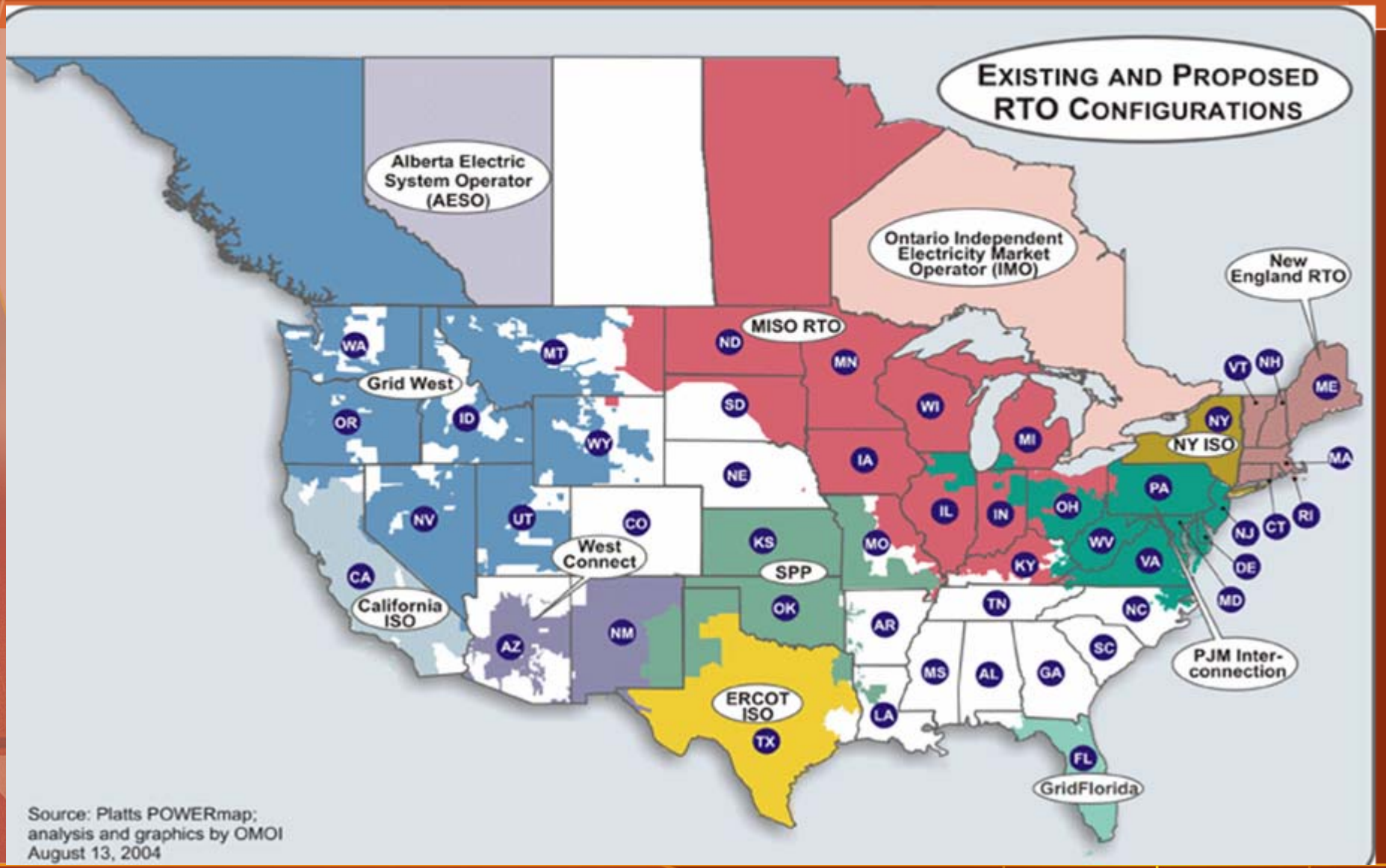
Infrastructure, Regulators and Utilities in the World of RTOs and Electricity Markets

Steve Gaw, Commissioner,
Missouri Public Service Commission
President of the Organization of MISO States

Springfield, Illinois

November 30, 2006

RTOs In The United States



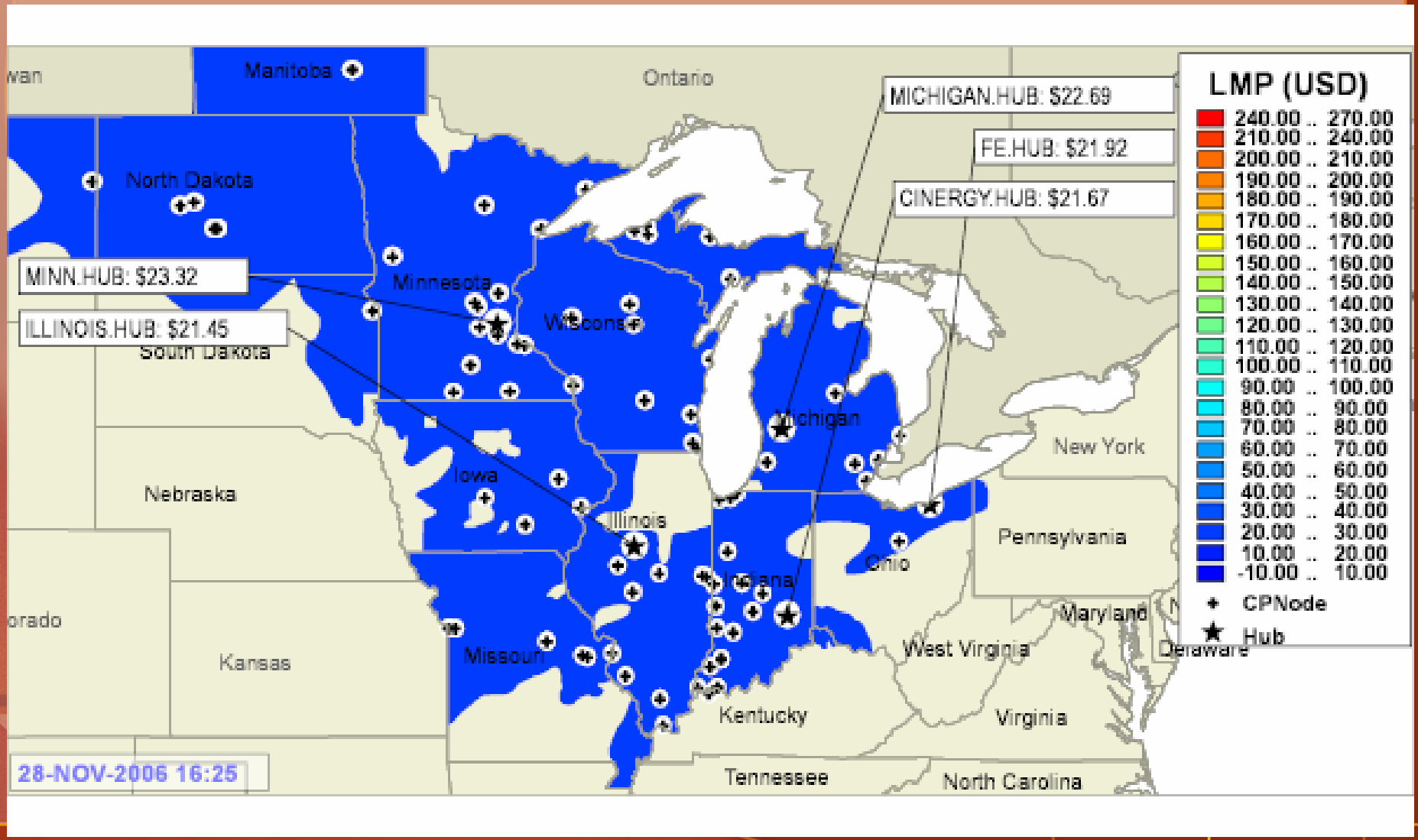
Markets Operated by Regional Transmission Organizations (RTOs)

