International Clean Energy Coalition
Final Technical Report

Project Start Date: September 29, 2003
Project End Date: September 28, 2010

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DOE Disclaimer

Abstract

In 2003, the National Association of Regulatory Utility Commissioners (NARUC) and National Energy Technology Laboratories (NETL) collaboratively established the International Clean Energy Coalition (ICEC). The coalition consisting of energy policy-makers, technologists, and financial institutions was designed to assist developing countries in forming and supporting local approaches to greenhouse gas mitigation within the energy sector. ICEC's work focused on capacity building and clean energy deployment in countries that rely heavily on fossil-based electric generation.

Under ICEC, the coalition formed a steering committee consisting of NARUC members and held a series of meetings to develop and manage the workplan and define successful outcomes for the projects. ICEC identified India as a target country for their work and completed a country assessment that helped ICEC build a framework for discussion with Indian energy decisionmakers including two follow-on in-country workshops. As of the conclusion of the project in 2010, ICEC had also conducted outreach activities conducted during United Nations Framework Convention on Climate Change (UNFCCC) Ninth Conference of Parties (COP 9) and COP 10.

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N A R U C
National Association of Regulatory Utility Commissioners

Final Technical Report

PROGRAM:	International Clean Energy Coalition (ICEC)
COUNTRIES IMPACTED:	Global/Multi-Regional
COOP. AGREEMENT #:	DE-FG26-03NT41829
PERFORMANCE PERIOD:	9/29/2003 through 9/28/2010
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I. Project Background –

Starting in 2001, the U.S. Department of Energy's National Energy Technology Laboratory (NETL) and the National Association of Regulatory Utility Commissioners (NARUC) conducted a series of international educational forums designed to assist developing countries in addressing global climate change through state-based policy initiatives and innovative energy technologies. To this end, NETL and NARUC hosted an officially sanctioned side event during the United Nations Framework Convention on Climate Change (UNFCCC) Seventh Conference of Parties (COP 7) held in Marrakech, Morocco. The Clean Energy Forum side event showcased U.S. technologies and state-based policy options designed to encourage the voluntarily reduction of greenhouse gas emissions within the context of the UNFCCC. In 2002 NETL and NARUC conducted a similar event during the Eighth Conference of Parties (COP 8) held in New Delhi, India.

II. Overview –

Building upon relationships developed with the international community through NETL and NARUC activities at COP 7 and COP 8, NARUC and NETL established the International Clean Energy Coalition (ICEC) in 2003. The coalition consisted of energy policy-makers, technologists, and financial institutions to assist developing countries in developing local approaches to greenhouse gas mitigation within the energy sector. ICEC's work focused on two broad tasks:

- **Capacity Building** – Equipping developing country officials with tools to better develop local approaches to mitigate greenhouse gas emissions.

- **Clean Energy Technology Deployment** – Assisting developing countries in identifying and financing clean energy technologies that optimize local energy resources including energy efficiency.

NETL was the project lead on energy technology issues, NARUC was the project lead on policy issues.

III. Goal –

The broad goal of this project was to develop a coalition of decision-makers, technologists, and financial institutions to assist developing countries in implementing affordable, effective and resource appropriate technology and policy strategies to mitigate greenhouse gas emissions.

Project goals were met through international forums, a country assessment, and in-country workshops (see Section IV Project Tasks Completed). This project focused on countries that rely heavily on fossil-based electric generation.

IV. Project Tasks Completed–

1. Identify Partnership Organizations/Establish Steering Committee
   In order to develop a working coalition of energy technologists, policy-makers and financial institutions, NARUC and NETL identified appropriate NARUC members to participate in the ICEC Steering Committee. States regulatory commissions represented on the Steering Committee by Commissioners included Indiana, New Jersey, New York, Vermont, Washington, DC, and California.

   The Steering Committee was established to guide coalition activities and met periodically to manage project activities and make programmatic adjustments as needed. To this end, in additional to face-to-face meetings and conference calls, the Steering Committee also produced a report defining successful project outcomes.

   Deliverables:

   a) **ICEC Steering Committee Meeting**
   March 10, 2004, Charleston, South Carolina
   See attached: synopsis, Butler presentation, Spahn presentation

   b) **ICEC Steering Committee Meeting in conjunction w/NARUC Winter Meetings AD Hoc Committee on Global Climate Change Meeting**
   July 13, 2004, Washington, DC
   See attached: synopsis (agenda and talking points)

   c) **ICEC Steering Committee Meeting**
   July 2005
   See attached: synopsis (agenda and presentations)

   d) **ICEC: Defining Successful Project Outcomes**
   See attached: report

2. Develop Country Assessment (Technology Deployment/Capacity Building)
The steering committee identified India as a country that relied heavily on fossil-based electric generation and would benefit from an in-country clean energy resource evaluation. Thus the Steering Committee targeted India for the Country Assessment. To execute the assessment the Steering Committee developed criteria and identified key in-country stakeholders for information gathering purposes as well as follow-on workshops. These stakeholders included:

- Energy/Environment Decision-Makers;
- Clean Energy Investment Activities, Opportunities and Barriers;
- Carbon Trading Activities, Opportunities and Barriers;
- Greenhouse Gas Registry Activities (baseline calculations and price indices);
- Clean Energy Regulatory Policy Incentives;
- Clean Energy Tax Incentives;
- Clean Energy Finance Mechanisms; and
- Clean Energy Rate Making Treatments.

Deliverable:

e) **Country Assessment Report for India**
April 2005
See attached: Assessment Report

3. Conduct One In-Country Workshop (Technology Deployment/Capacity Building)
Once the Country Assessment was complete, members of the Steering Committee and their designates met with in-country energy/environment decision-makers to vet the Country Assessment and to assist in identifying additional policy and technology strategies to address greenhouse gas emissions from the energy sector. The result was a series of linked activities, "Electricity Market in India and Learnings from Developed Markets Workshop," "NARUC/NTPC Technical Assistance Workshop," and "Roundtable Discussions on the Development of Power Markets in India." These workshops built off the Country Assessment and were designed to strengthen stakeholder communications and engagement on clean energy policy issues.

Deliverables:

f) **Electricity Market in India and Learnings from Developed Markets Workshop and NARUC/NTPC Technical Assistance Workshop**
March 1-3, 2005, India
See attached: Final Report, Agenda, and Presentations

g) **Roundtable Discussions on the Development of Power Markets in India**
September 5-6, 2006, New Delhi, India
See attached: Agenda, Presentations, and Roundtable Interaction Questions

4. <u>Develop and Participate In International Energy Forums (Capacity Building)</u>
   As a follow up to outreach activities conducted during United Nations Framework Convention on Climate Change (UNFCCC) Seventh Conference of Parties (COP 7) and COP 8, NETL and NARUC conducted side meetings during prominent international energy forums highlighting U.S. technologies and state-based policy options designed to encourage the voluntarily reduction of greenhouse gas emissions. These forums were conducted at COP 9 and COP 10, in 2003 and 2004 respectively.

   <u>Deliverables</u>:

   h) **United Nations Framework Convention on Climate Change (UNFCCC) Ninth Conference of Parties (COP 9)**
   December 1-12, 2003, Milan, Italy
   See attached: Synopsis

   i) **United Nations Framework Convention on Climate Change (UNFCCC) Tenth Conference of Parties (COP 10)**
   December 6-17, 2004, Buenos Aires, Argentina
   See attached: Synopsis (Special Report from UNFCCC COP-10 and NARUC Bulletin)

V. Project Challenges–

As DOE is aware, this grant went through a series of revisions regarding both budget and period of performance as follows:

Amendment No.	*Obligated Funds (total)*	*Period of Performance*
A000	$ 60,000	9/29/03 through 9/28/06
A001	$150,000	9/29/03 through 9/28/06
A002	$280,000	9/29/03 through 9/28/06
M003	$280,000	9/29/03 through 9/28/08
M004	$280,000	9/29/03 through 9/28/08
M005	$280,000	9/29/03 through 9/28/08
M006	$280,000	9/29/03 through 9/28/08
M007	$280,000	9/29/03 through 9/28/09
M008	$280,000	9/29/03 through 9/28/10

Based on the success of the ICEC project from 2003 to 2006 and continued interested from international parties, NARUC requested the first no-cost extension of the end of the performance period from 9/28/2006 to 9/28/2008 to allow NARUC to successfully implement additional follow-on activities with remaining funds. Due to delays in reaching agreement with DOE and foreign partners and a natural disaster in one of the target countries, NARUC requested a no-cost extension until 9/28/2009 to allow additional preparation time to organize workshops and technical meetings in India and China.

When a planned add-on activity to the Eco-Beijing conference scheduled for the Fall of 2009 was postponed and ultimately cancelled because of Chinese government travel restrictions related to the H1N1 virus, NARUC again requested a no-cost extension for an additional year (ending 9/28/10). Throughout 2009 and 2010 NARUC offered several additional activity proposals to DOE and continued to foster relationships with international partners. However, despite support for the concepts DOE indicated that there were travel restrictions in place for both U.S. and foreign participants and ultimately none of the proposals were approved.

VI. Conclusion–

Through the Steering Committee and collaboration of NETL and NARUC members, ICEC took shape and grew over time. NETL and NARUC were able to build a number of strong relationships with target country decision-makers and engage in technical as well as policy dialogues with energy sector stakeholders on the mitigation of greenhouse gas emissions. ICEC's participation in COP dialogues raised the profile of the coalition and enhanced the strength of the international collaboration aspect of this project. Additionally, the coalition's approach in assessing and targeting India for workshops on clean energy issues resulted in sustained, productive discussion and information sharing between representatives from the Indian energy sector and NARUC's expert volunteers.

Thus the project goal "of developing a coalition of decision-makers, technologists, and financial institutions to assist developing countries in implementing affordable, effective and resource appropriate technology and policy strategies to mitigate greenhouse gas emissions" was widely a success. Each of the agreed upon tasks identified above have been effectively concluded as per the attached deliverables.

Annex 1- Task 1 Deliverables

a) ICEC Steering Committee Meeting- March 10, 2004
b) ICEC Steering Committee Meeting- July 13, 2004
c) ICEC Steering Committee Meeting- July 2005
d) ICEC: Defining Successful Project Outcomes

ICEC Planning Meeting
(March 2004)

THE MARCH 10^{th}, 2004 ICEC MEETING COVERED:

1) PROJECT OVERVIEW:

ICEC IS DESIGNED TO BRING POLICY-MAKERS, FINANCIAL INTERESTS AND TECHNOLOGISTS TOGETHER TO ASSIST DEVELOPING COUNTRIES DEPLOY CLEANER ENERGY TECHNOLOGIES AND FOSTER CLEAN ENERGY PRACTICES. (see attached "success" document for more details)

2) THE DECEMBER 10th STEERING COMMITTEE MEETING HELD IN SOUTH CAROLINA:
see attached "success" document for a summary.

3) PROJECT GOALS AND "DEFINITIONS OF SUCCESS":
The original "success" document was a product of the South Carolina ICEC Steering Committee Meeting (and subsequent conversations between NARUC and NETL).
The revised "success" document was updated based on the March 10th meeting (new version attached)
A final version of the document will be ready for approval before July 2004.

4) FOLLOW-UP ACTIONS:
Before the next ICEC Steering Committee Meeting scheduled in conjunction with the NARUC Summer Meetings (July 10-14) in Salt Lake City Utah, ICEC participants will:
Revise and finalize the "Success" document
Identify an ICEC Project
Identify a Project Partner
Conduct monthly conference calls

During the July ICEC Meeting, participants will approve an ICEC project, project partner, and revise the project action plan for the summer and fall of 2004. ICEC will also discuss expanding the Steering Committee.

