



Executive Forum on Solutions to Transmission Investment

Summary of Participant Ideas

Power Systems Engineering Research Center

*A National Science Foundation
Industry/University Cooperative Research Center
since 1996*



PSERC's 2006 Industrial Members

ABB	American Electric Power
American Transmission Company	AREVA T&D
Arizona Public Service	Baltimore Gas & Electric
British Columbia Transmission Co.	California ISO
CenterPoint Energy	Duke Energy
Entergy	EPRI
Exelon	FirstEnergy
GE Energy	Institut de recherche d'Hydro-Québec (IREQ)
ISO New England	Korea Electric Power Research Institute
Michigan Electric Transmission Co.	MidAmerican Energy
Midwest Independent Transmission System Operator (MISO)	National Grid USA
National Rural Electric Coop. Assn.	New York ISO
New York Power Authority	Pacific Gas and Electric
PJM Interconnection	PowerWorld Corp.
RTE – French Trans. Sys. Operator	Salt River Project
Siemens EMA	Southern Company
Tennessee Valley Authority	Tri-State Generation and Transmission
TXU Electric Delivery	U.S. Department of Energy
Western Area Power Administration	

Collaborating Universities and Site Directors

Arizona State (Jerry Heydt)	Berkeley (Shmuel Oren)	Carnegie Mellon (Sarosh Talukdar)
Colorado School of Mines (P.K. Sen)	Cornell (Robert J. Thomas)	Georgia Tech (Sakis Meliopoulos)
Howard University (James Momoh)	Illinois (Peter Sauer)	Iowa State (Jim McCalley)
Texas A&M (Mladen Kezunovic)	Washington State (Anjan Bose)	Wisconsin (Christopher DeMarco)
	Wichita State University (Ward Jewell)	

Director: Professor Vijay Vittal, Arizona State University

Website: <http://www.pserc.org>; Phone: 480-965-1643; Email: pserc@asu.edu



Power Systems Engineering Research Center

PSERC Executive Forum on Solutions to Transmission Investment:

Participant Ideas on Challenges, Solutions, and Steps to Improving and Expanding the Electric Transmission Grid

**Forum Held on April 21, 2006
Chicago, IL**

May 2, 2006

Table of Contents

I. Overview	1
II. Participant Suggestions of Challenges and Solutions	3
A. Business and Economics	3
B. Planning and Transmission Investment Policy.....	6
C. Technology	9
III. Key Questions Identified for Additional Discussion	10
A. Business and Economics Small Groups	10
B. Planning and Transmission Investment Policy Small Groups	10
C. Technology Small Groups	10
IV. Responses to the Question: What One Action Could Improve or Expand the Transmission Grid in the Next 3 to 5 Years?.....	11
V. Closing Comments from Professor George Gross.....	12

Participant Ideas on Challenges, Solutions, and Steps to Improving or Expanding the Transmission Grid

I. Overview

This Forum provided an opportunity for senior managers and PSERC experts to identify critical challenges and possible solutions to (1) transmission investment and pricing issues, and (2) issues related to enhancing grid reliability. There was an informative and wide-ranging discussion with a frank exchange of views on key challenges in increasing transmission investment and maintaining grid reliability, and on possible solutions. The discussions led to a list of possible solutions, of the barriers to achieving those solutions, and of steps that could be taken to overcome those barriers. There were 40 participants, 32 from industry and 8 from academia. The list of participants is given in Table 1.

Speakers in the morning session identified critical issues facing the electricity power industry concerning transmission adequacy and expansion. They also provided their perspectives on the new challenges imposed on the existing transmission infrastructure due to restructuring, and the complexities associated with transmission expansion and adoption of new technology to enhance transmission efficiency and reliability. The speakers conveyed their views on economic, business, policy, and technological barriers to modernizing and expanding the transmission infrastructure. They described success stories, remaining hurdles and open questions in the economic, business, public policy, and technological arenas concerning such expansion. Specific presentations covered:

- RTO and integrated utility experiences in transmission planning and investment
- Role of an independent transmission company (ITC) in transmission planning and investment
- Technological solutions to transmission investment concerns
- Transmission investment to facilitate energy markets: beyond reliability considerations.

Preparations for the afternoon discussion began in the morning. Attendees were asked to communicate their own perspectives on challenges and solutions using 4X6 cards. Contributions were kept confidential. This input provided “data” for the afternoon discussions in the areas of (1) business and economics, and (2) public policies toward planning and transmission investment, and (3) technology.