A. Advertised Benefits
   1. Transparency of Wholesale Electricity Prices
   2. Transparency of Congestion Costs
   3. Greater Independence in Transmission Planning
   4. Greater efficiency in use of transmission grid and in dispatch of generation
   5. Increased incentives to build needed infrastructure
   6. Benefits to participants that exceed costs

Are the RTOs Delivering Progress as Promised?

Transparency….

Have the RTOs Delivered?
Transparency of Prices and Costs

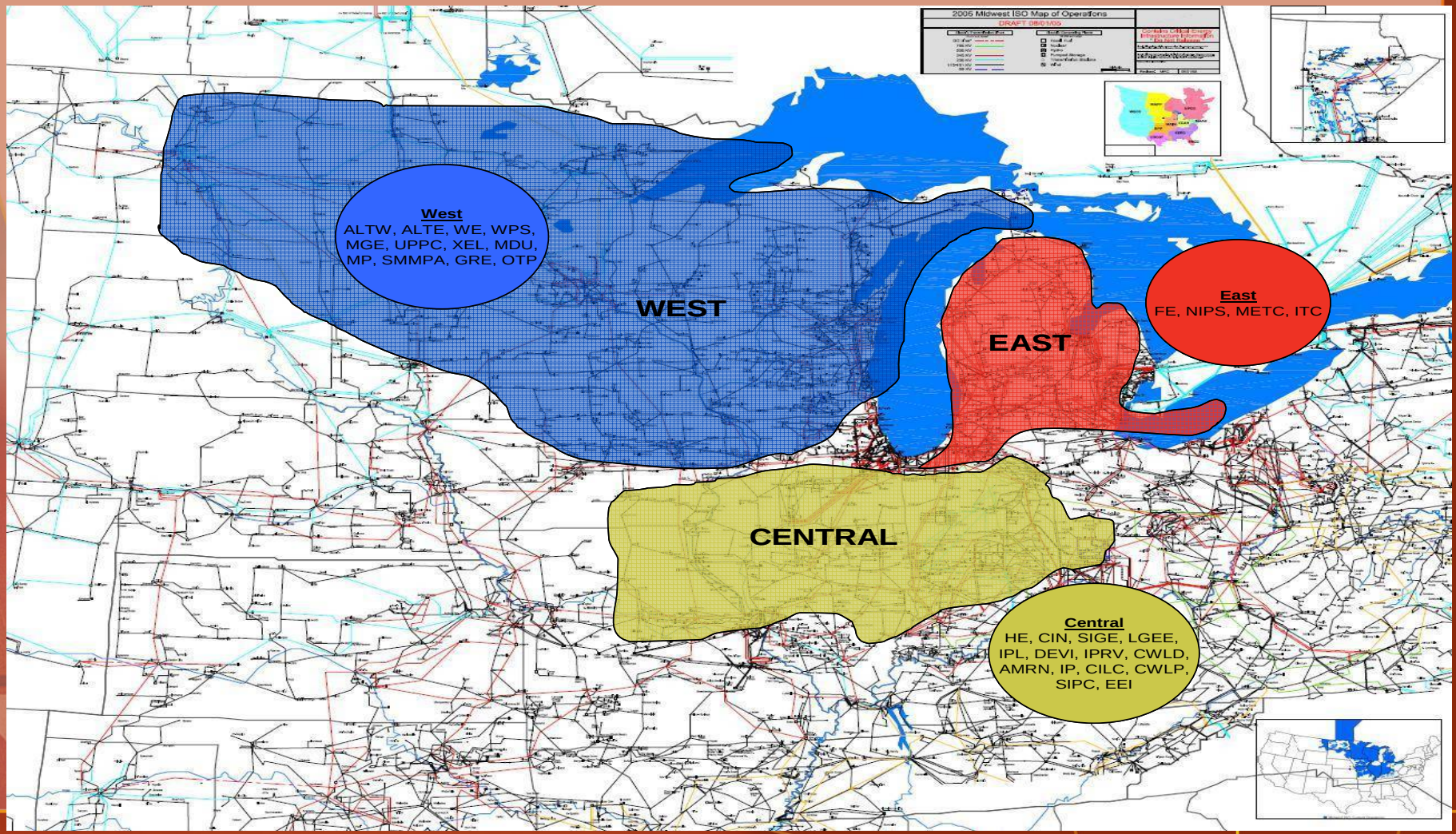


Progress as Promised?

Location	Hourly Day Ahead			5-Minute Real Time			Delta			Last Hour Estimated		
	HE 18			17:25						HE 17		
	LMP	MLC	MCC	LMP	MLC	MCC	LMP	MLC	MCC	LMP	MLC	MCC
AEC	45.87	-1.61	-4.64	45.57	-1.52	0	0.3	-0.09	-4.64	25.46	-1.02	-4.11
AECI	46.48	-1.49	-4.15	45.41	-1.68	0	1.07	0.19	-4.15	23.32	-1.03	-6.24
AEP	45.51	-1.67	-4.94	45.89	-1.2	0	-0.38	-0.47	-4.94	25.36	-0.99	-4.24
ALTE.COLUMBAL1	57.75	-0.8	6.43	45.34	-1.75	0	12.41	0.95	6.43	26.39	-1.19	-3.01
ALTE.EDGG5G5	56.8	0.69	3.99	46.43	-0.66	0	10.37	1.35	3.99	27.00	-0.57	-3.01
ALTW.DAEC	25.13	-2.32	-24.67	44.82	-2.27	0	-19.69	-0.05	-24.67	11.49	-1.39	-17.71
ALTW.FPL_DAEC	25.13	-2.32	-24.67	44.82	-2.27	0	-19.69	-0.05	-24.67	11.49	-1.39	-17.71
ALTW.OTTUMW1	41.91	-2.59	-7.62	44.55	-2.54	0	-2.64	-0.05	-7.62	15.77	-1.46	-13.36
AMRN.CALLAWAY1	43.18	-2.91	-6.03	43.79	-3.3	0	-0.61	0.39	-6.03	24.00	-2.13	-4.47
AMRN.LABADIE3	42.99	-3.37	-5.76	43.33	-3.76	0	-0.34	0.39	-5.76	23.72	-2.47	-4.40
AMRN.LABADIE4	43.05	-3.31	-5.76	43.37	-3.72	0	-0.32	0.41	-5.76	23.75	-2.45	-4.40
AP	45.51	-1.67	-4.94	45.89	-1.2	0	-0.38	-0.47	-4.94	25.36	-0.99	-4.24
BCA	45.72	-1.62	-4.78	45.59	-1.5	0	0.13	-0.12	-4.78	25.42	-1.02	-4.15
BREC	46.09	-0.97	-5.06	45.48	-1.61	0	0.61	0.64	-5.06	25.30	-1.07	-4.22
CE	45.51	-1.67	-4.94	45.89	-1.2	0	-0.38	-0.47	-4.94	25.36	-0.99	-4.24
CIN.CAYUGA.1	43.93	-3.06	-5.13	44.22	-2.87	0	-0.29	-0.19	-5.13	24.37	-1.99	-4.24
CIN.CAYUGA.2	44.16	-2.82	-5.14	44.46	-2.63	0	-0.3	-0.19	-5.14	24.51	-1.84	-4.24
CIN.GIBSON.1	42.57	-4.45	-5.1	43.42	-3.67	0	-0.85	-0.78	-5.1	23.82	-2.53	-4.23
CINERGY.HUB	45.59	-1.5	-5.03	45.59	-1.5	0	0	0	-5.03	25.20	-1.18	-4.22