NARUC

NARUC and the International Clean Energy Collaborative

Commissioner Frederick Butler
New Jersey Public Utilities Commission

March 2004

NARUC

What is National Association of Regulatory Utility Commissioners (NARUC)

- **MEMBERS: governmental agencies that are engaged in the regulation of utilities and carriers in the fifty States, the District of Columbia, Puerto Rico and the Virgin Islands.**
- **MISSION: serve the public interest by improving the quality and effectiveness of public utility regulation.**
- **Ensure the establishment and maintenance of such energy utility services as may be required by the public convenience and necessity, and to ensure that such services are provided at rates and conditions that are just, reasonable and nondiscriminatory**

NARUC

Ad Hoc Committee on Global Climate Change

- **Established as Clearinghouse for Ongoing NARUC Climate Change Activities**
- **Participation in UNFCC Process**
  - Conference of the Parties in 2003 in Milan
- **Several Resolutions Passed Supporting Climate-Related Efforts and Measures**

NARUC

On-Going Global Climate Change Activities and Projects

- **Continue to Examine Domestic and International Aspects** (Greenhouse gas related sessions and meetings at NARUC conferences)

- **Filed Comments With Department of Energy on GHG Registries (1605b)**

- **Regional Greenhouse Gas Initiative Proposal:**

  -Designed to facilitate the understanding of GHG registries and tradable renewable energy credits (RECs), and explore development of economic regulatory tools.

NARUC

International Clean Energy Collaborative (ICEC)

- ***Goal:***

  Bring policy-makers, technologists and financial institution together to address non-technical barriers associated with affordable and replicable clean energy deployment in developing countries.

NARUC

Overall ICEC Tasks

- **Capacity Building – Equipping developing country officials with tools to better develop local approaches to mitigate greenhouse gas emissions.**

- **Clean Energy Technology Deployment – Assisting developing countries in identifying and financing clean energy technologies that optimize local energy resources including energy efficiency.**

NARUC

ICEC Activities

- **Initial planning meeting of the ICEC in Charleston, South Carolina (December 10, 2003)**
- **Steering Committee refined Project Goals and "Definitions of Success" in summary paper**

NARUC

ICEC Guidance Principles

- **Focus on developing countries where a significant increase in greenhouse gas emissions is expected over the next decade (e.g. India and China).**
- **Focus on affordable and replicable clean energy projects and will not exclude projects located in mid-sized cities or rural areas.**

NARUC

Next Steps

- Revise and finalize the "Success Document"
- Identify an ICEC Project
- Identify a Project Partner
- Conduct monthly conference calls

NARUC

GLOBAL CLIMATE CHANGE UPDATE

Andrew Spahn
Director of Grants and Research
NARUC

March 2004

NARUC

NARUC'S PARTICIPATION IN GLOBAL CLIMATE CHANGE ISSUE

- PARTICIPATION IN UNFCCC PROCESS
- SEVERAL RESOLUTIONS PASSED SUPPORTING CLIMATE-RELATED EFFORTS
- ONGOING WORK OF COMMITTEES

NARUC

BIG PICTURE: WHAT IS HAPPENING WITH KYOTO?

- **SEVERAL COUNTRIES HAVE RATIFIED AGREEMENT**
  (Agree to reduce emissions to 1990 levels)
- **RUSSIA'S RATIFICATION KEY**
- **FIRST REPORTING PERIOD ENDS 2012**
  (Negotiations start 2005)
- **COP-9 (NARUC PARTICIPATION)**
- **BI-LATERAL EFFORTS**

NARUC

WHAT'S THE U.S. DOING?

- **CONTINUED SUPPORT OF UNFCCC** (Activities to reduce GHG emissions)
- **CARBON SEQUESTRATION LEADERSHIP FORUM (STATE/DOE)**
- **CLIMATE LEADERS (EPA)**
- **CLIMATE CHANGE RESEARCH INITIATIVE**

NARUC

WHAT IS NARUC DOING?

- **CONTINUES TO EXAMINE DOMESTIC AND INTERNATIONAL ASPECTS**
  (IGCC/Climate Changes Session & ERE)
- **FILED COMMENTS ON GHG REGISTRIES**
  (Grace Delos Reyes)
- **AD HOC COMMITTEE ON GLOBAL CLIMATE CHANGE**
  (Commissioner Butler/ Tuesday @4:30)

NARUC

HOW TO GET INVOLVED

- **NARUC'S AD HOC COMMITTEE ON GLOBAL CLIMATE CHANGE**
  (COMMISSIONER FRED BUTLER – CHAIR)

- **NARUC/DOE PARTNERSHIP FOR CLEAN COAL AND CARBON SEQUESTRATION**
  (COMMISSIONER DAVID HADLEY – CHAIR)

- **ATTEND WEDNESDAY'S JOINT SESSION**

ICEC Planning Meeting
(July 2004)

AD HOC COMMITTEE ON GLOBAL CLIMATE CHANGE	
TUESDAY, JULY 13, 2004	
4:30 pm – 6:30 pm	
Location: TBD	
	JOINT MEETINGS AD HOC COMMITTEE ON GLOBAL CLIMATE CHANGE and INTERNATIONAL CLEAN ENERGY COLLABORATIVE
4:30 pm – 4:40 pm	**Introduction – What is the Role of PUCs in Promoting State Greenhouse Gas Mitigation Strategies** State Public Utility Commissions play an important role in moving State GHG initiatives forward. Commissioner Butler will give an overview on how public utility commissions can influence state based GHG mitigation practices. • *Commissioner Frederick Butler, New Jersey BPU*
4:40 pm – 4:50 pm	**Legislative Update** Climate change measures are increasingly being offered by members of both the Democratic and Republican Parties. Senators Joseph I. Lieberman (D-CT) and John McCain (R-AZ) introduced a bill in January 2003 setting a national cap on greenhouse gas emissions and allowing companies to buy and sell emission credits. The Senate Foreign Relations Committee, in May 2003, passed without objection a provision calling for U.S. engagement in the development of a binding international climate change treaty. The energy policy bill overwhelmingly passed by the Senate in July 2003 included provisions that would establish a national climate change strategy and a national greenhouse gas inventory, and several bipartisan provisions increasing the efficiency of products and technologies. • *Chris Mele, Legislative Director – Energy, NARUC*
4:50 pm – 5:00 pm	**Update on Regional Greenhouse Gas Initiative** RGGI is a cooperative effort by the 11 northeast states, from Maine to Maryland, to design, by April 2005, a flexible, market-based cap-and-trade program to reduce carbon dioxide emissions from power plants in the region. The effort was launched in April 2003 when New York Governor George Pataki extended an invitation to the governors of the other 10 northeast states to participate in the development of a regional cap-and-trade program. • *James Gallagher, Director, Office of Electricity and Environment, New York PSC*
5:00 pm – 5:10 pm	**Update on Northeast, Northwest and the California Climate Action Registries** Several regions are actively working to address the challenge of reducing GHG emissions such as CO2 through GHG registries. A regional registry can facilitate emissions reductions by establishing emissions baselines against which any future mandates might be applied. Registries also provide data needed to conduct cap-and-trade regimes. • *Mike Winka, Director, NJ Clean Energy Office, NJ BPU*
5:10 pm – 5:20 pm	**Connection Between Greenhouse Gas Markets and Renewable Energy Credits** • *Ed Holt and Assoc.*
5:20 pm – 5:30 pm	**IGCC and Carbon Sequestration**

	If the world is to tackle the problem of climate change in earnest, "clean coal" has to become more than just an amusing oxymoron. All fossil fuels contain carbon, but coal is by far the most carbon-intensive. Capturing and storing carbon dioxide could slow down climate change and also allow fossil fuels to be a bridge to a clean hydrogen-based future. • *Neville Holt, Electric Power Research Institute*
5:30 pm – 6:30 pm	**Update on International Clean Energy Collaborative Activities and Discussion** • *Jim Ekmann, NETL*

Commissioner Butler's Talking Points on Climate Change

THROUGH THE AD HOC COMMITTEE ON GLOBAL CLIMATE CHANGE, NARUC SPEARHEADS SEVERAL DOMESTIC AND INTERNATIONAL ACTIVITIES RELATED TO THE DEVELOPMENT AND DEPLOYMENT OF CLEAN ENERGY TECHNOLOGIES AND CLIMATE-FRIEDNLY PRACTICES. TRADITIONALY, THE AD HOC COMMITTEE HAS BEEN A CLEARINGHOUSE FOR CLIMATE CHANGE ACTIVITIES CONDUCTED THROUGH NARUC'S STANDING COMMITEES.

UNTIL RECENTLY THE ACTIVITIES OF THE COMMITTEE HAVE BEEN TRULY "AD HOC". YESTERDAY WAS THE FIRST FACE-TO-FACE MEETING OF THE AD HOC COMMITTEE ON GLOBAL CLIMATE CHANGE: IT WAS VERY SUCESSFUL. DURING THAT MEETING, WE HEARD ABOUT:

- **NARUC'S ONGOING CLIMATE CHANGE PROJECTS;**
- **NARUC'S RECENTLY FILED GHG REGISTRY COMMENTS; AND**
- **THE REGIONAL GREENHOUSE GAS INITIATIVE (AS WELL AS OTHER STATE-BASED GHG EFFORTS).**

TODAY'S MEETING WILL BUILD UPON YESTERDAY'S MEETING. THIS AFTERNOON WILL BE FOCUSING ON THE ONGOING EFFORTS OF THE INTERNATIONAL CLEAN ENERGY COALITION (OR ICEC).

ICEC IS DESIGNED TO BRING POLICY-MAKERS, FINANCIAL INTERESTS AND TECHNOLOGISTS TOGETHER TO ASSIST DEVELOPING COUNTRIES DEPLOY CLEANER ENERGY TECHNOLOGIES AND FOSTER CLEAN ENERGY PRACTICES.

THE PURPOSE OF TODAY"S MEETING IS TO MOVE FORWARD ON THE ICEC PROJECT BY:

- **FOLLOWING UP ON THE DECEMBER 10th STEERING COMMITTEE MEETING HELD IN SOUTH CAROLINA;**
    - **Andrew will give a very brief overview of that meeting.**
- **REFINING PROJECT GOALS AND "DEFINITIONS OF SUCCESS";**
    - **The revised "success" document was circulated to this group last week**
    - **It is a product of the South Carolina Meeting (and subsequent conversations between NARUC and NETL)**
    - **It gives a good overview of the ICEC project to date.**
    - **It is a DRAFT document – we need your input and buy-in before moving forward.**
- **IDENTIFYING PARTNER ORGANIZATIONS**

AT THE END OF THE MEETING I WOULD LIKE TO HAVE A SET OF ACTION ITEMS TO COMPLETE BEFORE WE MEET AGAIN IN SALT LAKE CITY.

A FEW OTHER ITEMS THAT WE WILL NEED TO DISCUSS:

- **Do we need to formally appoint participants to the ICEC steering committee?**
- **Do we need to hold periodic conference calls**
- **Do we need to meet at each NARUC meeting or should we expand to other venues?**

WE WILL ADJOUN THE MEETING AT 1:30 (OR SOONER IF WE ARE EFFICIENT).