The afternoon session opened the floor to a discussion among the participants and PSERC researchers. The basis for discussion was key discussion questions identified by small groups during the lunch hour. During the afternoon session, participants were asked to submit one idea on what actions could be taken by industry, government or academia that could make significant improvement or expansion of the transmission grid in the next 3 to 5 years. The Forum ended with closing comments by Professor George Gross from the University of Illinois at Urbana/Champaign.

This document lists the ideas participants shared in writing on 4X6 index cards or on flipcharts. Section II gives ideas for the challenges or barriers to grid investment and proposed solutions. Section III provides the key questions that six small groups identified as being important for further discussion by the Forum. Then, Section IV lists the steps proposed by the attendees that,

if implemented, could demonstrably improve or expand the transmission grid. The final categorization was done judgmentally by PSERC to make it easier for the reader to understand the range of ideas from the participants. Certainly some ideas could fit into different or multiple categories. Some rewording of participant responses was also done to clarify the ideas expressed.

The Forum was used for discussion and brainstorming. No attempt was made to reach a consensus or to prioritize the challenges, solutions, or next steps. The ideas contained do not necessarily represent the views of PSERC or its members.

Table 1: Forum Participants

Organization	Name	Title
ABB Corporate Research	Le Tang	VP, Director of Corporate Research Center–U.S.
Alberta Elec. Sys. Op.	Neil Millar	VP, Transmission
Amer. Transmission Co.	José Delgado	President and CEO
Amer. Transmission Co.	Don Morrow	Director, System Planning and Protection
American Elec. Power Co.	Mike Heyeck	VP, Transmission
American Elec. Power Co.	Navin Bhatt	Manager, Advanced Trans. Studies & Tech.
AREVA T&D	JD Hammerly	North America VP
Baltimore Gas & Elec.	Ralph Bourquin, Jr.	Manager-Transmission Business
Calif. Indpnt Sys. Op.	Darius Shirmohammadi	Director, Regional Transmission – South
Cornell University	Frank Wayno	Professor
Cornell University	Richard Schuler	Professor and NYISO Board of Directors Mbr
Duke Power	Ed Ernst	Manager, Grid Operations Engineering
EPRI	Richard Lordan	Director of Techn., Power Delivery and Markets
FirstEnergy Corp.	Bradley Ewing	VP of Trans. Ops. & Electric Delivery Services
Ga. Inst. of Technology	Shi-Jie Deng	Professor
GE Energy	Hamid Elahi	General Manager – Advisory Services
Iowa State University	Jim McCalley	Professor
ISO New England	Stephen Whitley	Senior VP
Mich. Electric Trans. Co.	David Tates	VP of Asset Management and Planning
Midwest Ind. Trans. SO	Ron McNamara	VP of Regulatory Affairs and Chief Economist
Nat’l Rural Elec. Cp. Asc.	David Mohre	Executive Director - Energy & Environment
National Grid USA	Mary Ellen Paravalos	Director of Regulatory Policy
National Grid USA	Tom Gentile	Director, Trans. Network Planning and Dvlpmt
New York ISO	John Buechler	Acting VP of Market Structures
New York ISO	Jonathan Mayo	Market Design Specialist
New York Power Auth.	Shalom Zelingher	Chief Technology Officer
PJM Interconnection	Steven Herling	VP, Planning
PowerWorld	Mark Laufenberg	President
PSERC	Dennis Ray	Executive Director
RTE-France	Jean Verseille	Chief, System Dvlpmnt and Asset Optimization
Southern Co.	Perry Stowe	Director Transmission Planning
Southwest Power Pool	Jay Caspary	Director, Engineering
Tennessee Valley Auth.	Mike Ingram	Senior Manager, Transmission Technologies
Tri-State G&T	Phil Buckland	VP Transmission and Information Systems
TXU Electric Delivery	Charles Jenkins	VP
Univ. of Calif Berkeley	Shmuel Oren	Professor
Univ. of California	Merwin Brown	Director, PIER Transmission Res. Program
Univ. of Illinois Urb/Ch.	George Gross	Professor
Univ. of Illinois Urb/Ch.	Tom Overbye	Professor
Westar Energy	Kelly Harrison	VP of Trans. Ops and Env. Services