Progress as Promised?

Independence in Planning:
Midwest Independent System Operators (MISO)



Progress as Promised?

- Tensions exist between the particular interests of generator owners and improvements in the overall efficiency of the transmission grid.
- An Independent, Regional Transmission Planning Process.
  - Provides an independent review of both needs and benefits by an entity that is not economically impacted by the transmission upgrade.
  - Includes a stakeholder process that provides input on need and benefits.

Progress as Promised?

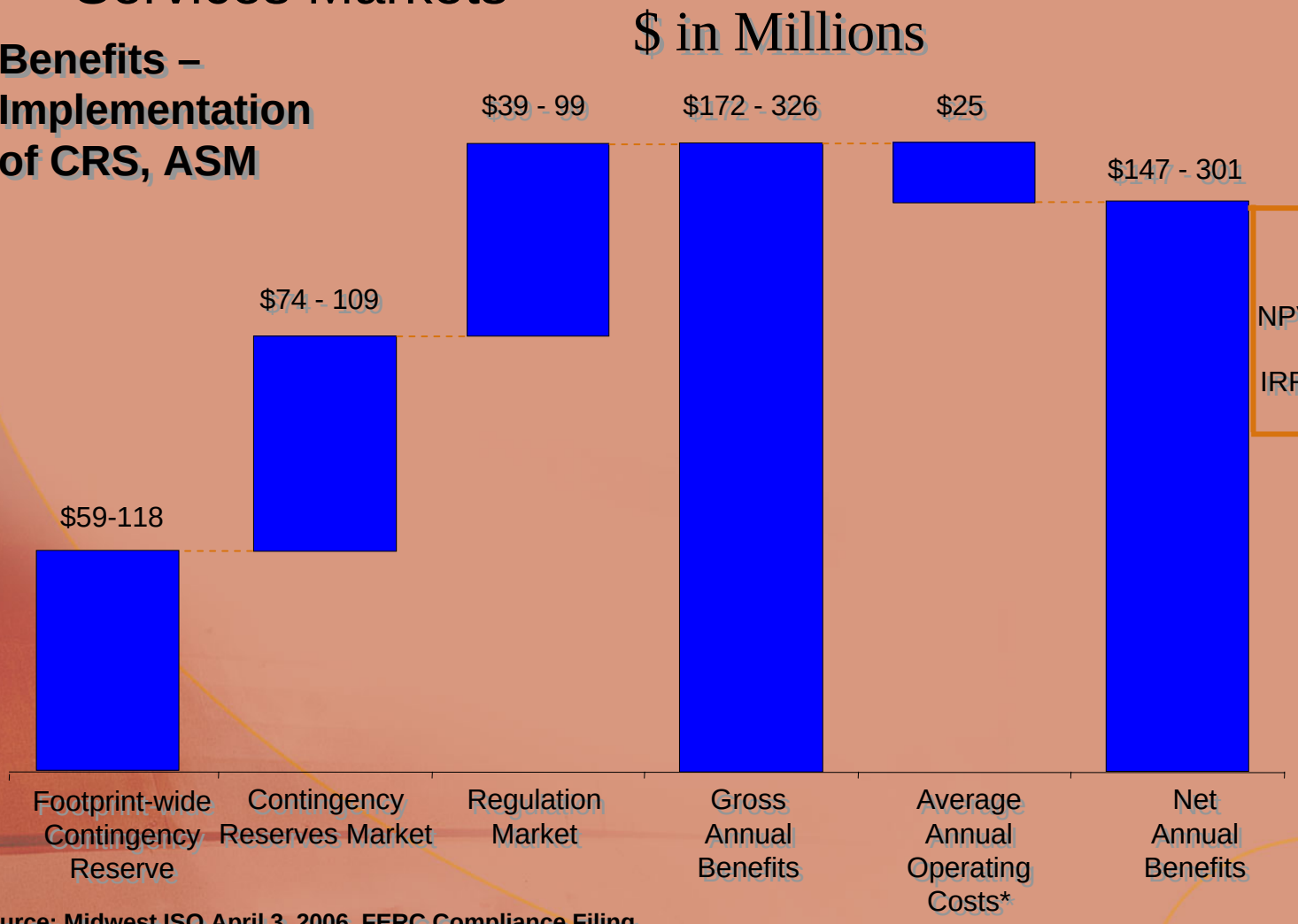
Efficiency of Dispatch Operation:

- Theoretically RTO Markets should cause the dispatch of most efficient units first.
- Sharing Resources
- The actual efficiencies in MISO compared to the theoretical benefits are currently being studied.

Estimated Annual Benefits:

Consolidation of Control Areas and Creation of Ancillary Services Markets

Benefits – Implementation of CRS, ASM



	Low	High
NPV**	$990	$2,456
IRR	583%	1,299%

Source: Midwest ISO April 3, 2006, FERC Compliance Filing

* Recovery through existing Midwest ISO Schedule 17; includes amortization of startup costs calculated using $65 million estimated project cost; amortized over seven years at 5%

** NPV calculated over 10 years using 5% discount rate

Progress as Promised?

- Incentives for new construction
  - Financial signals are clearer now than prior to markets.
    - Are Pricing Signals alone sufficient?
  - Adoption of a Fair Cost Allocation Formula is critical to new transmission investment.

Progress as Promised?

- FERC Order 888 Policy established the entity requesting new or changed transmission service must pay for all upgrades required to grant that service ("Requestor Pays")
- A regional cost allocation methodology is needed that recognizes:
  - Transmission upgrades cannot be sized to exactly fit the request.
  - Transmission customers other than the Requestor benefit from transmission upgrades needed to meet the request.