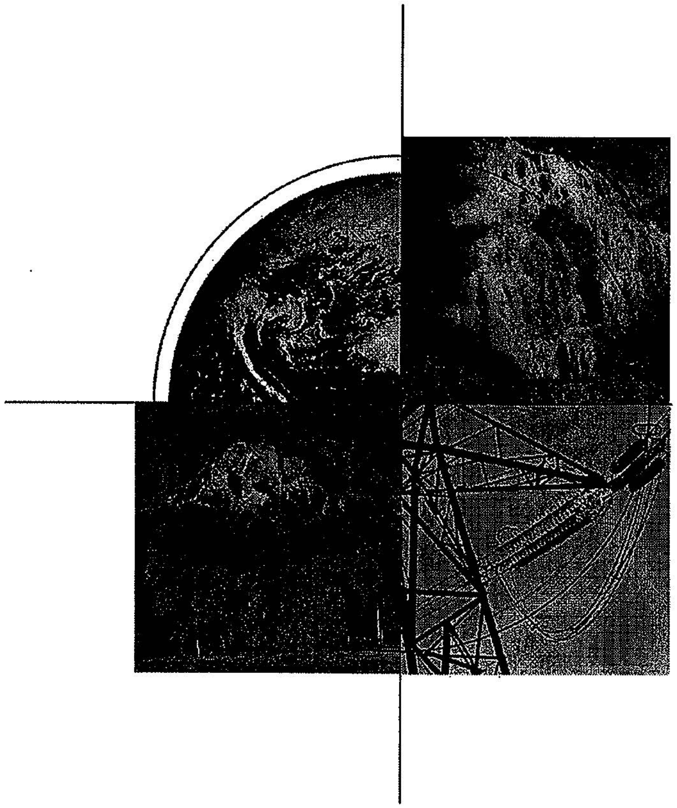
Conducted ICEC Planning Meeting
(July 2005)

AD HOC COMMITTEE ON CLIMATE CHANGE	
MONDAY, JULY 25, 2005	
3:00 pm – 5:00 pm	
Location: TBD	
	JOINT MEETING AD HOC COMMITTEE ON CLIMATE CHANGE and COMMITTEE ON ENERGY RESOURCES AND THE ENVIRONMENT
3:30 pm	**CLIMATE CHANGE: U.S. INDUSTRIES GEAR UP FOR RISK** Moderator: *Pat Oshie*, Commissioner, Washington Utilities and Transportation Commission • *John Stowell,* Vice President, Cinergy, Environmental Strategy & Sustainability • *Michael McNamara,* Director of Public Relations, Swiss Re Insurance Company (invited) • *Gerald Stokes,* Director, Joint Global Change Research Institute, Pacific Northwest National Laboratories

AD HOC COMMITTEE ON CLIMATE CHANGE	
TUESDAY, JULY 26, 2005	
10:45 am – 5:00 pm	
Location: TBD	
	JOINT MEETING AD HOC COMMITTEE ON CLIMATE CHANGE, COMMITTEE ON ENERGY RESOURCES AND THE ENVIRONMENT, and COMMITTEE ON CONSUMER AFFAIRS
1:30 pm	**DIVERSE SOLUTIONS TO THE NATURAL GAS CRISIS – FINDING CLEAN SOLUTIONS Part One** Moderator *Rick Morgan*, Commissioner, District of Columbia PSC • *Fred Butler*, Commissioner, Chair Ad Hoc Committee on Climate Change, introductory remarks • *R. Neal Elliott,* American Council for an Energy Efficient Economy, Energy efficiency effects on reducing natural gas prices • *David Hadley*, Commissioner, Indiana Utility Regulatory Commission: IGCC's role in reducing natural gas prices • *Steve Clemmer,* Union of concerned Scientists, How renewable resources can displace gas & reduce price volatility
3:00 pm	**Networking Break**
	JOINT MEETING AD HOC COMMITTEE ON CLIMATE CHANGE, COMMITTEE ON ENERGY RESOURCES AND THE ENVIRONMENT, COMMITTEE ON GAS, and COMMITTEE ON CONSUMER AFFAIRS
3:30 pm	**DIVERSE SOLUTIONS TO THE NATURAL GAS CRISIS – FINDING CLEAN SOLUTIONS Part Two** Moderator *Linda Kelly*, Commissioner, Connecticut Department of Public Utility Control • *Diane Munns,* Commissioner, Iowa Utilities Board, Introductory

	Remarks • *Larry Downes,* CEO, New Jersey Resources and Chairman of the American Gas Association, Responding to Increased Natural Gas Costs Without Increasing the Carbon Burden? • *David Moskovitz,* Regulatory Assistance Project, Regulatory incentives and rate design to encourage clean solutions • *Dian Grueneich,* Commissioner, California Public Utility Commission, recent CPUC orders regarding energy saving goals and resource procurement
5:00	**INTERNATIONAL CLEAN ENERGY COLLABORATION – ADVISORY COMMITTEE MEETING**
	Moderator: *Fred Butler*, Commissioner, Chair Ad Hoc Committee on Climate Change • Andrew Spahn, Director of Grants and Research, NARUC ICEC Update • Jim Ekmann, Director, Office of Technology Impacts and International Coordination, National Energy technology Laboratory – DOE Presentation of Proposed ICEC Projects • Discussion of Proposed ICEC Projects • Outline Next Steps

Proposed DG Activities Under USAID-NETL GEP Global Climate Change Supplement



James M. Ekmann
Associate Director
Office of Technology Impacts and International Coordination

U.S. Department of Energy
Office of Fossil Energy
National Energy Technology Laboratory

India Power Sector - Challenges

- Ever increasing demand/supply gap
- Insolvent State Electricity Boards
- Inadequate infrastructure
- Inefficiencies – high T&D losses
- Lack of internally generated funds for capacity addition
- Single-buyer model
- Inadequate fuel mix – Heavily reliant on coal
- Government controlled, vertically integrated monopoly
- Irregular, unreliable, and poor quality of supply
- Lack of consumer protection
- Rural sector neglect – lack of access to electricity
- Skewed tariff structures
- Environmental concerns – high volumes of fly ash generated

NETL

Government of India (GOI) Response

- **Electricity Act 2003 highlights**
  - Open access and competition, generation delicensed (end of vertically integrated electricity boards)
  - Regulatory reform
  - Universal access to clean and reliable electricity
  - Restoration of financial health to the power industry
  - Generation capacity addition plans
  - Reduction in T&D losses
  - Distributed generation for rural electrification
  - Blend of "Cost of Service" and "Performance Based" tariff structures to encourage competition and efficiency
  - Consumer protection
  - Attract private investment to increase captive and private plants
  - Power markets (multi-buyer, multi-user system)

NETL

USAID/NETL Support for GOI Goals Through Participating Agency Services Agreement (PASA)

- Efficient Coal Conversion
  - Sustainable efficiency improvement
  - Enhanced collaboration with the private sector
  - High efficiency generation technologies
  - Plant maintenance best practices
  - Training and technical exchange programs
- Decentralized Energy Systems
  - Distributed generation (DG) market analysis, technology selection and demonstration
  - Capacity building and financing
  - DG training and workshops

NETL

USAID/NETL Support for GOI Goals Through Participating Agency Services Agreement (PASA)

- Regulatory Reforms
  - Creating the right regulatory environment for power market
  - Training for regulators and the regulated
  - Seminars and workshop
- Communication and Outreach
  - Public participation and awareness creation
  - Information dissemination
  - Capacity building

NETL

Current PASA Activities

- Regulatory Reform
  - Regulatory policy support
  - Training (in the United States)
  - Seminars and workshops (in India)
- Decentralized Energy Systems (Mohan Dairy Project)
  - Power generation from cow dung for rural electrification
  - 1-year demonstration of advanced DG (Capstone) technology
  - Environmental and social benefits
  - Capacity building including local utility

NETL

Current PASA Activities

- Efficient Coal Conversion
  - High efficiency power generation (IGCC)
  - Efficiency improvement in existing power plants
  - Guidelines for best practices
  - Alliances and capacity building
- Communication and Outreach
  - Public participation and awareness in PASA tasks
  - Workshop facilitation, handbooks, newsletters

NETL

Proposed Distributed Generation Activities (Technology Simulation and Evaluation) - I

- Technologies Selection/Application
  - Introduction of DG simulation and analytical tools
    - Building Energy Analyzer (software only)
    - Distributed Energy Technology Simulator (software/hardware)
  - Technology selection criteria and case studies
  - Economic and technical feasibility for critical power needs
  - Market entry strategies, efficiency, and security benefits
  - On-site technology demonstration
    - Residential, commercial, and industrial (CHP) application

NETL

Proposed Distributed Generation Activities (Technology Simulation and Evaluation) - II

- Advanced DG Simulation Training and Workshops
  - Structure and functionality, evaluation, and calibration
  - DG technology selection and deployment strategies
  - DG/utility interface and interconnection challenges
  - Power buy-back tariff structures
  - Capacity building and financing

NETL

Proposed Distributed Generation Activities
(Capacity Building and Demonstrations - I)

- DG/Microturbine Users Association in India
  - Establish association in India
  - Identify organizations (private sector, government, NGOs)
  - Sponsor regional Asian DG/microturbines annual workshop
- Cow Dung to Energy Project
  - Partnership with local Energy Development Authority, cluster of dairy farming units, technology provider, local non-profit, bank
  - Conduct feasibility study
- Landfill Gas to Energy Project
  - Electricity for remote and/or rural population
  - Develop landfill site
  - Adapt Capstone technology for standalone operation
  - Alliance with state, local government, and technology provider
  - Training

NETL

Proposed Distributed Generation Activities
(Demonstrate Fuel Cell Technology and MicroGrid Systems - II)

- Indian Chloralkali Industry
  - Demonstration of PEM fuel cell technology
  - Hydrogen utilization for power generation
  - Improved power generation efficiency
  - Reduction in pollutants and greenhouse gas emissions
- Rural Commercially Viable Electrification System
  - Rural electrification model in India
  - Use of local renewable energy
  - Local capacity building for sustainable management
  - Cross-sectoral benefits
  - Project monitoring and evaluation
  - Concept replication

NETL

Summary

- One project started; the technology provider would prefer an implementing partner in India
- Identified three topical areas for additional work
  - Simulation and evaluation
  - Capacity building
  - Replicable demonstration projects
- Intent: Build capacity in India to define, develop, and deploy DG technologies & help achieve GOI goals
  - Characteristics of replicable projects?
  - Reduce barriers to multi-national developer teams?
  - Rural electrification vs. working in the shadow of the wires?

Schedule as of 02/04/2005

WORKSHOP ON
"ELECTRICITY MARKET IN INDIA AND LEARNINGS FROM DEVELOPED MARKETS"
Power Management Institute, NOIDA
MARCH 1st and 2nd, 2005

PROGRAMME: DAY 1

REGISTRATION: 9.00-9.30 Hrs	
INAUGURAL SESSION: 9.30-10.30 Hrs	
• Inaugural function	• Chairman, CERC • Chairman, CEA • NARUC • CMD,NTPC • D(Commercial), NTPC
HIGH TEA: 10.30-11.00 Hrs	
SESSION I : 11.00-13.00 Hrs	
US Electricity Sector	
SESSION CHAIRMAN : Sh. H. L. Bajaj, Chairman, CEA	
• Overview of the US Electricity Sector (Producers, Regulators, NERC, ISO and RTOs) • Regulators perspective on development of electricity market ▪ FERC, NERC and STATE PUCs in the US- Their roles in regulating the electricity sector ▪ US power sector experience related to electricity market development ▪ Merchant power plants without long term agreements/contracts in the US - What can India learn?	SPEAKERS: o NARUC,USA
LUNCH : 13.00-13.45 Hrs	
SESSION II : 13.45-15.15 Hrs	
Electricity Market in India	
SESSION CHAIRMAN: Sh. K. N. Sinha, Member, CERC	
• The electricity market in India: Opportunities and challenges	SPEAKERS: • Sh. T. N. Thakur, CMD, PTC • Ms. Leena Srivastava, ED,TERI • Ms. Usha Ramachandran, ASCI • Sh. M. G. Ramachandran, Advocate • NTPC
TEA BREAK: 15.15-15.30 Hrs	
SESSION III : 15.30-17.00 Hrs	
US Experience on Electricity Market	
SESSION CHAIRMAN: Sh P. Narasimharamulu, Director(Finance), NTPC	
• Regulations and Investments in Generation & Transmission - US experience	SPEAKERS: • NARUC, USA
FROM 17.30 – 19.00 HRS	
ROUNDTABLE DISCUSSIONS ON "INVESTMENT IN POWER SECTOR"	
Coordinated by CII	

DINNER 19.30 HRS ONWARDS

PROGRAM DAY 2

SESSION I: 9.30- 11.30 Hrs

Intra-State ABT and Wholesale Electricity Market

SESSION CHAIRMAN: Sh Bhanu Bhushan, Member, CERC

- Intra state Availability Based Tariff (ABF)
- Unscheduled Interchange (UI) of Power as a trading mechanism

SPEAKERS:
- Mr. R. G. Yadav, ED(SO), Powergrid
- Mr. S. K. Soonee, ED, NRLDC,
- Mr A K Asthana, Director,CEA
- Mr. S. K. Dube, Director, PTC
- Mr. Mahender Kumar, Chief Executive, REL
- NTPC

TEA BREAK :11.30 TO 11.45 Hrs

SESSION II : 11.45 TO 13.15 Hrs

Power Exchange: Trading Mechanisms

SESSION CHAIRMAN: Sh. R. D. Gupta, Member, UPERC

- Power exchanges
  - Role and structure of Spot and Futures
  - Settlement mechanisms thereof

SPEAKERS:
- NARUC
- Prof Prem Kumar Kalra,IIT-K
- Ms. Rupa Devi Singh, Director, CRISIL
- Mr K K Agarwal, NVVN
- NCDEX

LUNCH: 13.15 -14.15 Hrs

SESSION III : 14.15-15.45 Hrs

Transmission Planning and Electricity Market

SESSION CHAIRMAN: Sh. S. C. Mishra, Director(P), Powergrid

- Transmission system planning and capacity addition scenarios in an Electricity market
  - Role of Regulators
  - Licensing mechanism
  - Transmission Pricing mechanism

- M. Ravinder, Chief (Engg), CERC,
- Mr. Ravi Nayak, ED(Engg.), Powergrid
- M.r Alok Roy, Chief Executive, Reliance Energy
- Mr. P. R. Ramakrishnan, Tata Power
- Mr. S. K. Dube, Director, PTC
- Mr. K. K. Agarwal, NVVN

TEA BREAK : 15.45 - 16.00 Hrs

SESSION IV : 16.00-17.00 Hrs

PANEL DISCUSSION

- Sh. H. L. Bajaj, Chairman, CEA
- Sh. K. N. Sinha, Member, CERC
- Sh. Bhanu Bhushan, Member, CERC
- NARUC
- Sh. R. D. Gupta, Member, UPERC
- Sh. P. Narasimharamulu, D(F), NTPC
- Sh. Chandan Roy, D(Operation), NTPC
- Sh. S. C. Mishra, D(P),Powergrid

VALEDICTORY SESSION: 17.00-17.30 Hrs

- Address by NARUC
- Address by CMD, NTPC

Note: There would be no participation fees for this workshop, however, participants shall have to make their own arrangements for lodging, boarding and transportation.