II. Participant Suggestions of Challenges and Solutions

A. Business and Economics

Challenges	Solutions
<i>Cost Allocation and Who Pays</i>	
1. Cost allocation (short term and long term issue)	<ul style="list-style-type: none"> • Devise a simple formula that is transparent and applicable to all situations • “Socialization” of costs provides simplest formula but difficult to get agreement.
2. Cost allocation and fairness	Eliminate cost allocation arguments. They delay approval and construction. Implement postage stamp rates.
3. Cost allocation	Over how big a region would a New England or ERCOT cost allocation mechanism (broadly paid for by all users) work? MISO, nationally, entire interconnection?
4. Cost allocation of new transmission projects	<ul style="list-style-type: none"> • Abandon formal cost allocation. • Use Financial Transmission Right (FTR) markets for independent transmission companies (ITCs) to take risk and be rewarded for performance by allowing ITCs to sell increased capacity by taking short positions in FTR markets.
5. Cost allocation	<ul style="list-style-type: none"> • Allocate cost to beneficiaries. • Need FERC to have and articulate a clear policy on cost allocation; many inconsistencies exist today (e.g., socialize generation interconnection cost in transmission, allow allocation to only beneficiaries within the RTO)
6. Cost allocation	Benefit-based cost allocation difficult because difficult to predict future use/load levels and patterns. There is a level of transmission use which is highly certain. This can be used to do a partial allocation based on benefit.
7. Cost allocation	You cannot allocate costs too carefully. That is, cost allocation is never going to be a precise calculation.
8. Grandfathered agreements can detract from proper system operation and result in different classes of customers	Need to protect sanctity of contracts, but when is enough enough? FERC should institute a sunset criteria (e.g., 5 years, 10 years, ...)

9. Need to assure cost recovery	<ul style="list-style-type: none"> • Have an approved tariff that assigns cost in a simple consistent manner. • Avoid methods that require a determination of who benefits! • Socialize the cost across broad areas for bulk transmission projects.
10. Cost allocation: how do we pay for an interstate backbone?	Federal tax. Socialized cost.
11. Workable competition may not be possible in all segments of the industry	“Market-based” cost allocations may not be workable.
12. Rate freezes at retail level make it difficult to pay for transmission additions	Get rate policies to accept new transmission rate base additions

Economic Justification of Investments

<i>Economic Justification of Investments</i>	
13. Rising congestion in regions with reliability-only focus	Plan for reliability and long-term economic needs recognizing use will change over life of asset
14. Economic justification for transmission investment on a project by project basis	Do a comprehensive long term build out plan and justify the total package. How do we achieve this?
15. Economic/market efficiency basis for transmission planning: who should decide?	Use regional state committees. [FERC: they haven’t had success consistently in trying to mandate this through RTO formation]. [State by state: won’t work]. [Congress].
16. Winners and losers	How do we account for winners and losers in energy markets due to transmission expansion?
17. Getting right prices for expansion	How do we go from the short-term locational marginal prices to long-term marginal costs?
18. Justifying investment in technology and R&D	<ul style="list-style-type: none"> • Performance measures for technology investments. Cost/Investment recovery. “Value” or “Benefit” to cost ratio? Net present value • Effectiveness and efficiency measures (like “runs batted in”)
19. What metric should be used for transmission adequacy	Use \$ invested or \$ invested / transmission capacity
20. No generally agreed on valuation methodology for transmission projects	Assessment needed to determine whether such a valuation methodology should be or can be determined.

<i>Business Models and Transition Issues</i>	
21. Business objectives do not favor transmission investment	New business models needed: Are ITC's a better model?
22. Many different market/business models in place. Many individual (small) owners who also own other energy assets. Not an efficient structure for transmission investment.	RTO/ISO type model can overcome those balkanized issues and direct individual transmission owner, to build. But, still not conducive to mega-projects ...hundreds of miles.
23. "Grandfathering transmission rights" issue	<ul style="list-style-type: none"> • Sell transmission system to ITC • Negotiate phase out
24. Is there a way to blend merchant transmission into a market with socialized transmission tariffs?	Assessment needed
25. Creating a national grid	Build HVDC and island regions with HVDC ties for control, stability and security.