Cost Allocation Methodology Must Be:

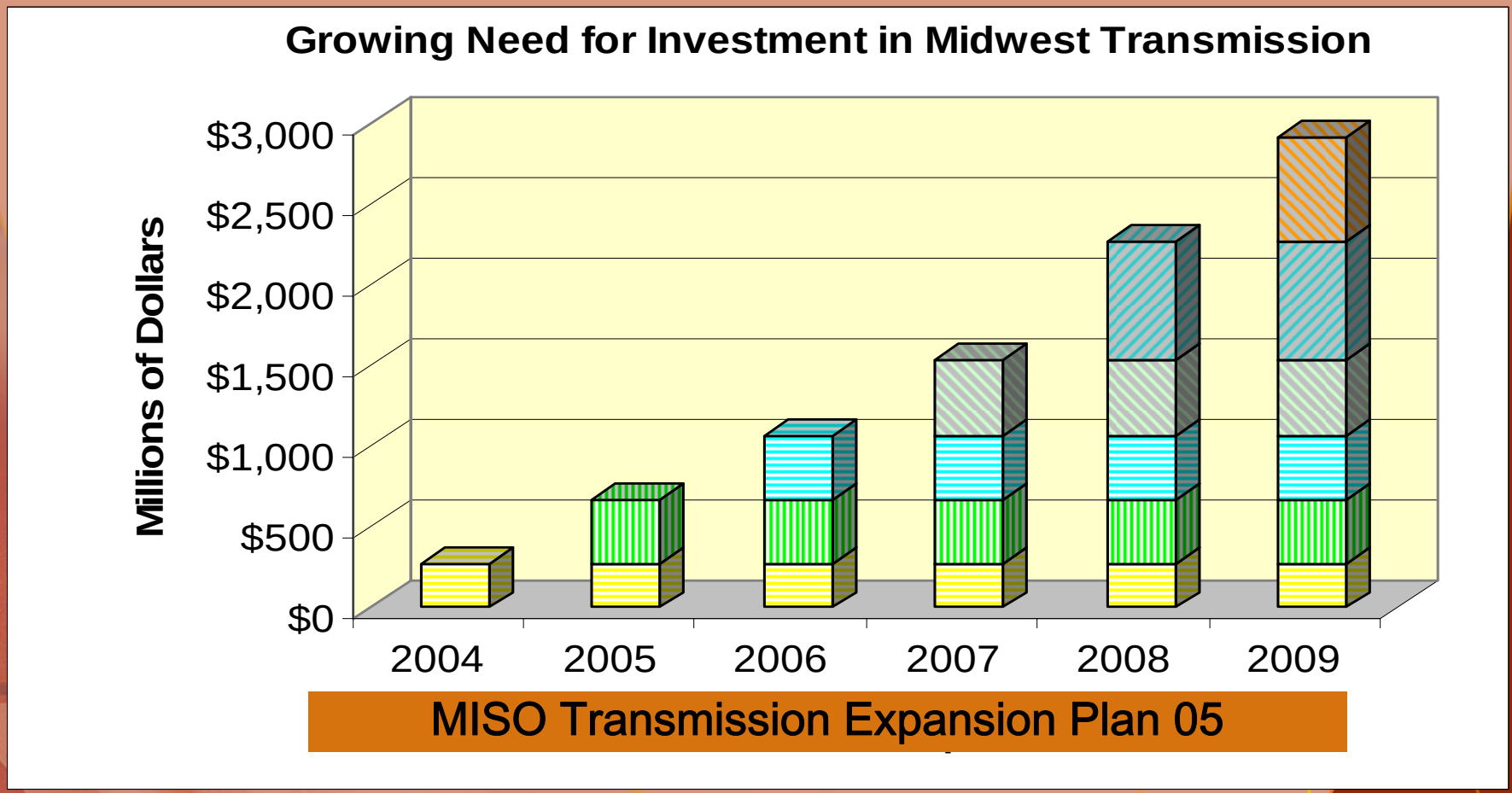
- Fair
- Acceptable to transmission owners and investors
- Acceptable to federal and state regulators
- Create sufficient assurances that investment will be returned.

Regional Transmission Planned by MISO

- MISO Transmission Expansion Plans have:
  - identified over $4.3 billion of transmission projects,
  - more than 390 transmission projects primarily for reliability purposes,
  - approximately 5,123 miles of transmission line upgrades are projected through 2009 (4.6% of the approximately 112,000 miles of line existing throughout the MISO area),
  - over $400 million of these projects were completed by the end of 2004, and
  - for 2006, MISO has identified approximately 80 transmission projects. The top ten of those projects will cost approximately $135 million.
- MISO Transmission Plans are steadily evolving and the third regional plan is due December 2006.

Increasing Transmission Investments Observed, but is it Enough?

Planned New Transmission Investments in the Midwest



MISO Transmission Expansion Plan 05 estimates.

Transmission Investment

A few weeks ago, in USA Today, an article on the 'Power crunch'[1] illustrated the *"transmission lines that we have now are overloading."*[2] *"If we are to continue to have a strong economy and continue to meet America's growing demand for electricity, we have got to take proactive measures to ensure our ability to deliver electricity is unimpeded."*[3]

Why does the Transmission Grid Need to Grow & Change?

Reliability
Economic Growth
Increase in use of power consuming technology
Increasing reliance on market transactions for supply

[1] 'Power crunch could lead to lots more lines, Nov 10, 2006, Paul Davidson.
[2] John Smatlak, Dominion Vice President; [3] Kevin Kolevar, a director for the Energy Dept.

Transmission Investment

Despite the importance of transmission to reliable and efficient operations of the transmission grid, **there has been insufficient investment** in Transmission.

The following is a quote from the Notice of Proposed Rulemaking on "Promoting Transmission Investment through Pricing Reform" issued by the Federal Energy Regulatory Commission on November 17, 2005.

"Transmission investment declined in real dollar terms for 23 years, from 1975 to 1998, before increasing again, although investment for the most recent year available, 2003, is still below 1975 levels.[1] Over the same time period, electric load more than doubled, resulting in a significant decrease in transmission capacity relative to load in every North American Electric Reliability Council region.[2] Edison Electric Institute (EEI) estimates that capital spending must increase by 25 percent, from $4 billion annually to $5 billion annually, to assure system reliability and to accommodate wholesale electric markets, and that the 2.5 percent growth rate in transmission mileage since 1999 is insufficient to meet the expected 50 percent growth in consumer demand for electricity over the next two decades.[3]"

[1] EEI Survey of Transmission Investment: Historical and Planned Capital Expenditures (1999-2008) at 3 (2005).

[2] Barriers to Transmission Investment, Presentation by Brendan Kirby (U.S. Department of Energy, Oak Ridge National Laboratory), April 22, 2005 Technical Conference, Transmission Independence and Investment, Docket No. AD05-5-000 (April 22, 2005 Technical Conference).

[3] Energy Policy Act of 2005: Hearings before the House Subcommittee on Energy and Commerce, 109th Congress, First Sess. (2005) (Prepared statement of Thomas R. Kuhn, President of EEI).

Growth in Load

Projected loads show that load will exceed supply anywhere from 2011-2016, depending on how you define the region and whose study you're looking at [sources: MISO, NERC].

