Investment Opportunities in the US Electric Power Sector

Assef Zobian
Cambridge Energy Solutions

Presented to

Lazard Freres & Co. LLC

September 10, 2003
Boston, MA

Presentation Outline

- About CES
- Investment Opportunities in
  - Generation Market
  - Transmission Assets
  - Energy Trading
  - Information Technology and Hardware

About CES

- Cambridge Energy Solutions is a software company with a mission to develop software tools for participants in deregulated electric power markets.
- CES-US provides information and tools to assist market participants in analyzing the electricity markets on a locational basis, forecast and value transmission congestion, and to understand the fundamental drivers of short- and long-term prices.
- CES-US staff are experts on market structures in the US, system operation and related information technology

Products & Tools

- DAYZER: Day-Ahead Locational Market Clearing Prices Analyzer (a model for each RTO). Assists in analyzing the impact of various market uncertainties on locational market clearing prices, transmission congestion and associated price risk.
- RANDOMIZER: An option-based model for valuing electric power generation and transmission assets. Utilizes information on historical and implied volatility of locational prices in forecasting future prices and valuating assets.

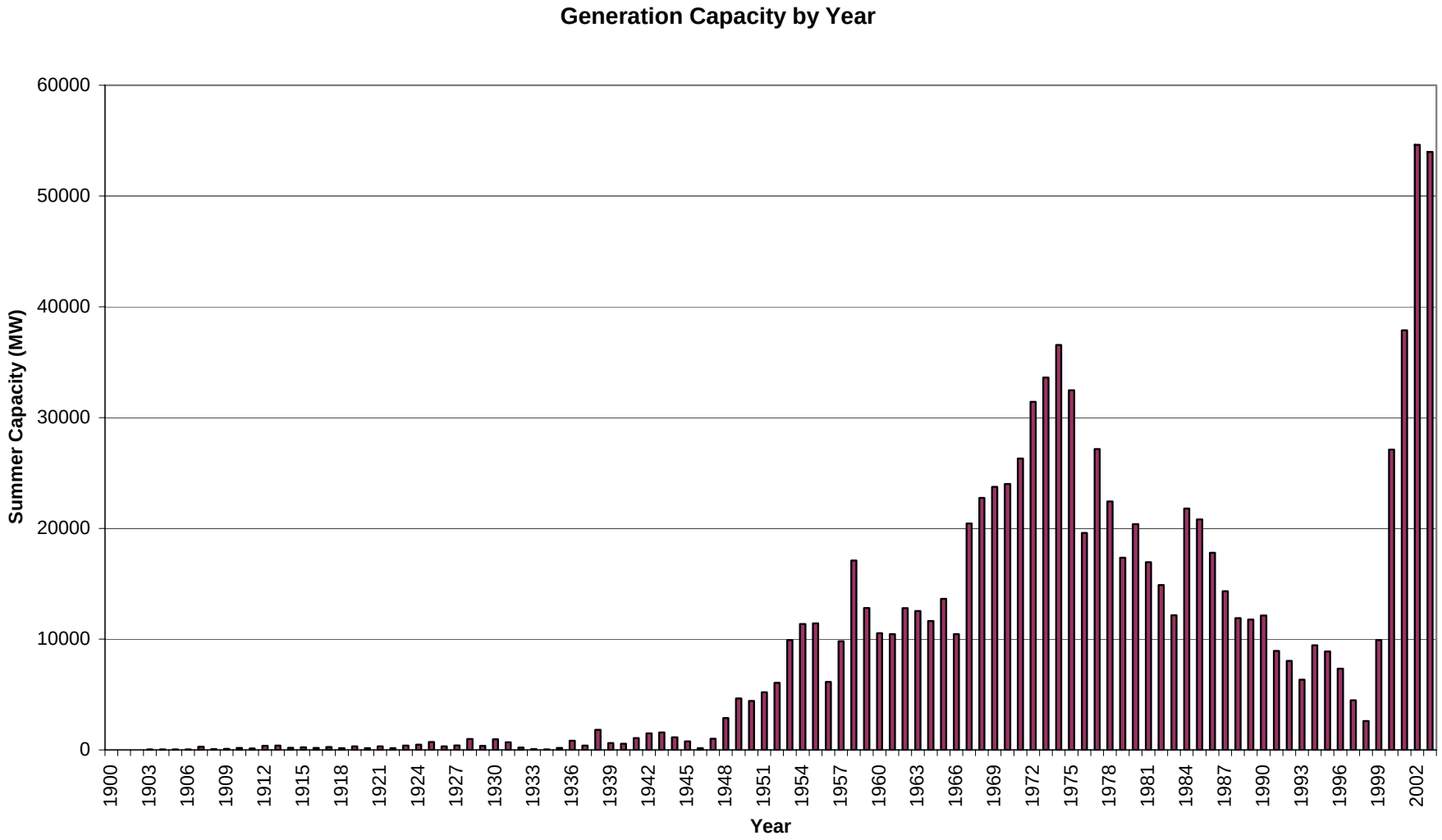
Products & Tools

- NAPD: North America Electric Power Transmission and Generation Database for each NERC region. Provides detailed information on various system elements via a web-based interface
- OPTIMALSCH: Optimal Scheduler helps power plant operators optimize the operation and dispatch of their generation assets across various products for a single unit or portfolio of generation units

Generation Market

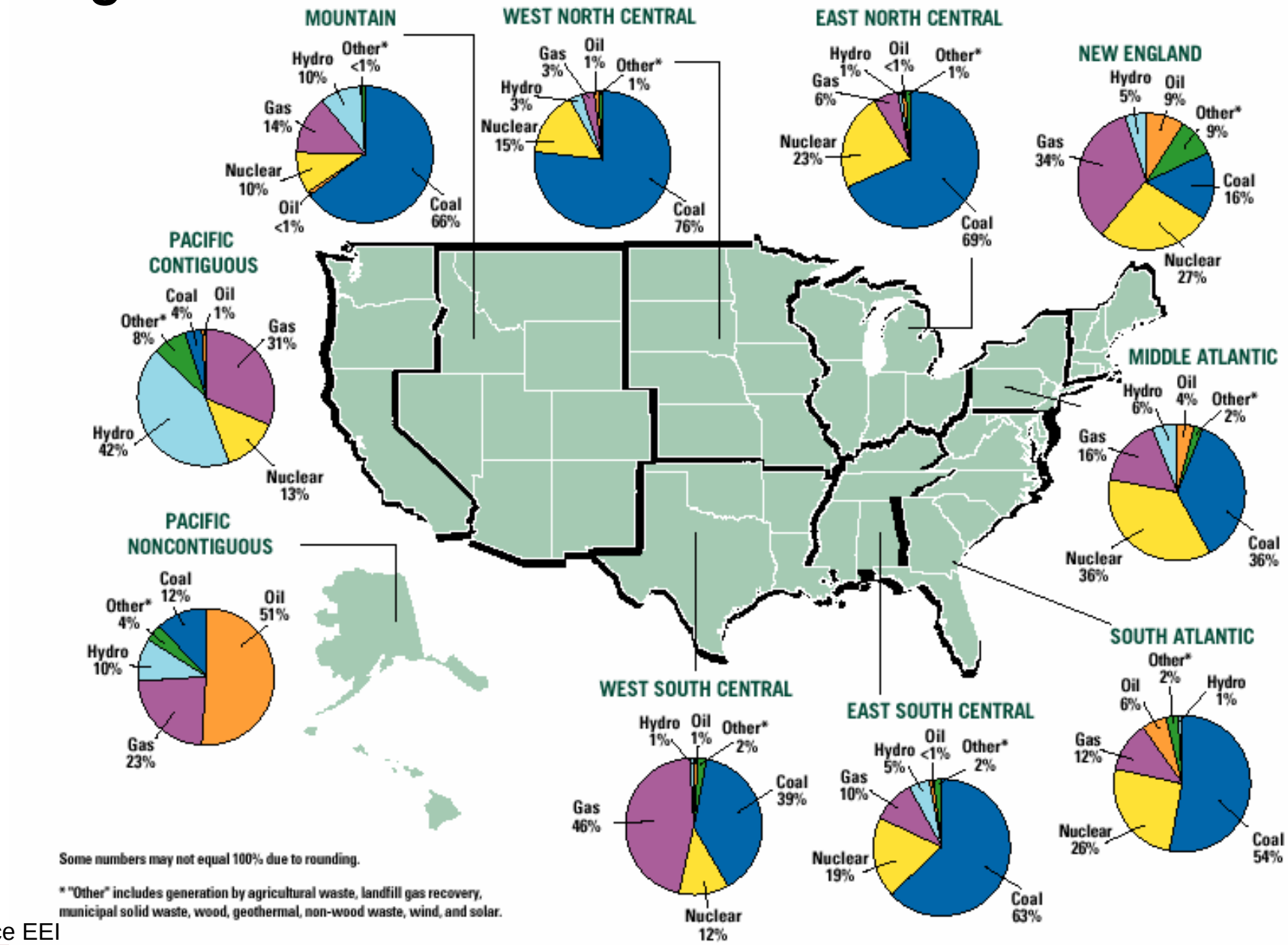
- There is an excess generation capacity in most of the US (with some local needs: NYC, San Francisco, & Florida)
- Demand growth, regulation and technological innovation will drive the market for new entry
  - More efficient generation technologies
- Cyclical nature with boom-bust cycle