<i>Substitutability of Generation, Transmission And Demand Response</i>	
26. FERC has said transmission, generation and demand response are perfect substitutes for each other. Can our economy survive this approach?	Facilitate transmission construction. Enable generation competition. Optimize in short-term via demand response.
27. How to avoid undercutting the competitive generation market by building transmission. Do generation and transmission compete or not?	<ul style="list-style-type: none"> • System operator (ISO/RTO) to provide proper price signals and let marketplace determine whether transmission or generation is built • Employ a stable transmission planning policy so there is a level playing field

B. Planning and Transmission Investment Policy

Challenges	Solutions
<i>Size and Organization of Geographic Area for Planning</i>	
1. Transmission planning by multiple players in varying geographic areas	Assuming “bigger footprint is better/easier for transmission system operation, asset management, planning and investment. How do we achieve that scope? Government mandate? FERC incentives?
2. Achieving coordination in planning across the region	<ul style="list-style-type: none"> • Bigger is better • Need “effective” seams agreements and real coordinated planning.
3. Many transmission operators with different geographic sizes.	Define the size of a region. Easier to plan for larger areas than the size of area we have today
4. Getting states to agree on regional transmission additions	Do not allow RTOs to cover too large a region
5. Pricing transparency in non-ISO/RTO markets	Centralized planning

<i>Responsibility and Accountability</i>	
6. Economic/market efficiency basis for transmission planning: who should decide?	Use regional state committees. [FERC: they haven’t had success consistently in trying to mandate this through RTO formation]. [State by state: won’t work]. [Congress].
7. Accountability for planning. Make authority clear to make planning happen	<ul style="list-style-type: none"> • Contractual agreement between ISO/RTO and transmission owner • Get buy-in/cooperation of state regulators
8. Achieving financial accountability if line is not built in time to serve load?	Have ISO provide funds to make load whole with local generation or lost revenue.
9. Accountability for planning	Assign clear accountability for planning and authority to identify the preferred solutions and ability to implement the new projects.
10. Creating sufficient capacity to assure reliability	The industry must provide because we can’t afford to not keep the lights on. The price may be high, but reliability must be maintained.
11. Regulatory uncertainty	Make it more certain

<i>Approval and Public Support</i>	
12. How to get political/public support for siting transmission	Public education. Presentations that are understandable for non-technical audiences
13. Selling transmission projects to the public	<ul style="list-style-type: none"> • How do you show “system needs” to local residents and politicians in a manner that they can understand and believe? Relate future system conditions to actual past/recent problems • Use visual tools to show need. How do you show “system needs” to local residents and politicians in a manner that they can understand and believe
14. Local approval authority	All transmission is local – have to sell, getting local support. Local involvement needed.
15. How to make stakeholder processes function efficiently when it comes to transmission planning?	None that I can think of.
16. Given that all transmission is local, how do we get transmission built when it might not have a local benefit (at least today)?	The solution is probably to recognize that transmission flows change over time. And these changes may not be initially apparent so appropriate, perhaps hypothetical studies, could be used to show local benefit.
17. ROW acquisition	Seek simultaneous acquisition across multiple public jurisdictions
18. How can we fund high cost, high potential benefit, new transmission options such as long distance, high power underground superconducting DC	We need to do a better job of education the public in how an enhanced electric transmission grid can help us move to a long-term sustainable energy infrastructure

<i>Manpower and Other Resources</i>	
19. Getting colleges to graduate more power system engineers	Need to encourage students to enter this field. Good salary, challenging problems to solve, positive contribution to society
20. Shortage of material, labor	<ul style="list-style-type: none"> • Provide incentives • Forecasting and partnership with industry
21. Need more “bench strength” in planners, power system engineers, reliability coordinators	Expand
22. Growing shortage of materials/equipment. No domestic transformer manufacturing for larger sizes (e.g., 500 kV)	Response needed

<i>Generation Location Decisions</i>	
23. Should transmission planning try to lead the way for generation expansion	Forecast generation based on profit maximization rather than scenario analysis
24. Generation location decisions	How to incent generation location decisions when transmission costs are socialized
25. How to incentivize the location of generation	Publish information about the capacity of the grid to connect new generation.
26. With market-based generation siting, how do you plan for transmission needs?	<ul style="list-style-type: none"> • Use scenario planning for future needs • Still need to determine when/whether to start construction of transmission projects.
27. Don't know where generation is going to built	Combined generation and transmission planning needed
28. Ability to predict generation is major problem in transmission siting and justification. Main issue is fuel price variability.	We have a technology need in the ability to perform integrated analysis of transmission, generation, and fuel transportation and production
29. Influence of merchant transmission on system operations and economics	Forecast impacts. Incorporate in planning.
30. How to optimize transmission investment given uncertainty in fuel prices, generation location.	Scenario planning, cost of various fuels, location of generation, location of load growth, CO2 costs, etc.
31. How to avoid undercutting the competitive generation market by building transmission. Do generation and transmission compete or not?	System operator (ISO/RTO) to provide proper price signals and let marketplace determine whether transmission or generation is built Employ a stable transmission planning policy so there is a level playing field
32. Anticipating generation expansion response to transmission investment	Try to simulate generation investment with transmission included.
33. Is transmission a substitute or complement of generation, demand-side management, distributed generation?	Assessment needed