CONTINUING GROWTH IN LOAD AND GENERATION:

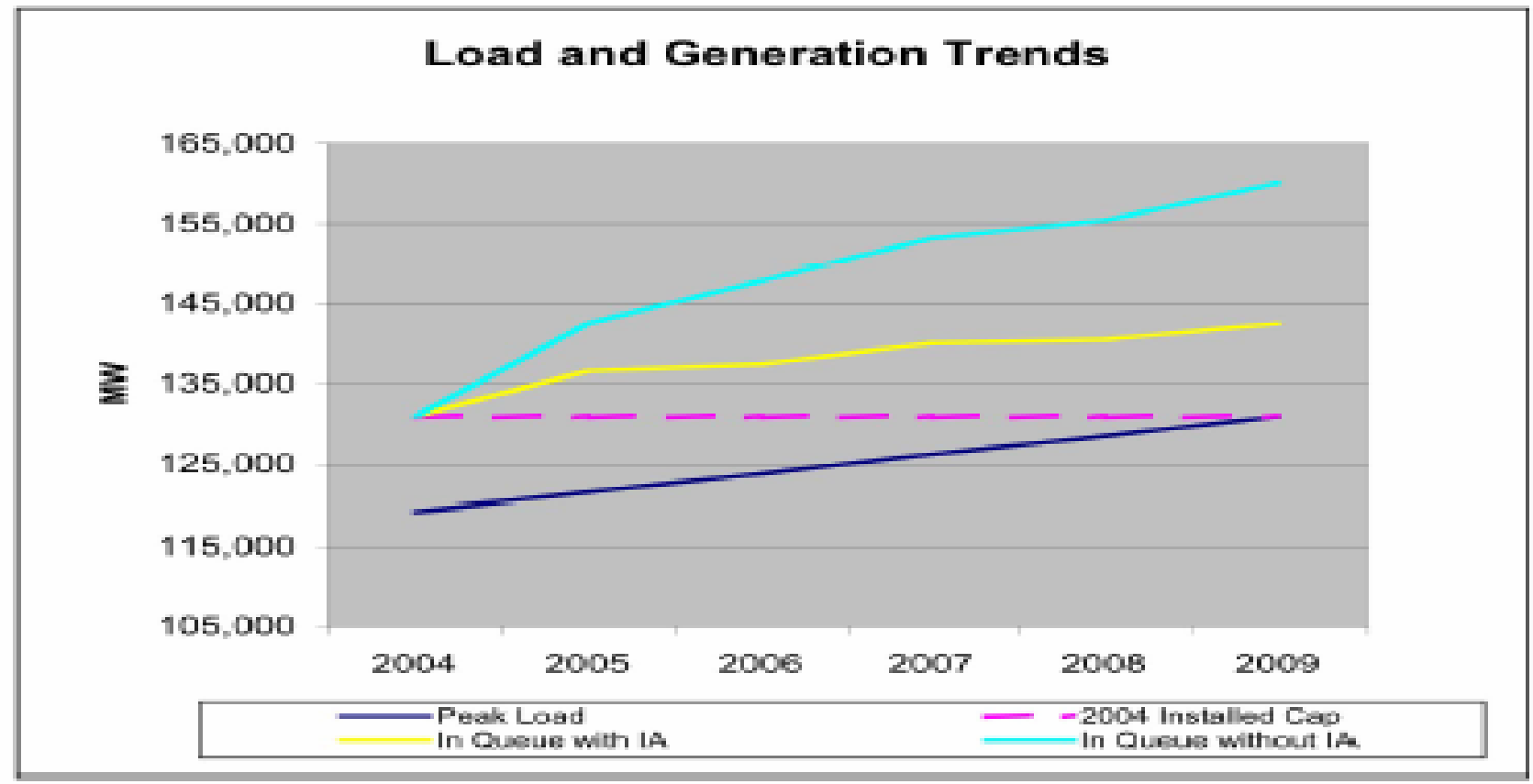
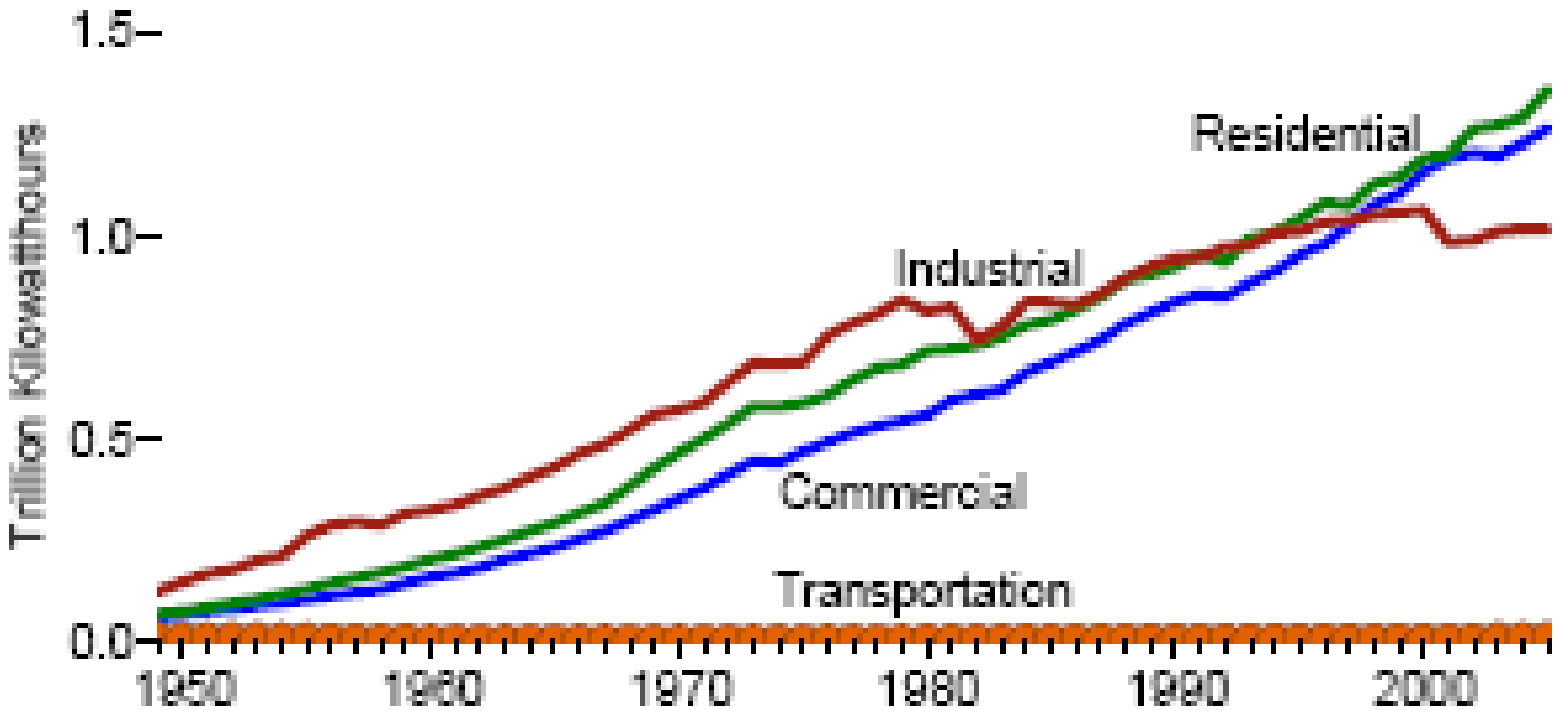