Day-I

Session-I (9.30 – 13.00 HRS)
Electricity Market in India

Presentation by NTPC (15min) on current status of the electricity sector in India (generation capacity, peak/off-peak demand, future plans/projections) and key provisions related to electricity market in Electricity Act 2003.

Questions

1. What is the role of regulators in market development, investment, and planning in the US electricity sector?
2. How are merchant power plants promoted in the US? What are the issues?
3. What are the roles and responsibilities of market operators?
4. What is the role of the Transmission System Operator (TSO) vis-à-vis the Independent System Operator (ISO)?
5. Describe the evolution and current status of wholesale and retail electricity market in the US?
6. Describe Standard Market Design (SMD). What are the issues?

Session-II (14.00 – 17.30 HRS)

Regulatory Strategies and Practices

Presentation by NTPC (15min)
- NTPC overview
- NTPC's current regulatory interface structure

Questions

1. What is the extent of regulation/deregulation in the electric power generation sector in the US?
2. What regulatory practices are followed by US regulators in issuing orders that minimize disputes? Describe petition review processes.
3. Are regulatory orders challengeable? Is there an appellate authority?

4. What are current regulatory compliance practices and issues in the US?
5. What suggestions would you have for NTPC on improving regulatory interface/interaction with CERC?

Day-2

Session-I (9.30 – 11.30 hrs) Electricity Pricing

Presentation by NTPC (15min) on **Electricity Pricing in India**

1. What is the ideal model for electricity pricing under shortage scenarios?
2. How are fuel price variations and stranded costs recovered by US utilities and power generators?
3. How are environmental externalities priced and recovered by US utilities and power generators?
4. Describe risk management, hedging, and cost recovery mechanisms used in electricity pricing in the US?
5. How is capital addition after completion of useful life of a power plant reflected in the tariff?
6. What transmission pricing mechanisms are used in the US?
7. Describe Right-of-Way mechanisms used by merchant power plants in the US.
8. Describe the concept of merchant transmission capacity. What are the issues?
9. What type of compensation mechanisms are used in the US for the impact of cyclic loads on electricity generators?

Session-II (12.00 – 13.00 hrs) Bilateral Exchange Programme with NARUC

- Scope of future collaboration/ bilateral exchange program with NTPC on following issues:
    - Regulatory practices followed by different utilities
    - Competency building in the area of regulatory management, electricity pricing, and demand side management
    - Mutual exchange program / visit to utilities
    - Future workshops/ seminars

DRAFT TALKING POINTS FOR SEPTEMBER 13, 2005
MEETING BETWEEN DOE AND NARUC

I. **Discuss revamping DOE/NARUC T&D Scope of Work**

a. **Grant Publications to date:**
   i. *Version 1.0 Transmission Siting Application* (in conjunction with RAP funding)
   ii. *Portfolio Management Report* (posted on website)
   iii. *Draft Document Search on Underutilized Rights of Way And Space on Existing Transmission Towers*

b. **Grant Workshops to date:**
   i. **Portfolio Management Workshop** was conducted in Washington DC, February 12-13, 2005. The purpose of the Workshop was to examine the concept of portfolio management and to understand it in terms of historical integrated resource planning (IRP) practices, to explore applications of PM and to identify the tools currently available as well as unmet analytical needs.
   ii. **The Resource Procurement and Planning Forum** between State Commissioners and members of the Federal Energy Regulatory Commission (FERC), which was conducted May 16, 2005. The purpose of this forum is to facilitate a discussion between State and Federal regulators concerning issues relating to the planning, procurement, and acquisition of generation resources

c. **Grant State Coordination on T&D Issues -** Through the National Council on Electricity Policy, NARUC has been coordinating with energy-related state officials. NARUC participates in monthly National Council conference calls. In addition, NARUC organized and participated in a face-to-face meeting of the National Council in October 2005. NARUC maintains the National Council website which contains conference call summaries and presentations from National Council event

d. **Upcoming Grant Workshops and Publications**

   i. **National Council Energy Efficiency Workshop** (Newark)
   ii. **National Council Face-To Face Meeting** (Chicago)
   iii. **National Council DG Workshop** held in coordination with the MN Department of Commerce (Chicago)
   iv. **Energy Efficiency and Energy Infrastructure Financing Primer** (sub-contracted to NCSL)

e. **Pending grant reports that should be re-programmed or eliminated:**
   i. *Report Examining the Effect of Retail Rate Freezes on T&D Investments with Recommendations on How States Can Address T&D Investments*

ii. *A Report Examining State and Regional Coordination on Reserve Margin Issues*

**** DOE agrees that NARUC should reprogram remaining funds to look at work that is more pertinent for the public utility commissioners in light of EPACT – some ideas are discussed below.***

f. **Future grant reports should focus on EPACT implementation including:**
   i. PURPA revisions (Subtitle E)
   **** Interest from DOE for technical assistance on how States are supposed to respond to the PURPA revisions; may be a good use for some of the remaining funds***
   ii. Energy Efficiency issues (Section 139)
   **** DOE has already talked to RAP about doing this work; Section 140 is going through EERE office and OE does not expect to get very involved***
   **** DOE discussed the National Action Team (name? Jim Rogers and Diane Munns to Co-Chair) as a possible resource to address this and may be used directly in the final report***
   iii. Economic Dispatch (Section 1234)
   **** DOE agrees that funding for Joint Boards would be a good way to reprogram some of the remaining funds (coordinating with FERC)***
   iv. Version 2.0 of the Transmission Siting Application (Section 1221)
   **** DOE agrees that funding a group to develop Version 2.0 of the Transmission Siting Application is a good use of monies; DOE is also interested in NARUC using some of the money to print glossy versions in preparation for the February Portfolio Management Workshop***

II. NARUC Electric Delivery Forum

III. Meeting Between K. Kolevar and NARUC Leadership
**** DOE is open to help coordinate for a NARUC delegation to come to DC to meet with high-level DOE folks (NARUC will look at dates in mid-October and get back to DOE to begin planning – also looking to coordinate with FERC visit)***

IV. Meeting between N-Groups and OE on grant implementation/funding for FY 2006
**** DOE will put together a list of bullets with ideas for the next phase of implementation planning for the National Council and will have something ready for the October 4th Face-to-Face***

International Clean Energy Collaboration: Defining Successful Project Outcomes

1. *Project Background*

Since 2001, the U.S. Department of Energy's National Energy Technology Laboratory (NETL) and the National Association of Regulatory Utility Commissioners (NARUC) have conducted a series international educational forums designed to assist developing countries in addressing global climate change through state-based policy initiatives and innovative energy technologies. To this end, NETL and NARUC hosted an officially sanctioned side event during the United Nations Framework Convention on Climate Change (UNFCCC) Eighth Conference of Parties (COP 8) held in New Delhi, India. The side event, the Clean Energy Forum, showcased U.S. technologies and state-based policy options designed to encourage the voluntarily reduction of greenhouse gas emissions within the context of the UNFCCC. In 2001 NETL and NARUC conducted a similar event during the Seventh Conference of Parties (COP 7) held in Marrakech, Morocco.

What is the concept?
Building upon relationships developed with the international community through NETL and NARUC activities over the last three years, this project will establish a coalition of energy policy-makers, technologists, and financial institutions to assist developing countries in developing local approaches to greenhouse gas mitigation within the energy sector. The project will focus on two broad tasks:

- **Capacity Building** – Equipping developing country officials with tools to better develop local approaches to mitigate greenhouse gas emissions.
- **Clean Energy Technology Deployment** – Assisting developing countries in identifying and financing clean energy technologies that optimize local energy resources including energy efficiency.

NETL will be the project leader on energy technology issues, NARUC will be the project leader on policy issues, and a yet-to-be-determined institution will be the project leader on financial issues.

What is the intended goal?
The broad goal of this project is to develop a coalition of decision-makers, technologists, and financial institutions to assist developing countries in implementing affordable, effective and resource appropriate technology and policy strategies to mitigate greenhouse gas emissions. Project goals will be met through international forums, country assessments and in-country workshops.

2. *Background Issues: Non-Technical Barriers Thwart The Development of Affordable, Replicable Clean Energy Projects*

In less-developed nations, several issues often come together that confound efforts to introduce new clean-energy technologies. Often these issues include intellectual property, availability of investment capital in the host country, import restrictions, regulatory hurdles that make introduction and acceptance of novel technologies difficult, and lack of trained workers for design, specification, procurement, installation, operation, and maintenance of the new equipment and the associated sensors and controls.

In some situations, national governments and state-level planning organizations focus on introducing the largest or most innovative technology options in locations where they serve as "showcase projects". This often means that clean energy projects are located near the largest cities or in the more developed industrial regions of a country. Just as the national governments focus on showcase projects, this same emphasis can pervade international cooperation amongst countries. Often multi-national clean energy efforts focus on the larger technology items that may be deployed as "one-of-a-kind" demonstrations. These projects, though innovative and efficient, may not replace a significant portion of a country's existing generation capacity for a decade or more (if ever). Compounding this problem, developing countries often lack the capability to procure, build, and operate "showcase projects" using their own domestic workforce.

To assist developing countries address the complicated issues associated with clean energy development and deployment, *the International Clean Energy Collaboration (ICEC) was established to bring policy-makers, technologists and financial institution together to address* ***non-technical barriers***[1] *associated with affordable and replicable clean energy deployment in developing countries.*

3. *Kick-Off Steering Committee Meeting: Defining A Project Goal*

During the initial planning meeting of the ICEC (December 10, 2003) ***Steering Committee Members***[2] discussed how to define ICEC success. Without identifying what the project intends to accomplish it is impossible to define project activities. The Steering Committee agreed that ICEC should not focus on producing outputs such as documents, studies, and meetings without creating tangible and measurable results. The Steering Committee agreed that the goal of the ICEC is to assist developing countries deploy advanced clean energy technologies (such as fossil-

[1] **Non Technical Barriers** refer to legal, regulatory, institutional, financials obstacles associated with the deployment of clean energy technologies or practices. Non-techncial baariiers couold also include lack of technical training to operate and maintain a project; lack of long-term electricity purchase agreements; lack of spare parts; and others.