<i>Transmission Adequacy Metrics</i>	
34. How to define a transmission corridor as needed upgrade in the public interest?	Specification needed
35. How to plan for new transmission when stability needs N-2 while NERC says N-1	Take the higher value
36. What metric should be used for transmission adequacy	Use \$ invested or \$ invested / transmission capacity

C. Technology

<i>Innovation and Deployment of New Technologies</i>	
1. Deployment of new developed technologies	Needs to be advanced
2. How to create synergies among fragmented industry for concerted technology development efforts?	Coordination of technology development efforts among various groups (industry, government, R&D bodies/labs)
3. Little incentive to employ new technologies broadly? How to best drive technology innovation and implementation?	<ul style="list-style-type: none"> • Make technology advancements an objective of regulators, especially states (candidate for regional state committees?) • Use industry groups to educate/lobby state staff to facilitate cost recovery
4. Lack of focus in R&D	Create more focus. Need a regulator approach, practical voice for operations with long-term perspective. R&D community cannot come together w/o external customer directives

<i>Planning, Operating and Maintaining the Grid Under Uncertainty</i>	
5. How to handle uncertainty in the planning process when cost allocation is decided?	New analysis tools needed
6. Ability to predict generation is major problem in transmission siting and justification. Main issue here is fuel price variability.	We have a technology need in the ability to perform integrated analysis of transmission, generation, and fuel transportation and production.
7. What do you do with PMU data?	Tools for operators and reliability coordinators
8. Cost acceptable level for diagnostics and life extension	Need new sensor technologies and low cost communication, and better analysis methodologies

<i>Increasing Grid Capacity</i>	
9. Increasing transmission capacity in a given ROW	Voltage upgrades (compact line design), advanced conductors, power electronic controllers, bulk energy storage
10. Right of way becoming more precious in \$, time, etc.	Flow more power through ROW (increase MW/acre)

<i>Addressing Economic and Engineering Challenges Due to Kirchhoff's Laws</i>	
11. Create a national grid	Build HVDC and island regions with HVDC ties for control, stability and security.

III. Key Questions Identified for Additional Discussion

A. Business and Economics Small Groups

1. Should we differentiate transmission project cost allocation for reliability projects, economic projects, or generator interconnection (system improvements)?
2. How should cost allocation be done when more than one state is involved?
3. Should compensation for transmission investments be value-based or cost-based?
4. How do we value transmission investments?
5. What is the right size for a planning area (or transmission owner)?
6. Should planning be proactive or request-driven?

B. Planning and Transmission Investment Policy Small Groups

1. How can planning integrate transmission, generation and demand resources?
 - Uncertainty high in fuel prices making planning more difficult, such as for “benefit-based” assessments of transmission investments
 - Investment costs are certain, but benefits are not easily quantified.
 - How to assess substitutability between transmission, generation and demand resources?
 - Need for clear policies that specify planning objectives
2. How can stakeholder processes be effectively managed to reach a resolution within a reasonable time frame?
3. How can transmission projects be effectively sold to regulators, the public, and other stakeholder to gain approval?
4. Are economic and reliability objectives both relevant for transmission planning? How can planning analyses consider both objectives?
 - Economics and reliability: not an either/or problem
 - Long-term imperative to achieve both objectives
 - Resource concerns (cost, availability and environmental effects) must be considered.
5. How can cost allocation become a settled policy?
 - Certainty needed in regulatory policy
 - Identification of beneficiaries (initially and over time) is an obstacle to benefit-based allocations.
6. How can “bench strength” in critical human resources (engineers, planners, others) be built for today and the future?