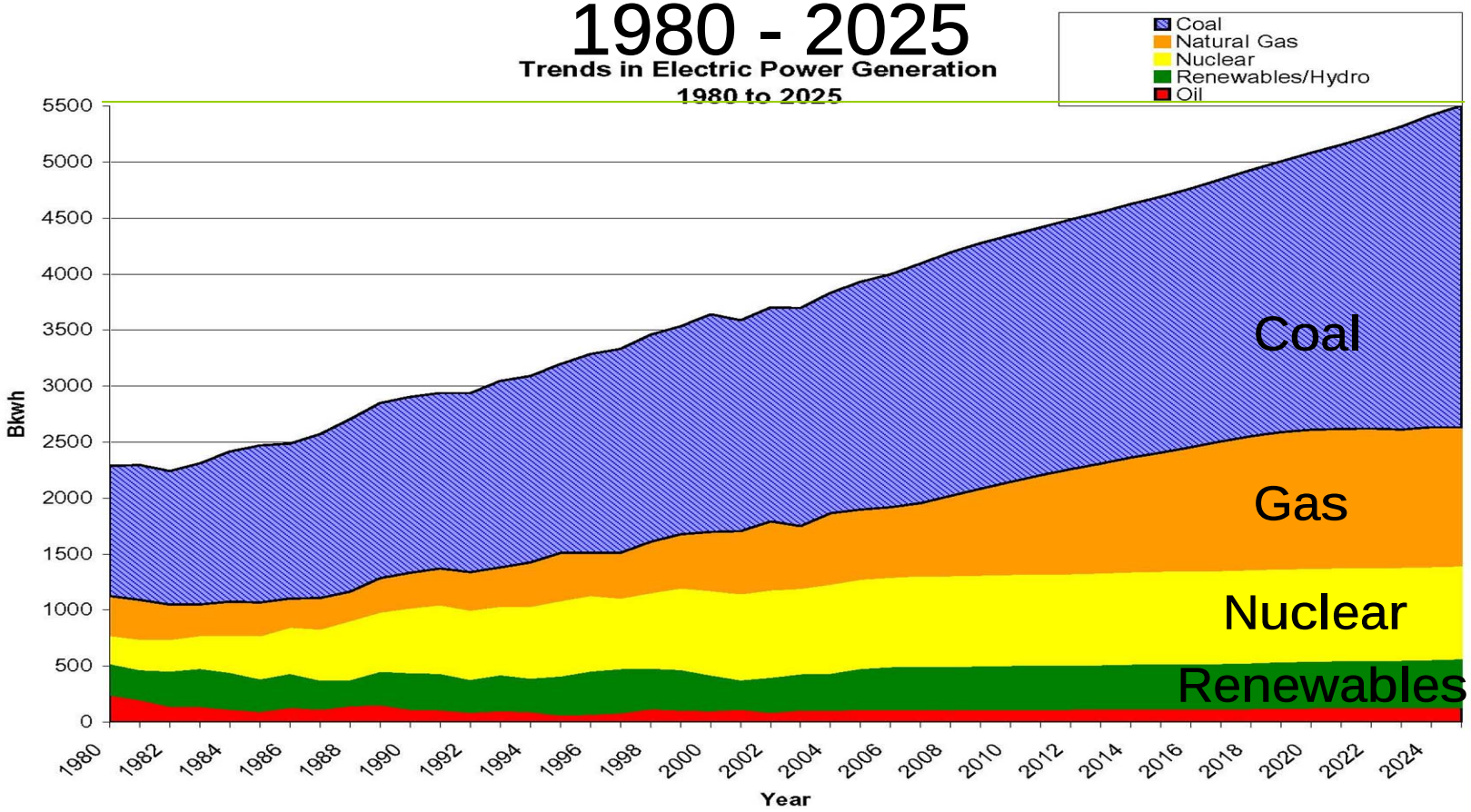
Figure 48. Retail Sales by Sector



Enormous growth occurred in the amount of electricity sold to the three major sectors—residential, commercial, and industrial. Industrial sector sales showed the greatest volatility. Sales to residences exceeded sales to industrial sites since the early 1990s, and sales to commercial sites surpassed industrial sales since the late 1990s.

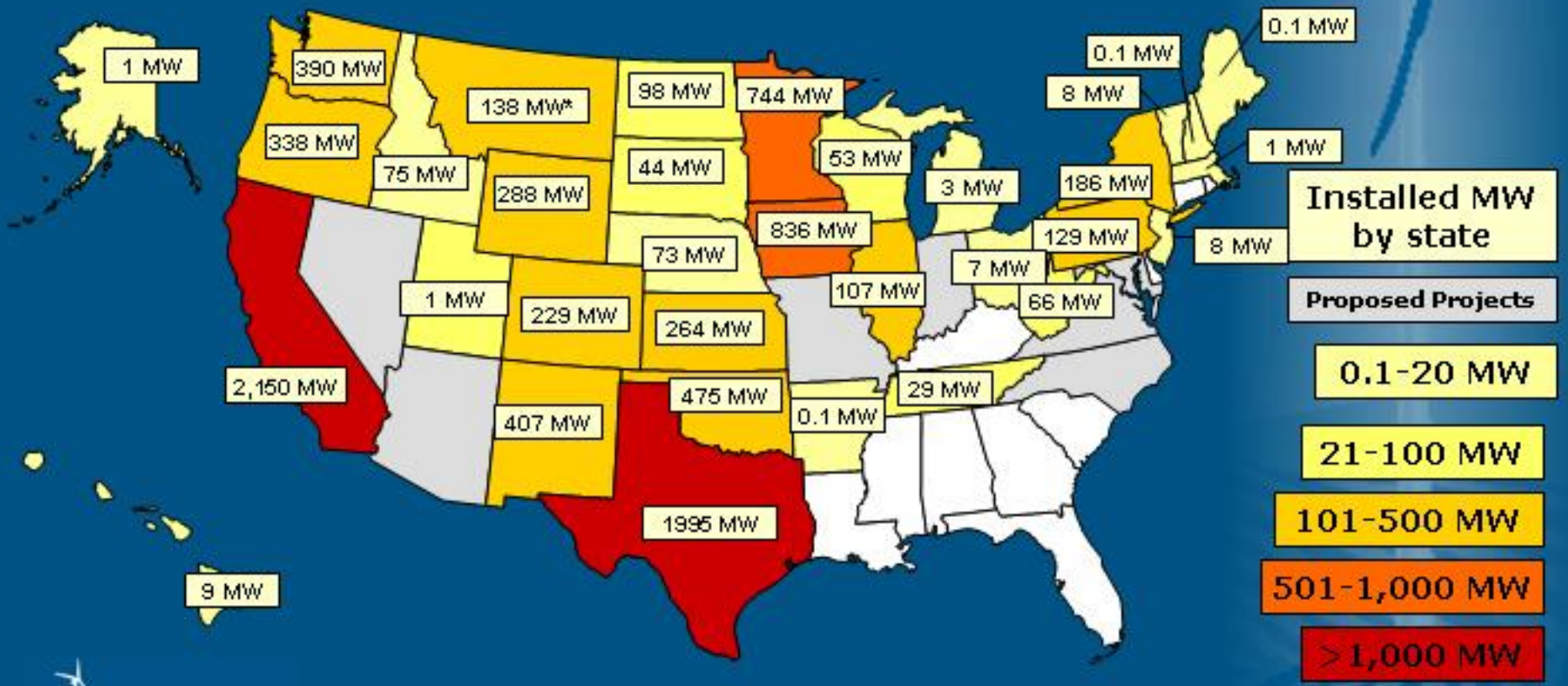
Importance of Transmission: Improvement and Expansion