Impact of Deregulation & Cyclical Behavior



Source: EIA

Regional Generation Mix



Some numbers may not equal 100% due to rounding.

* "Other" includes generation by agricultural waste, landfill gas recovery, municipal solid waste, wood, geothermal, non-wood waste, wind, and solar.

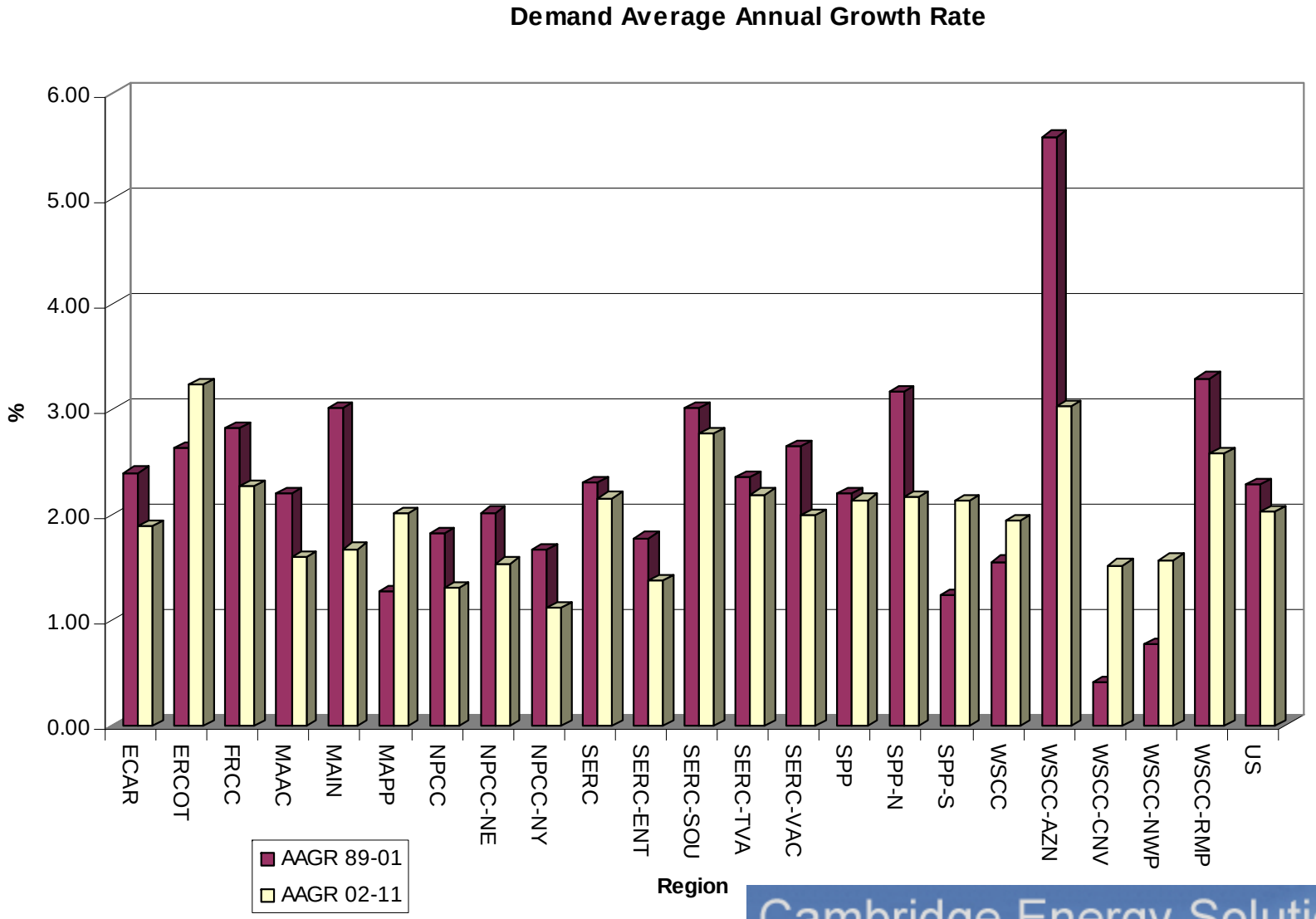
Source EEI

Generation Market

- Over the past 4 years, the average annual growth rate of generation capacity was 5% compared to a national average annual demand growth rate of 2%
- Generation excess to last for next 4-5 years in most regions

Exisiting and New Generation Summer Capacity (MW)				
Year	New Entry (MW Online)	New Entry (MW Expected)	Existing (MW)	Increase (%)
2000	27,118		783,097	3.5%
2001	37,884		810,215	4.7%
2002	54,628		848,099	6.4%
2003	27,156	26,830	902,727	6.0%
2004	-	23,870	956,713	2.5%
(source EIA)			980,583	

Electricity Demand Growth by Region



Source: ES&D 2002

Generation Market

- More than 95% of the new capacity are natural gas-fired units
- In the past 4 years generation capacity increased by 22% (173,616 MW), but still less than third the proposed and announced planned capacity
- Many projects were withdrawn, cancelled or aborted after construction

Generation - Opportunities