[2] **Steering Committee Members (March 2004)** are Jim Ekmann (NETL), Commissioner Hadley (IN), Commissioner Butler (NJ), Mr. Jim Gallagher (NY), Ms. Sandra Waldstein (VT), Ms. Grace Hu (DC), Mr. Andrew Spahn (NARUC). The Steering Committee will be expanded to include representatives from CA.

renewable hybrid systems, clean coal technologies or combined heat-power) and improve clean energy- practices (such as demand side management). Most Steering Committee members agreed that ICEC is not designed to deploy and demonstrate unproven and expensive clean-energy technologies. Steering Committee members agreed that ICEC could not produce significant results in a vacuum, but rather ICEC should focus on developing synergies with planned clean energy projects in developing countries.

The ICEC Steering Committee initially defined project success as:

> *Assisting a partner or companion effort to overcome non-technical barriers so that clean energy technologies and practices can be implemented in developing countries.*

Steering Committee members agreed that there should be a geographic target for ICEC activities. The Steering Committee preliminarily agreed on the following guidance:

> *ICEC efforts will focus on developing countries where a significant increase in greenhouse gas emissions is expected over the next decade (e.g. India and China). ICEC will focus on affordable and replicable clean energy projects and will not exclude projects located in mid-sized cities or rural areas.*

4. Which Clean Energy Projects Might Be Strong ICEC Candidates?

In order to target the proper clean energy project it is important to narrow down the types of project ICEC could assist. Below is a summary of projects that might qualify for ICEC support:

- Projects that involve the installation of multi-pollutant control systems on large industrial and small electric power systems fueled by liquid, solid or gaseous fuels (fossil fuels, biomass, etc.).
- Projects that are located in second-tier regions within a country (and are therefore not in the queue for large government subsidies).
- Project that use innovative and affordable systems to control oxides of sulfur and nitrogen, perhaps to greatly reduce emissions of fine particulates (PM 10 and below) and might address emission of persistent organic pollutants (POP's) and trace metals such as mercury.
- Projects that encourage large-scale reuse of combustion by-products to lessen waste disposal, reclaim mined lands and reduce consumptive uses of potable water.

5. Defining Project Criteria

In order to select projects that fit into the goal of ICEC, a set of objective criteria must be adopted. ICEC anticipates identifying two projects that would qualify for ICEC assistance in 2004. Below is a DRAFT set of mandatory project criteria:

- The Clean Energy Project[3] must be replicable in a developing country without significant multi-national donor support.
- The Clean Energy Project must NOT be over-subscribed (that is include too many partners) and must NOT be a showcase project having the highest national visibility.
- The Clean Energy Project must meet in country environmental regulation without special government waivers.
- The Clean Energy Project must go through a standard siting process without special government waivers.
- The Clean Energy Project must use an abundant and affordable generation resource (fossil, non-fossil, or demand side management).
- The Clean Energy Project must be able to attract significant private investment capital.
- The Clean Energy Project must reduce greenhouse gas emissions in the range of 25% and significantly reduce persistent organic matters, trace metals, and fine particulate matter.
- The Clean Energy Project must reduce the consumptive use of potable water for electricity generation when compared to a 250 MW conventional pulverized coal generating facility.

6. Model Project Action Plan

Project identification is the first step in a multi-step process to assist developing countries deploy affordable and replicable clean energy projects. Below is a DRAFT Project Action Plan that summarizes how an ICEC project may be implemented:

- **Identify a Project (Target Completion: May 20, 2004)** - *Using project criteria as a guideline*, identify an on-going initiative or project that focuses on clean energy technologies or practices that fit the charter of the ICEC (Initially, ICEC will focus on micro-grid projects);
- **Identify a *Project Partner*[4] (Target Completion: June 30, 2004) –** Based upon the project selected by the ICEC, a project developer will be identified as a Project Partner.

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[3] **Clean Energy Project** is defined as a technology or practice that will reduce greenhouse gas emissions at least 25% when compared to a 250 MW conventional pulverized coal generating facility

[4] **Project Partner** will be the in-country organization spearheading the development of the Clean Energy Project. An ideal partner would be in the process of designing a clean energy project in either China or India.

- **Identify a Additional *ICEC Partners*[5] (Target Completion: August 1, 2004) –** Once an initial project is identified ICEC may decide to expand its steering committee to include more policy, technology or financial partners.
- **Identify Non-Technical Project Barriers (Target Completion: September 1)** - Meet with project partners to identify significant non-technical barriers that exist within the identified project;
- **Develop a Project Implementation Plan (Target Completion: October 1)** - Cooperatively establish goals that focus on facilitating successful installation of the identified project by addressing non-technical barriers**;**
- **Resolve Non-Technical Project Barriers** (**Target Completion: TBD**) - Work with project partners to reach project goals.

7. Next Steps (March 2004)

Before the next ICEC Steering Committee Meeting scheduled in conjunction with the NARUC Summer Meetings (July 10-14) in Salt Lake City Utah, ICEC participants will:

- Revise and finalize the "Success Document"
- Identify an ICEC Project
- Identify a Project Partner
- Conduct monthly conference calls

During the July ICEC Meeting, participants will approve an ICEC project, project partner, and revise the project action plan for the summer and fall of 2004. ICEC will also discuss expanding the Steering Committee.

[5] **ICEC Partners** are organization that will be part of the ICEC Steering committee (for example GE Capital could spearhead ICEC's financial work). To date only NARUC and NETL are ICEC Partners.

Annex 2- Task 2 Deliverable

e) Country Assessment Report for India- April 2005

Country Assessment Report for India

(April 2005)

International Clean Energy Collaborative: March 2005 Technical Assistance Mission to India

Prepared for the National Energy Technology Laboratory

June 2005

National Association of Regulatory Utility Commissioners

Synopsis Report on the March 2005 Technical Assistance Mission to India

In March 2005, the National Association of Regulatory Utility Commissioners (NARUC) sent a delegation to New Delhi, India to participate in a series of workshops designed to strengthen India's power sector reform efforts. The NARUC delegation was participating on behalf of the International Clean Energy Collaboration (ICEC), which is a project funded by the National Energy Technology Laboratory (NETL). One goal of ICEC is to create local approaches to greenhouse gas mitigation in the Indian energy sector. The March 2005 events were designed to build the capacity of Indian regulators while advancing the goals of ICEC.

Background on the International Clean Energy Collaborative

In 2002, NARUC and NETL established the ICEC which is designed to assist developing countries create local approaches to greenhouse gas mitigation through a coalition of U.S. energy officials, technology researchers, and financial institutions. The ICEC project focuses on two broad tasks:

- **Capacity Building** - Equipping developing country energy officials with tools to better develop local approaches to mitigate greenhouse gas emissions.
- **Clean Energy Technology Deployment** - Assisting developing countries in identifying and financing clean energy technologies that optimize local energy resources including energy efficiency.

In 2004, *ICEC Steering Committee Members*[1] agreed that the goal of the project is to assist developing countries deploy advanced clean energy technologies (such as fossil-renewable hybrid systems, clean coal technologies or combined heat-power) and improve clean energy- practices (such as demand side management). The ICEC project is not designed to deploy and demonstrate un-proven and expensive clean-energy technologies.

Project goals will be met through international forums, country assessments and in-country workshops. The project focuses on countries that rely heavily on fossil-based electric generation such as India and China.

The March 2005, mission to India was the first step in developing a set of projects that could benefit from ICEC assistance. The March 2005 mission created an opportunity for U.S. utility regulators to coordinate with their overseas counterparts, create relationships with Indian energy officials, and build credibility with U.S. and Indian industrial representatives. The March 2005 mission has set the stage for further U.S-India cooperation in the context of ICEC.

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[1] **Steering Committee Members** are Jim Ekmann (NETL), Commissioner Hadley (IN), Commissioner Butler (NJ), Mr. Jim Gallagher (NY), Ms. Sandra Waldstein (VT), Ms. Grace Hu (DC), Mr. Andrew Spahn (NARUC).

March 2005 Mission to India: An Overview

In March 2005, NARUC (on behalf of ICEC) sent a delegation to New Delhi, India to participate in three workshops:

- "***Electricity Market in India Workshop" and "Learning from Developed Markets Workshop***" which were jointly convened by the United States Department of Energy - National Energy Technology Laboratory / United States Agency for International Development (USDOE-NETL/USAID) and National Thermal Power Corporation Limited (NTPC); and
- "***NARUC-NTPC Technical Assistance Workshop***", designed to encourage frank discussions on a range of regulatory issues related to energy market developments in India.

NARUC participation was central to all three workshops (see attachment 1 for NARUC delegation biographies). As India moves toward a more independently regulated environment, private utilities are struggling to understand how utility regulation will affect the cost of energy production and use. The three workshops enabled Indian energy officials to better understand the significance of independent regulation in the context of utility privatization.

The NARUC delegation played an important role in assisting Indian State and Federal utility regulators to better understand the nuances to utility regulation from a U.S.-based perspective. In addition, the NARUC delegation was able to conduct frank discussions with Indian utilities about the U.S. regulatory process. Indian utilities are very concerned about four central questions:

- What do utility regulators want from utilities?
- How are rate cases developed?
- Will regulators prevent private utilities from creating adequate revenues
- How will utility regulators define adequate rates of return

NARUC is viewed by both Indian regulators and industry as a credible and neutral source of information on utility regulation and clean energy policy development. By assisting Indian utility regulators and utility officials, NARUC and ICEC are better positioned to encourage the development of clean energy technologies and policies in India.

"Electricity Market in India Workshop" and "Learning from Developed Markets Workshop"

Regulatory reforms in the Indian power sector are changing the way business is done with emphasis on consumer protection. The reform efforts also aim to provide enabling infrastructure for overall growth of the Indian Power Sector. These workshops, conducted on March 1 and 2, 2005 in New Delhi, India, were designed to catalyze a better understanding of the implications of recent policy changes in India. The workshops also

examined the role of various Federal, State and private sector entities in ensuring success of power sector reforms.

More than 250 participants from the full spectrum of the Indian power sector attended the "*Electricity Market in India Workshop*" and more than 150 officials participated in the "*Learning from Developed Markets Workshop*"(see attachment 2 for agendas). The chairmen of Central Electricity Regulatory Commission (CERC), the Central Electricity Authority (CEA), and the National Thermal Power Authority (NTPC) participated in both events. CERC secretary and two other commissioners; chairmen from 6 State regulatory commissions also participated in the workshops (see attachment 3 for attendees).

During the workshops, several issues were discussed including:

- Attracting investments in the generation, transmission, and distribution sectors to meet growing demand;
- Determining the fair cost of electricity supply;
- Infrastructure requirements for implementing intra-state availability based tariff (ABT);
- Using power exchange as a tool for developing a competitive power market in India;
- Using un-scheduled interchange (UI) as a settlement mechanism;
- Creating affordable redundancy in the transmission network; determining open access and provisions for guaranteed payment for investors; and
- Developing power pools and a uniform tariff structure to enhance market development were discussed.

During both workshops, the NARUC delegation conducted a series of presentations on the U.S. regulatory framework. Questions from Indian officials focused on the State and Federal role in regulating regional electricity markets. Other reoccurring questions to the NARUC delegation focused on how the Indian energy sector could attract more foreign investments. An "enhanced" NARUC delegation will better enhance ICEC's ability to encourage the development of clean energy technologies and policies in India.

"NARUC-NTPC Technical Assistance Workshop"

On March 3, 2005, more than 50 middle and senior level managers from NTPC attended the informal Q&A session with the NARUC delegation. Most of the questions focused on: understanding the regulatory and tariff processes (ABT, UI, rate of return, O&M cost for vintage gas power plants in the U.S., Exparte Rules and the appeal process, ownership of RTOs and ISO in the U.S.), development of power pools and power marketing, and treatment of capacity and energy charge components of the tariff.

At the conclusion of the workshop, NTPC invited NARUC back to participate in ongoing educational activities. It was suggested by NTPC representatives that future NARUC delegations should include regulated utilities as well and Federal and State regulators.

Meeting with USAID/India

On March 3, 2005, NARUC met with USAID/India (see attachment 3 for attendees). Officials from USAID/India indicated that closer cooperation with NARUC on a host of regulatory issues could enhance USAID's ongoing efforts to promote energy sector reform and encourage cleaner energy technologies. USAID suggested that India should coordinate more closely with NARUC's regulatory capacity building efforts in Africa, South America, Central Europe and Asia.