Trends in Electric Power Generation 1980 - 2025



Source: US Department of Energy, Energy Information Administration

Wind Energy Development in the United States (as of January 2006)



WINDUSTRY™

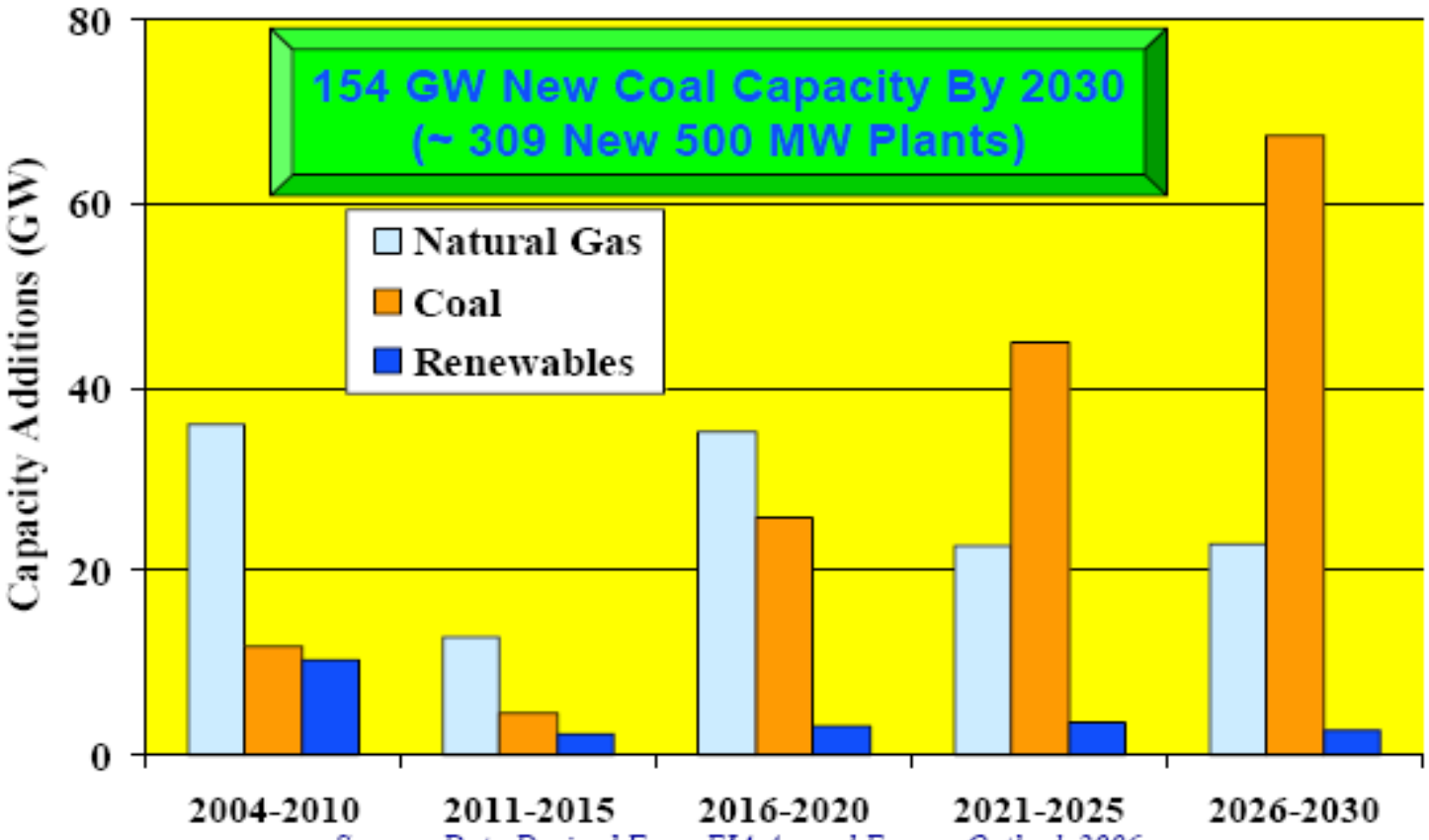
U.S. Total: 9,149 MW in early 2005, a 35% increase from 2005!

154 GW New Coal Capacity By 2030

(Accounts for 51% of New Capacity Additions)

New Electricity Capacity Additions

(EIA Reference Case)



Source: Data Derived From EIA Annual Energy Outlook 2006

NETL Contacts: Scott Klara, klara@netl.doe.gov
Erik Shuster, erik.shuster@sa.netl.doe.gov

Coal's Resurgence in Electric Power Generation

Proposed New Plants

Equivalent Power
for
93 Million Homes

154 Plants
93GW
$ 137 Billion

NETL Contacts: Scott Klara, klara@netl.doe.gov
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OCES 9/29/2006

Transmission Investment

- If the transmission system is challenged to function reliably how can we expect it to function optimally in a market based system?
  - *Achieving the Theoretical Benefit of Markets Depends on the Deliverability of Lower Cost Generation.*