- Buying “distressed” generation assets (example Exelon assets in MA)
- Local markets such NYC, LI, Florida, San Francisco, etc..
- Renewable sources (driven by regulation, most states have requirements of 5% or more of total energy to be renewable by 2010)
- New coal fired generation (driven by high natural gas prices)
- Distributed Generation

Transmission Investments

- Current investment level in transmission assets is less than historical levels throughout the US; around $3 billion/year (compared to around $5 billion in 1975)
- The annual average planned transmission lines additions measured in circuit miles is less than 1% over the next 10 years

Transmission Lines Circuit Miles (230 KV and above)					
	230 KV	345 KV	500 KV\	765 KV	DC (All)
2001	76,437	51,025	25,000	2,426	2,426
2010	80,515	53,855	27,343	2,518	2,450
AAGR	0.6%	0.6%	1.0%	0.4%	0.1%

Source: NERC ES&D 2002

Do We Need More Transmission?

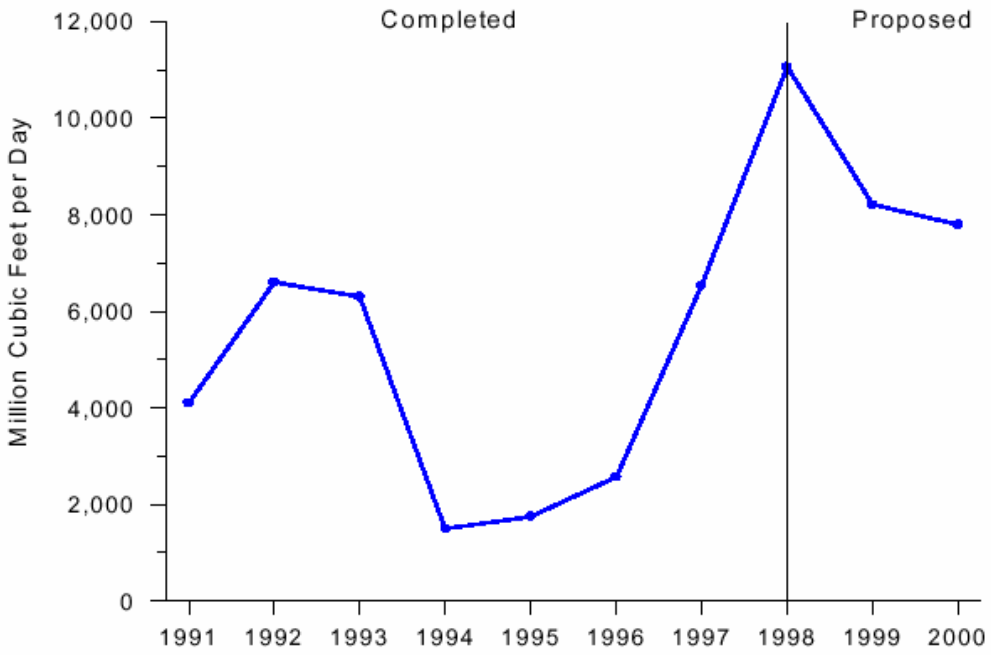
- Given that demand is growing at a 2% rate should electric power transmission grow at a similar rate (in some measure, MW-miles, miles etc)?
- No, because:
  - Better utilization of existing transmission system
  - Gas pipeline and local generation can substitute for transmission
  - Regulatory and financial hurdles to transmission investments