Since the March 2005, NARUC has send USAID/India background information on current regulatory capacity building efforts spearheaded by NARUC. In June, NARUC is meeting with USAID/India to discuss further collaborative efforts.

Proposed Next Steps

- **Conduct an ICEC Steering Committee Meeting During NARUC's Summer Meeting in Austin, Texas** – This meeting will allow NARUC and NETL to assess last year's activities and to plan for 2005/2006. Major changes need to be made to the ICEC work plan. ICEC efforts to identify tangible projects have been slow to develop.
- **Identify A Project in India for ICEC Assistance** – The thrust of this project is to assist in the development of tangible clean energy projects. A project should be identified in order to expand the effectiveness of this project.
- **Expand ICEC Participation -** The Association of State Energy Technology Transfer Institutions (ASERTTI) has expressed an interest in becoming active in the ICEC project. In addition, the Small Enterprise Assistance Funds have expressed an interest in becoming active in ICEC.
- **Update the ICEC Work Plan** – After the Steering Committee Meeting, ICEC will issue a revised work plan.
- **Conduct a Series of Regulatory Workshops in India during The First Week of October 2005** – These workshops will build on the March 2005 efforts.

Annex 2- Task 2 Deliverable

e) Country Assessment Report for India- April 2005

Country Assessment Report for India

(April 2005)

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Prepared for the National Energy Technology Laboratory

June 2005

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In 2004, *ICEC Steering Committee Members*[1] agreed that the goal of the project is to assist developing countries deploy advanced clean energy technologies (such as fossil-renewable hybrid systems, clean coal technologies or combined heat-power) and improve clean energy- practices (such as demand side management). The ICEC project is not designed to deploy and demonstrate un-proven and expensive clean-energy technologies.

Project goals will be met through international forums, country assessments and in-country workshops. The project focuses on countries that rely heavily on fossil-based electric generation such as India and China.

The March 2005, mission to India was the first step in developing a set of projects that could benefit from ICEC assistance. The March 2005 mission created an opportunity for U.S. utility regulators to coordinate with their overseas counterparts, create relationships with Indian energy officials, and build credibility with U.S. and Indian industrial representatives. The March 2005 mission has set the stage for further U.S-India cooperation in the context of ICEC.

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[1] **Steering Committee Members** are Jim Ekmann (NETL), Commissioner Hadley (IN), Commissioner Butler (NJ), Mr. Jim Gallagher (NY), Ms. Sandra Waldstein (VT), Ms. Grace Hu (DC), Mr. Andrew Spahn (NARUC).

March 2005 Mission to India: An Overview

In March 2005, NARUC (on behalf of ICEC) sent a delegation to New Delhi, India to participate in three workshops:

- "***Electricity Market in India Workshop" and "Learning from Developed Markets Workshop***" which were jointly convened by the United States Department of Energy - National Energy Technology Laboratory / United States Agency for International Development (USDOE-NETL/USAID) and National Thermal Power Corporation Limited (NTPC); and
- "***NARUC-NTPC Technical Assistance Workshop***", designed to encourage frank discussions on a range of regulatory issues related to energy market developments in India.

NARUC participation was central to all three workshops (see attachment 1 for NARUC delegation biographies). As India moves toward a more independently regulated environment, private utilities are struggling to understand how utility regulation will affect the cost of energy production and use. The three workshops enabled Indian energy officials to better understand the significance of independent regulation in the context of utility privatization.

The NARUC delegation played an important role in assisting Indian State and Federal utility regulators to better understand the nuances to utility regulation from a U.S.-based perspective. In addition, the NARUC delegation was able to conduct frank discussions with Indian utilities about the U.S. regulatory process. Indian utilities are very concerned about four central questions:

- What do utility regulators want from utilities?
- How are rate cases developed?
- Will regulators prevent private utilities from creating adequate revenues
- How will utility regulators define adequate rates of return

NARUC is viewed by both Indian regulators and industry as a credible and neutral source of information on utility regulation and clean energy policy development. By assisting Indian utility regulators and utility officials, NARUC and ICEC are better positioned to encourage the development of clean energy technologies and policies in India.

"Electricity Market in India Workshop" and "Learning from Developed Markets Workshop"

Regulatory reforms in the Indian power sector are changing the way business is done with emphasis on consumer protection. The reform efforts also aim to provide enabling infrastructure for overall growth of the Indian Power Sector. These workshops, conducted on March 1 and 2, 2005 in New Delhi, India, were designed to catalyze a better understanding of the implications of recent policy changes in India. The workshops also

examined the role of various Federal, State and private sector entities in ensuring success of power sector reforms.

More than 250 participants from the full spectrum of the Indian power sector attended the "*Electricity Market in India Workshop*" and more than 150 officials participated in the "*Learning from Developed Markets Workshop*"(see attachment 2 for agendas). The chairmen of Central Electricity Regulatory Commission (CERC), the Central Electricity Authority (CEA), and the National Thermal Power Authority (NTPC) participated in both events. CERC secretary and two other commissioners; chairmen from 6 State regulatory commissions also participated in the workshops (see attachment 3 for attendees).

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- Attracting investments in the generation, transmission, and distribution sectors to meet growing demand;
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During both workshops, the NARUC delegation conducted a series of presentations on the U.S. regulatory framework. Questions from Indian officials focused on the State and Federal role in regulating regional electricity markets. Other reoccurring questions to the NARUC delegation focused on how the Indian energy sector could attract more foreign investments. An "enhanced" NARUC delegation will better enhance ICEC's ability to encourage the development of clean energy technologies and policies in India.

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On March 3, 2005, more than 50 middle and senior level managers from NTPC attended the informal Q&A session with the NARUC delegation. Most of the questions focused on: understanding the regulatory and tariff processes (ABT, UI, rate of return, O&M cost for vintage gas power plants in the U.S., Exparte Rules and the appeal process, ownership of RTOs and ISO in the U.S.), development of power pools and power marketing, and treatment of capacity and energy charge components of the tariff.

At the conclusion of the workshop, NTPC invited NARUC back to participate in ongoing educational activities. It was suggested by NTPC representatives that future NARUC delegations should include regulated utilities as well and Federal and State regulators.

Meeting with USAID/India

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Since the March 2005, NARUC has send USAID/India background information on current regulatory capacity building efforts spearheaded by NARUC. In June, NARUC is meeting with USAID/India to discuss further collaborative efforts.

Proposed Next Steps

- **Conduct an ICEC Steering Committee Meeting During NARUC's Summer Meeting in Austin, Texas** – This meeting will allow NARUC and NETL to assess last year's activities and to plan for 2005/2006. Major changes need to be made to the ICEC work plan. ICEC efforts to identify tangible projects have been slow to develop.
- **Identify A Project in India for ICEC Assistance** – The thrust of this project is to assist in the development of tangible clean energy projects. A project should be identified in order to expand the effectiveness of this project.
- **Expand ICEC Participation -** The Association of State Energy Technology Transfer Institutions (ASERTTI) has expressed an interest in becoming active in the ICEC project. In addition, the Small Enterprise Assistance Funds have expressed an interest in becoming active in ICEC.
- **Update the ICEC Work Plan** – After the Steering Committee Meeting, ICEC will issue a revised work plan.
- **Conduct a Series of Regulatory Workshops in India during The First Week of October 2005** – These workshops will build on the March 2005 efforts.

Annex 3- Task 3 Deliverables

f) Electricity Market in India and Learnings from Developed Markets Workshop and NARUC/NTPC Technical Assistance Workshop- March 1-3, 2005
g) Roundtable Discussions on the Development of Power Markets in India- September 5-6, 2006

Electricity Market in India and Learnings from Developed Markets Workshop and NARUC/NTPC Technical Assistance Workshop
(March 1-3, 2005)

International Clean Energy Collaborative: March 2005 Technical Assistance Mission to India

Prepared for the National Energy Technology Laboratory (NETL)

June 2005

National Association of Regulatory Utility Commissioners

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Schedule as of 02/09/2005

WORKSHOP ON
"ELECTRICITY MARKET IN INDIA AND LEARNINGS FROM DEVELOPED MARKETS"
Power Management Institute, NOIDA
MARCH 1st and 2nd, 2005

PROGRAMME: DAY 1

<table>
<tr><td colspan="2">REGISTRATION: 9.00-9.30 Hrs</td></tr>
<tr><td colspan="2">INAUGURAL SESSION: 9.30-10.30 Hrs</td></tr>
<tr><td>• Inaugural function</td><td>• Chairman, CERC
• Chairman, CEA
• Diane Munns – Commissioner, Iowa Utilities Board. NARUC
• CMD,NTPC
• D (Commercial), NTPC</td></tr>
<tr><td colspan="2">HIGH TEA: 10.30-11.00 Hrs</td></tr>
<tr><td colspan="2">SESSION I : 11.00-13.00 Hrs</td></tr>
<tr><td colspan="2">US Electricity Sector</td></tr>
<tr><td colspan="2">SESSION CHAIRMAN : Sh. H. L. Bajaj, Chairman, CEA</td></tr>
<tr><td>• Overview of the US Electricity Sector (Producers, Regulators, NERC, ISO and RTOs)
• Regulators perspective on development of electricity market
▪ FERC, NERC and STATE PUCs in the US- Their roles in regulating the electricity sector
▪ US power sector experience related to electricity market development
▪ Merchant power plants without long term agreements/contracts in the US - What can India learn?</td><td>SPEAKERS, REPRESENTING NARUC:
o FREDERICK J. BUTLER – Commissioner, New Jersey Board of Public Utilities
o Sandra Waldstein – Senior Advisor, Vermont Board of Public Utilities
o William H. Smith, JR., Exe. Director, OMS
o Andrew Spahn – Director of Energy, Environment and Infrastructure Programs, NARUC</td></tr>
<tr><td colspan="2">LUNCH : 13.00-13.45 Hrs</td></tr>
<tr><td colspan="2">SESSION II : 13.45-15.15 Hrs</td></tr>
<tr><td colspan="2">Electricity Market in India</td></tr>
<tr><td colspan="2">SESSION CHAIRMAN: Sh. K. N. Sinha, Member, CERC</td></tr>
<tr><td>• The electricity market in India: Opportunities and challenges</td><td>SPEAKERS:
• Sh. T. N. Thakur, CMD, PTC
• Ms. Leena Srivastava, ED,TERI
• Ms. Usha Ramachandran, ASCI
Sh. M. G. Ramachandran, Advocate NTPC</td></tr>
<tr><td colspan="2">TEA BREAK: 15.15-15.30 Hrs</td></tr>
<tr><td colspan="2">SESSION III : 15.30-17.00 Hrs</td></tr>
<tr><td colspan="2">US Experience on Electricity Market</td></tr>
<tr><td colspan="2">SESSION CHAIRMAN: Sh. P. Narasimharamulu, Director(Finance), NTPC</td></tr>
<tr><td>• Regulations and Investments in Generation & Transmission - US experience
• Determination of fair cost of supply (Generation and Transmission) - US experience</td><td>SPEAKERS, REPRESENTING NARUC:
• Diane Munns – Commissioner, Iowa Utilities Board
• Sandra Waldstein – Senior Advisor, Vermont Board of Public Utilities
• William H. Smith, JR., Exe. Director, OMS</td></tr>
</table>

<table>
<tr><td></td><td></td></tr>
<tr><td colspan="2">FROM 17.30 – 19.00 HRS</td></tr>
<tr><td colspan="2">ROUNDTABLE DISCUSSIONS ON "INVESTMENT IN POWER SECTOR"</td></tr>
<tr><td colspan="2">Coordinated by
CII</td></tr>
<tr><td colspan="2">DINNER 19.30 HRS ONWARDS</td></tr>
</table>