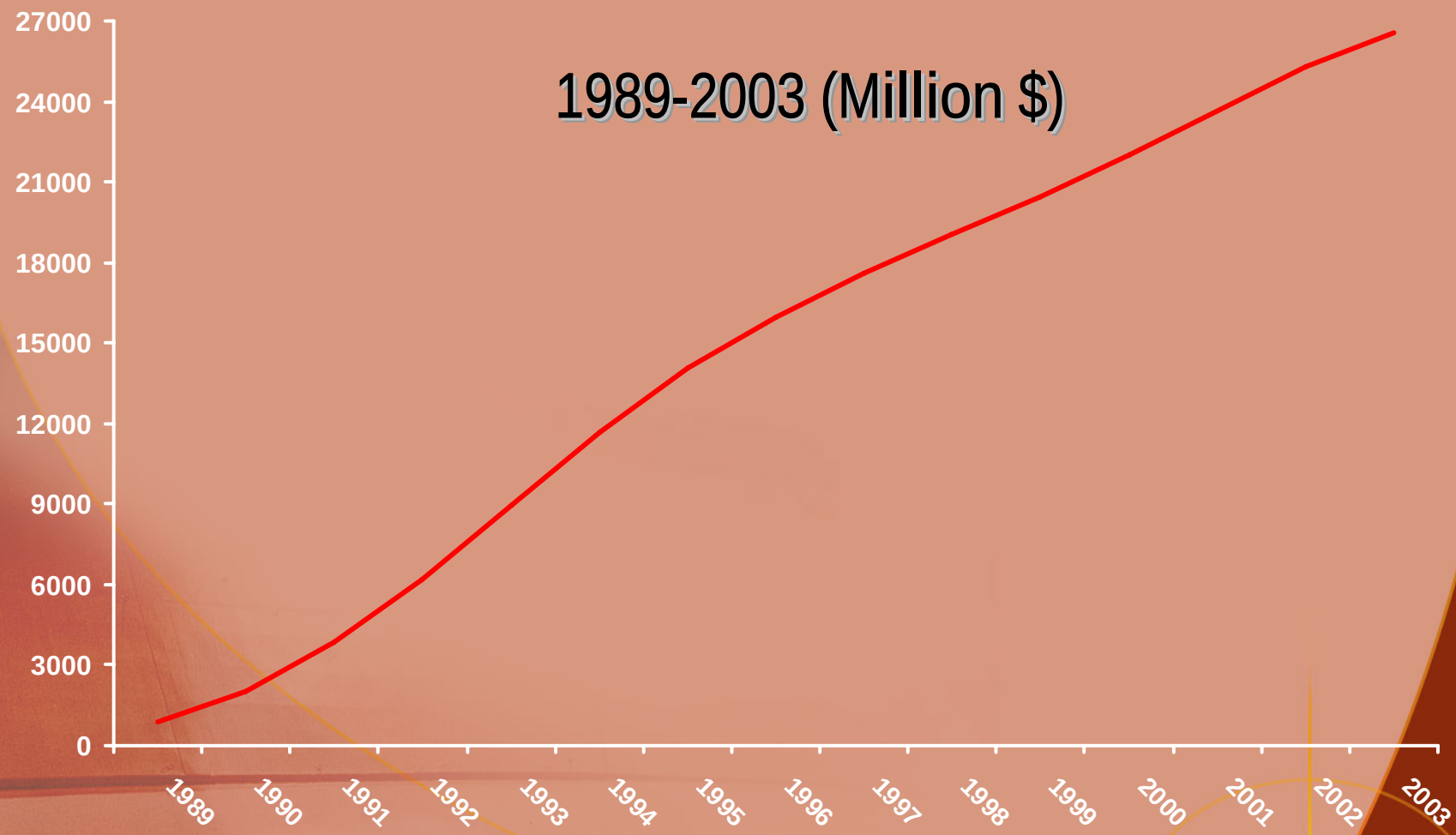
Challenges to New Generation Infrastructure

- Are market signals sufficient?
- Do capacity markets result in construction of new generation that timely and adequately matches load requirements?
- How should regulators and markets from vertically integrated and retail choice states work together to ensure such new generation is built?

Increasing Role of Demand Response

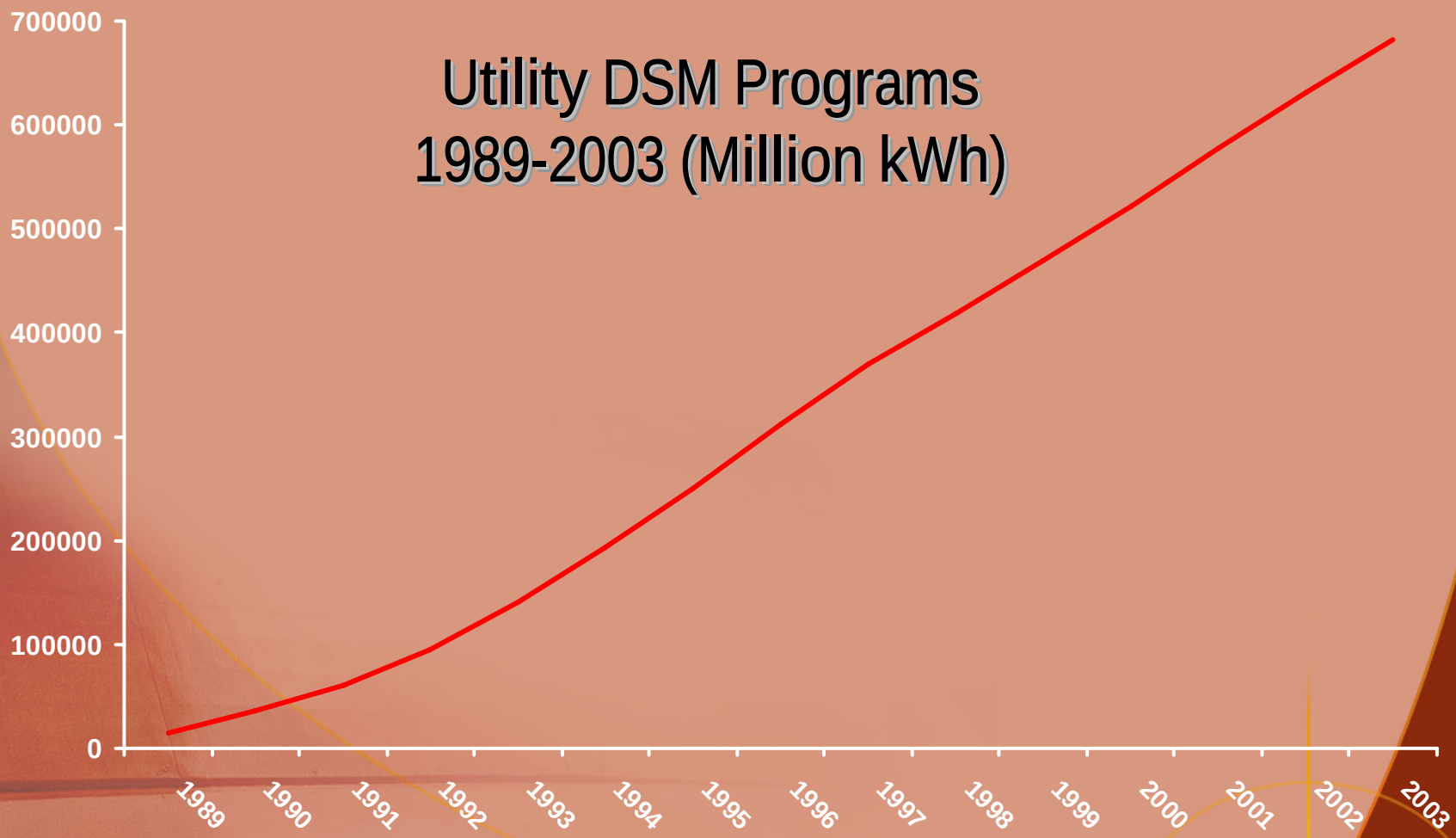
- Demand Response and energy efficiency efforts will have an impact on necessary generation and transmission.
- Demand response and energy efficiency efforts can:
  - Slow the increase in need for additional generation, and
  - Reduce grid congestion.
- Understanding how demand response fits into the equation for Modernization of the grid will be important.

Increasing Role of Demand Response: Utility DSM Program Expenditures



Source: Energy Information Administration and EEI. Some utilities were spending money on DSM as early as 1976. National data is not available for expenditures from 1976-1988.

Increasing Role of Demand Response: Energy Savings



Source: Energy Information Administration and EEI

THANK YOU

Steve Gaw, Commissioner

Missouri Public Service Commission and

President of the Organization of MISO States

E-mail: steve.gaw@psc.mo.gov