Competition from Natural Gas Pipelines

- Consider for example NYC where there are two options to increase delivered energy:
  - Option 1: build a new transmission line either AC or DC from upstate NY, or from NJ
  - Option 2: build new combined cycle units in NYC or small combustion turbines in many locations around the city (NYPA's approach). And build additional gas pipeline capacity into the city, if needed (NYC is short on natural gas especially in the winter)

Gas Pipeline Additions

Figure 36. Major Additions to U.S. Interstate Natural Gas Pipeline Capacity, 1991-2000



Note: 1998 includes 10 projects completed through August.
Sources: Energy Information Administration (EIA), EIAGIS-NG Geographic Information System: Natural Gas Pipeline Construction Database, as of August 1998; Natural Gas State Border Capacity Database.

Source EIA

Hurdles to Market-Based Investments

- Permitting and sitting
- Difficulty to capture the value of a transmission line in a network (externalities):
  - Lower congestion
  - Increased reliability (Better stability)
  - Lower losses
  - Lower local requirements for ancillary services and Installed Capacity
- Perception of regulatory risk !! (investments over 20 years with a high risk of changing the rules in the next few years)

Transmission- Opportunities

- Buying existing transmission systems/companies (example DTE transmission system). This is very attractive since investment is relatively low risk with high return (around 12%).
- Building new transmission lines (example, Transenergie DC line, Path 15, back-to-back DC converters)
- New technologies for transmission and for operation & control of power system
  - to extend the life of existing systems, or
  - squeeze more juice out of them

Transmission- Opportunities

- Examples of needed transmission upgrades:
  - Between: NY and northern VT, Georgia and Florida, Minnesota and Wisconsin (WUMS)
  - Into: NYC, Long Island, South Western CT, San Francisco, San Diego, Eastern Colorado
  - Path 15
- There are proposals at different levels to address most of these needs

Expected Changes

- Will the recent power outage in the Northeast cause some regulation driven technologies and investments?
- Maybe, but expect some changes in regulations to encourage new investments
  - Accelerated depreciation for transmission assets (from 20 to 15 years)
  - Higher rate of return on equity (to attract new investments) or performance-based rates
  - Federal sitting authority that makes the process of building transmission lines relatively easier for “interstate congestion areas”

  (The House version of the pending energy legislation includes the above provisions)

Expected Changes- RTOs

- More decision making authority for regional transmission organizations (RTOs) on transmission investments (currently limited to "reliability investments" not "economic investments")
- Implementation of the standard market design (SMD) with locational marginal prices (LMP) will send better price signals for transmission investments

Energy Trading

- The market will not disappear, there is a real demand and supply for a real product
- Trading companies will change to risk managers? Insurance providers? Or asset managers (trading around their assets to maximize their values)
- Will the market move towards long-term contracts and hedging backed by physical assets or short-term hedging deals?
- Will there be fewer players and less liquidity in the market?

Energy Trading

- Which ones would survive?
- Investment banks are entering the trading market (excellent credit rating)
- A move towards transparent prices using centralized power exchanges (NYMEX)

Information Technology

- Do we have an antiquated transmission system? The answer is no, but maybe the system IT is antique. Some parts of System Control and Data Acquisition System (SCADA) are still based on old technologies
- The move to RTOs will help in updating these systems, use newer and better hardware and software for system operation, monitoring and control

Information Technology - Opportunities

- Better technologies to coordinate operation of interconnected system (software and hardware)
  - Better communication among transmission operators
  - Seams among RTOs
- Better technologies to monitor and control the transmission system (smart devices)
  - Better data metering, collection, communication, and analysis tools

Other Transmission System Technologies

- Communication (Fiber Optic networks)
- Metering
- Flexible AC Transmission System (FACTS) devices
- Super-conducting cables and storage devices
- Digital switches
- “Self Healing” transmission system technologies (intelligent software running various system components)
- “Smart” transmission system

Q & A