PROGRAM DAY 2

<table>
<tr><td colspan="2">SESSION I: 9.30- 11.30 Hrs</td></tr>
<tr><td colspan="2">Intra-State ABT and Wholesale Electricity Market</td></tr>
<tr><td colspan="2">SESSION CHAIRMAN: Sh Bhanu Bhushan, Member, CERC</td></tr>
<tr><td>▪ Intra state Availability Based Tariff (ABF)
▪ Unscheduled Interchange (UI) of Power as a trading mechanism</td><td>SPEAKERS:
▪ Mr. R. G. Yadav, ED(SO), Powergrid
▪ Mr. S. K. Soonee, ED, NRLDC,
▪ Mr. A K Asthana, Director, CEA
▪ Mr. S. K. Dube, Director, PTC
▪ Mr. Mahender Kumar, Chief Executive, REL
▪ NTPC</td></tr>
<tr><td colspan="2">TEA BREAK :11.30 TO 11.45 Hrs</td></tr>
<tr><td colspan="2">SESSION II : 11.45 TO 13.15 Hrs</td></tr>
<tr><td colspan="2">Power Exchange: Trading Mechanisms</td></tr>
<tr><td colspan="2">SESSION CHAIRMAN: Sh. R. D. Gupta, Member, UPERC</td></tr>
<tr><td>▪ Power exchanges
o Role and structure of Spot and Futures
o Settlement mechanisms thereof</td><td>SPEAKERS:
• William H. Smith, JR., Exe. Director, OMS
• Prof Prem Kumar Kalra,IIT-K
• Ms. Rupa Devi Singh, Director, CRISIL
• Mr. K. K. Agarwal, NVVN
• NCDEX</td></tr>
<tr><td colspan="2">LUNCH: 13.15 -14.15 Hrs</td></tr>
<tr><td colspan="2">SESSION III : 14.15-15.45 Hrs</td></tr>
<tr><td colspan="2">Transmission Planning and Electricity Market</td></tr>
<tr><td colspan="2">SESSION CHAIRMAN: Sh. S. C. Mishra, Director (P), Powergrid</td></tr>
<tr><td>• Transmission system planning and capacity addition scenarios in an Electricity market
▪ Role of Regulators
▪ Licensing mechanism
▪ Transmission Pricing mechanism</td><td>• M. Ravinder, Chief (Engg), CERC,
• Mr. Ravi Nayak, ED(Engg.), Powergrid
• Mr. Alok Roy, Chief Executive, Reliance Energy
• Mr. P. R. Ramakrishnan, Tata Power
• Mr. S. K. Dube, Director, PTC
• Mr. K. K. Agarwal, NVVN</td></tr>
<tr><td colspan="2">TEA BREAK : 15.45 - 16.00 Hrs</td></tr>
<tr><td colspan="2">SESSION IV : 16.00-17.00 Hrs</td></tr>
<tr><td colspan="2">PANEL DISCUSSION</td></tr>
</table>

• Sh. H. L. Bajaj, Chairman, CEA • Sh. K. N. Sinha, Member, CERC • Sh. Bhanu Bhushan, Member, CERC • FREDERICK J. BUTLER – Commissioner, New Jersey Board of Public Utilities; • DIANE MUNNS – Commissioner, Iowa Utilities Board • Sh. R. D. Gupta, Member, UPERC • Sh. P. Narasimharamulu, D(F), NTPC • Sh. Chandan Roy, D(Operation), NTPC • Sh. S. C. Mishra, D(P),Powergrid
VALEDICTORY SESSION: 17.00-17.30 Hrs
• Address by NARUC - MS. DIANE MUNNS – Commissioner, Iowa Utilities Board • Address by CMD, NTPC

Note: There would be no participation fees for this workshop, however, participants shall have to make their own arrangements for lodging, boarding and transportation.

<u>Day-1</u>

Session-I (9.30 – 13.00 HRS)
Electricity Market in India

Presentation by NTPC (15min) on current status of the electricity sector in India (generation capacity, peak/off-peak demand, future plans/projections) and key provisions related to electricity market in Electricity Act 2003.

Questions

1. What is the role of regulators in market development, investment, and planning in the US electricity sector?
2. How are merchant power plants promoted in the US? What are the issues?
3. What are the roles and responsibilities of market operators?
4. What is the role of the Transmission System Operator (TSO) vis-à-vis the Independent System Operator (ISO)?
5. Describe the evolution and current status of wholesale and retail electricity market in the US?
6. Describe Standard Market Design (SMD). What are the issues?

Session-II (14.00 – 17.30 HRS)

Regulatory Strategies and Practices

Presentation by NTPC (15min)

- NTPC overview
- NTPC's current regulatory interface structure

<u>Questions</u>

1. What is the extent of regulation/deregulation in the electric power generation sector in the US?

2. What regulatory practices are followed by US regulators in issuing orders that minimize disputes? Describe petition review processes.

3. Are regulatory orders challengeable? Is there an appellate authority?

4. What are current regulatory compliance practices and issues in the US?

5. What suggestions would you have for NTPC on improving regulatory interface/interaction with CERC?

<u>Day-2</u>

Session-I (9.30 – 11.30 hrs)
Electricity Pricing

Presentation by NTPC (15min) on **Electricity Pricing in India**

1. What is the ideal model for electricity pricing under shortage scenarios?

2. How are fuel price variations and stranded costs recovered by US utilities and power generators?

3. How are environmental externalities priced and recovered by US utilities and power generators?

4. Describe risk management, hedging, and cost recovery mechanisms used in electricity pricing in the US?

5. How is capital addition after completion of useful life of a power plant reflected in the tariff?

6. What transmission pricing mechanisms are used in the US?

7. Describe Right-of-Way mechanisms used by merchant power plants in the US.

8. Describe the concept of merchant transmission capacity. What are the issues?

9. What type of compensation mechanisms are used in the US for the impact of cyclic loads on electricity generators?

Session-II (12.00 – 13.00 hrs)
Bilateral Exchange Programme with NARUC

- Scope of future collaboration/ bilateral exchange program with NTPC on following issues:
    - Regulatory practices followed by different utilities
    - Competency building in the area of regulatory management, electricity pricing, and demand side management
    - Mutual exchange program / visit to utilities
    - Future workshops/ seminars

Serving the consumer interest by seeking to improve the quality and effectiveness of public utility regulation in America.

Overview of U.S. Electricity Sector

March 2005

Commissioner Frederick Butler

New Jersey Board of Public Utilities

NARUC

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PRESENTATION OBJECTIVES

- To give a broad overview of the structure of the U.S. electricity sector
- To set the stage for other presentations in this session
- This presentation will cover physical and financial structure of U.S. electricity industry

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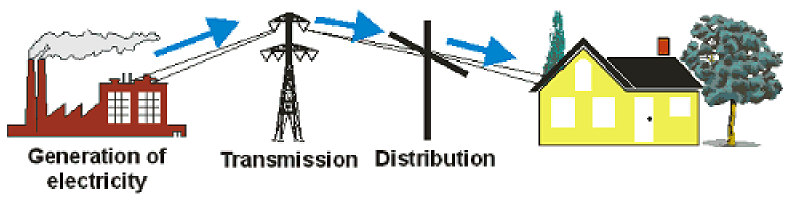
Electric Power Supply Functions



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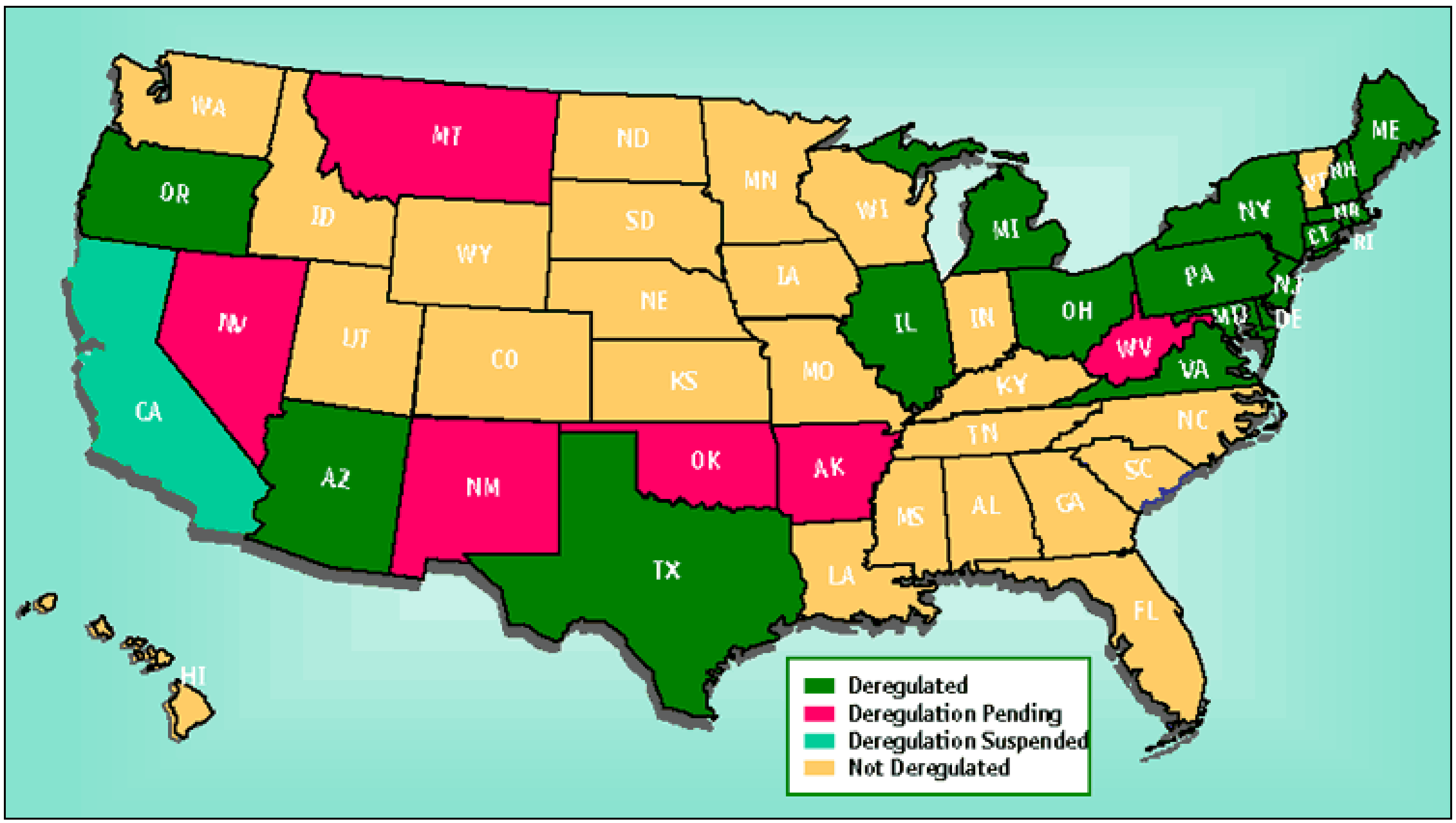
ELECTRICITY RESTRUCTURING



SYSTEM STRUCTURE:
DIVERSE YET RELIABLE AND AFFORDABLE

Generation

- **What is a typical sized unit?**
- **Which fuels are used?**
- **Is there regional fuel use diversity?**
- **Generation Ownership**

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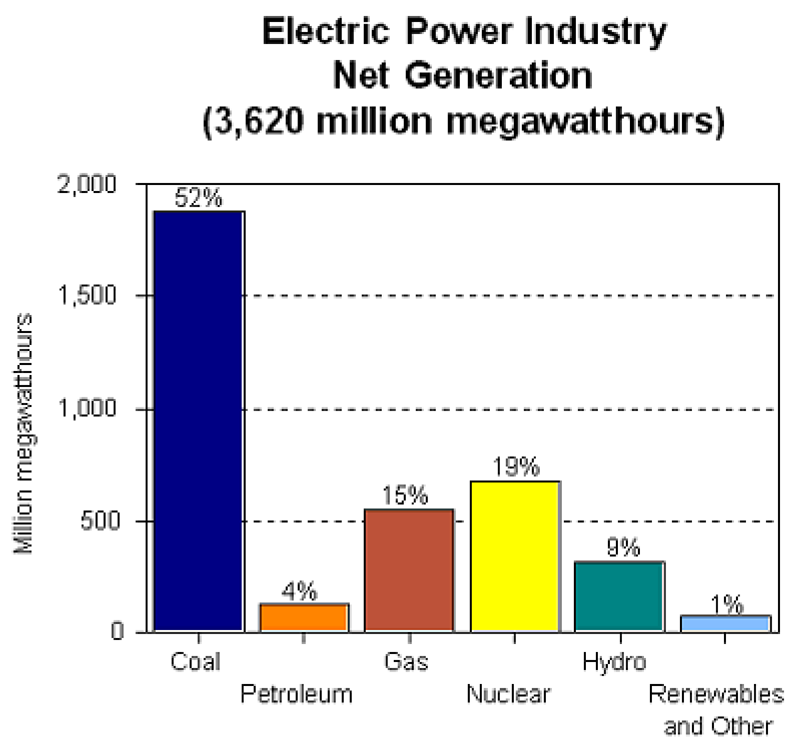
Net Generation: Fuel Type