C. Technology Small Groups

1. How can technology deployment for new technologies be advanced?
 - Improve the “hand-off” from R&D to applications
 - Keep assessing the practicality of the technology as R&D progresses
 - Keep assessing the commercial viability of the technology and associated products by constructing a “path to market” during the R&D phase
 - Insure reasonable opportunities for cost recovery and profit when new technologies are deployed.
2. What are the best approaches to drive technology innovation implementation?
3. What can be one to achieve a focus and synergy of R&D efforts among the diverse industry, government and university segments?

- Need to find a R&D coordinator (DOE? EPRI?)
 - Need to create an industry forum of utilities, vendors, universities, government research bodies, and labs
 - Need to ascertain how much coordination is optimal
4. What role should utilities play towards the development of a sustainable energy future?
 5. How can PMU technology applications be advanced?
 - “Chicken and egg” syndrome: need to determine how the data can be used in decision-making.
 - Need to know the role of ERO in deployment and use of data.
 - Need to establish a baseline of system performance (e.g., normal band of acceptable changes in voltage angles).
 - Need to “think out of the box” by forging ahead to “let the Genie out of the box”
 6. How do we convert the exploding amount of component and system data into operational and planning decisions?

IV. What one action could be taken to improve or expand the transmission grid in the next 3 to 5 years?

Improve Planning

1. A better understanding of regional planning process with a particular emphasis on accountability for the various parts of this process
2. Integrated regional planning ... 5 and 10 years out ... needs to be clearly articulated to garner support of government and communities, and get cost recovery
3. Plan for reliability and long-term economic needs of load serving entities
4. Develop understanding of how to operate/plan in an uncertain market
5. A single-shop policy developer and enforcer in FERC. Need to give FERC total jurisdiction over transmission siting and cost recovery issues. The policy needs to provide incentives for investment in transmission.
6. Help industry get leadership to make decisions or just plan
7. Define the minimum/optimal size of a region
8. Make it simple; don't look for a win-win" answer; build!

Eliminate Uncertainty in Cost Allocation and Determination of Who Pays

9. Need to achieve regulatory certainty on cost allocation
10. Get certainty on how transmission projects are paid for and sited
11. Transmission cost allocation policy certainty
12. For planning and innovation to move forward need to take certain policy issues off the table (that is, get policy resolutions), particularly in the area of cost allocation and recovery (must be resolved on a state/federal basis)
13. Cost recovery model that can be applied industry wide so that transmission owners recover their investments
14. Develop a national cost allocation model, such as ERCOT's or ISONE's
15. Establish a policy position on when to unbundle or socialize interconnection costs

16. Clear, nationally applicable policy by FERC on cost allocation, covering both existing assets and new facilities, and that policy should be consistent and logical in the relationship between existing and new facilities.
17. Socialize costs of bulk power system across the region

Expand Independent Transmission Companies and Induce Merchant Transmission

18. Large, publicly-traded, for-profit, transmission-only companies (two or three nationwide)
19. Big government incentives for creation of for-profit companies that combine system operation and transmission ownership that are FERC jurisdictional and operate under regulated performance-based regulation for reliability, economic expansion or system, and low operating costs.
20. Induce more beneficial merchant transmission investment projects

Improve Conversion of Data into Useful Information

21. Managing data – prioritizing information – facilitate/support decision-making in operations, planning, and maintenance/asset management
22. Deploy PMUs.

Educate Public on Key Role of Electricity in Reaching a Sustainable Energy Future

23. Long-term, electric utilities should take more of a lead in educating the public about the key role electricity could play in moving our energy infrastructure from one heavily based on petroleum to one that is sustainable.

V. Closing Comments from Professor George Gross

Paradoxes in Transmission Investment:

- Under the RTO structure, we have adopted an open centralized regional planning process; yet the message from virtually every speaker was that all transmission is local.
- The economics and reliability dimensions need to be considered together; we cannot talk about either one or the other in an unbundled way.
- Transmission as an enabler of markets vs. transmission as a substitute for generation or demand.
- Need for policy certainty in transmission; cost allocation.
- The desire for a single consistent policy vs. the finding by the speakers that there is not a single model in transmission investment but rather many models that are required.
- No technological impediments exist yet the lack of the deployment of existing technology is pervasive.

There was not much discussion today of business models. For the 2002 National Transmission Grid Study, PSERC researchers examined the attractive aspects of the transmission business model in England and Wales, with the finding that incentives produced improvements that measurably reduced congestion.