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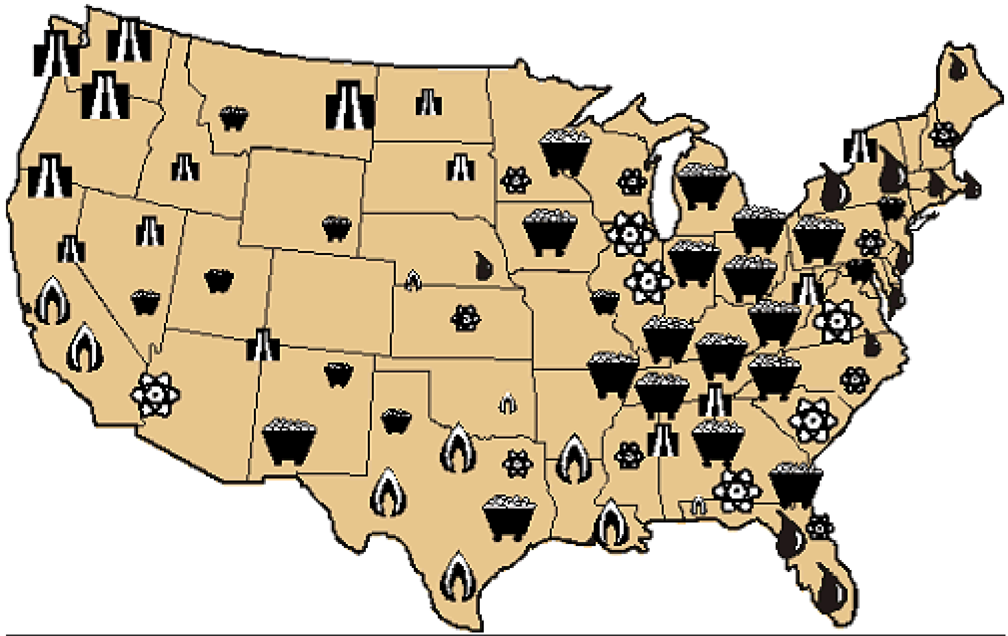
Generation Fuel by Region



SYSTEM STRUCTURE:
DIVERSE YET RELIABLE AND AFFORDABLE

Transmission

- What is the typical size?
- RTO
- Operating Areas
- Electricity Sales and Trade

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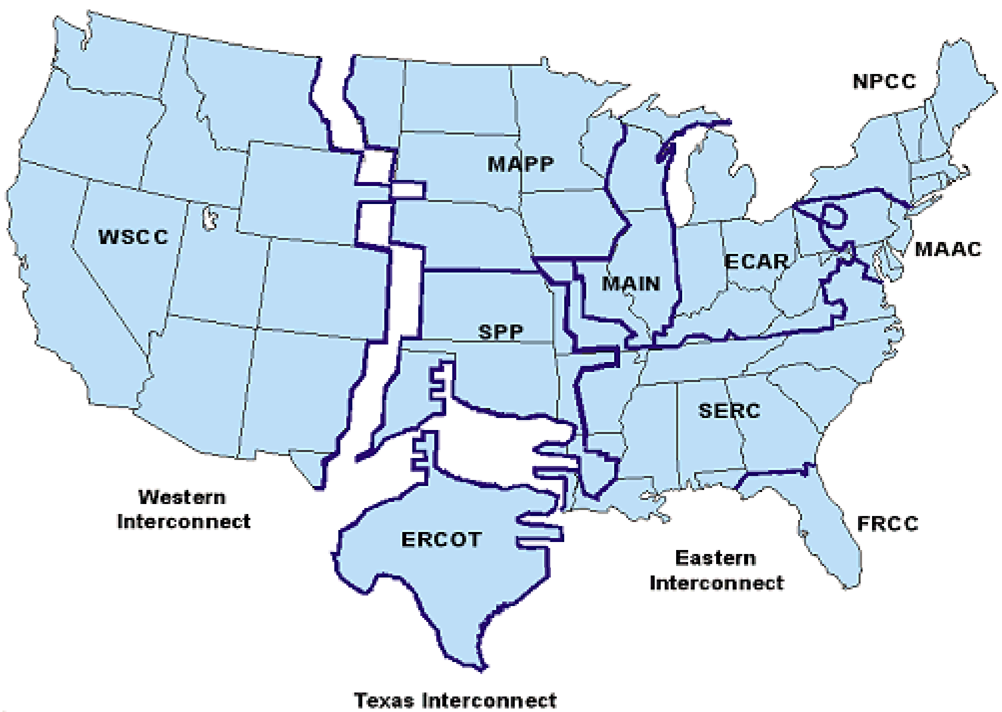
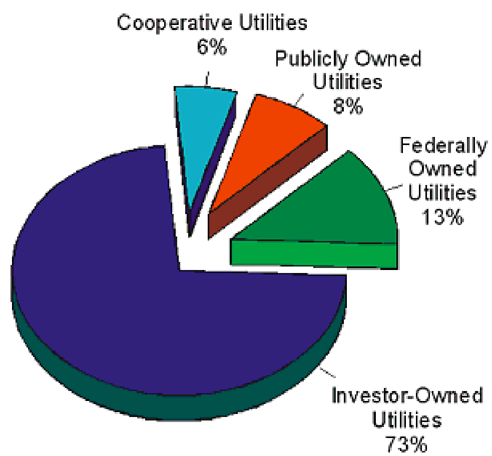
Main Interconnections of the U.S. Electric Power Grid and the 10 North American Electric Reliability Council Regions



TRANSMISSION OWNERSHIP



Estimated High-Voltage Transmission Line Miles in the United States, 1994 (Miles)

Investor-Owned	199,924
Publicly Owned	21,960
Cooperative	16,005
Federally Owned	35,675
Total	**273,564**

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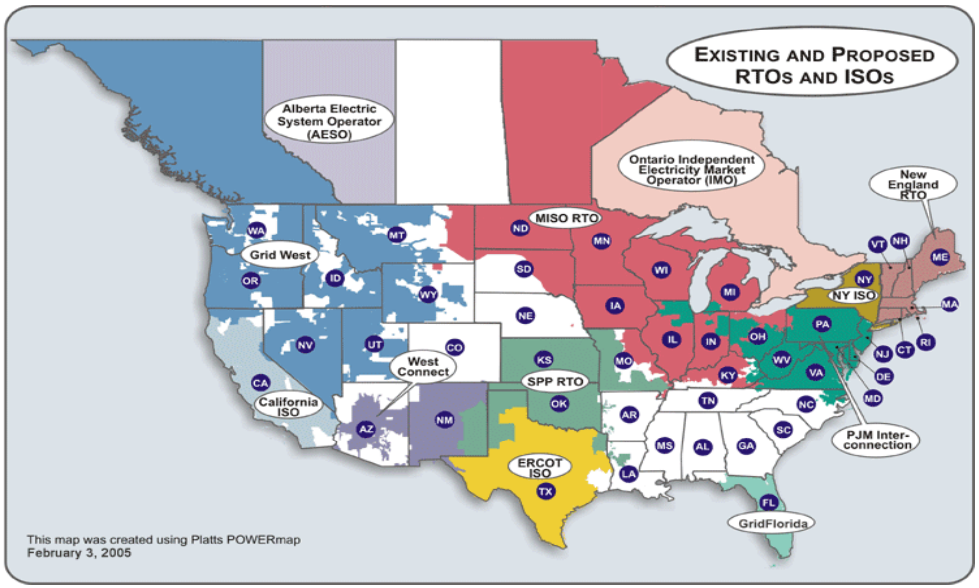
EXISTING AND PROPOSED RTOs



SYSTEM STRUCTURE:
DIVERSE, YET RELIABLE AND AFFORDABLE

Distribution

- General characteristics
- Natural monopoly

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SYSTEM OWNERSHIP STRUCTURE: EVOLVING EFFICIENCY

Ownership

- Types of Utilities
- Who owns the utilities?

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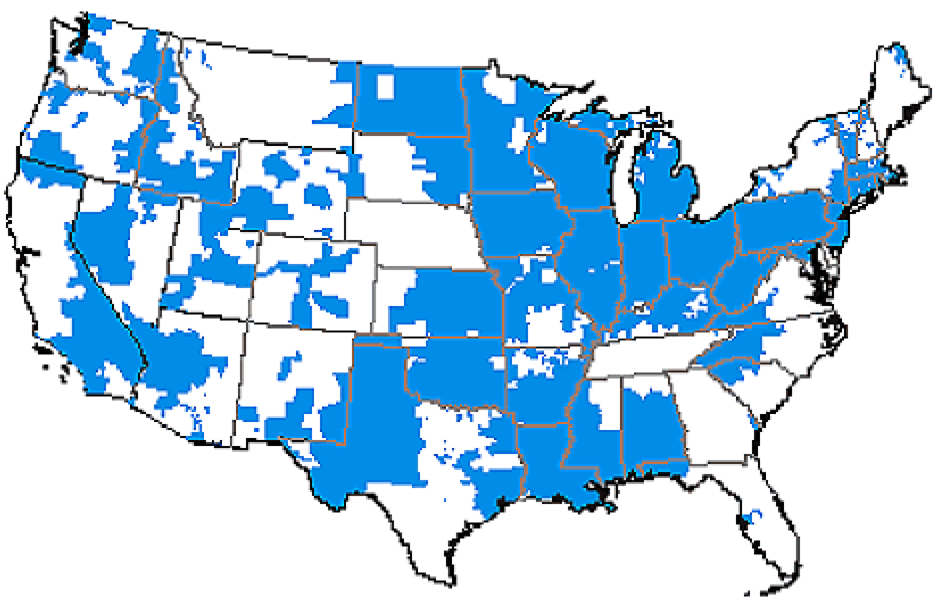
Service Areas of Investor-Owned Utilities,



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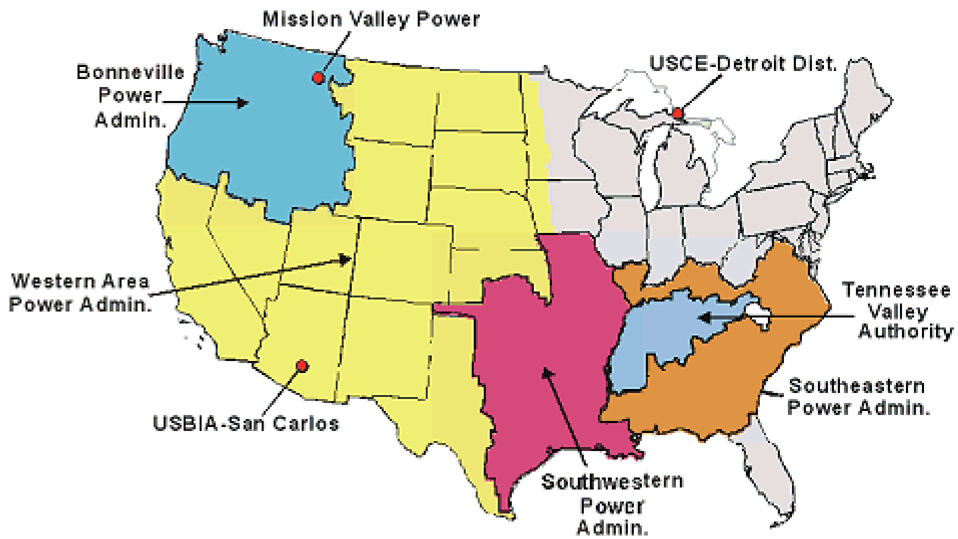
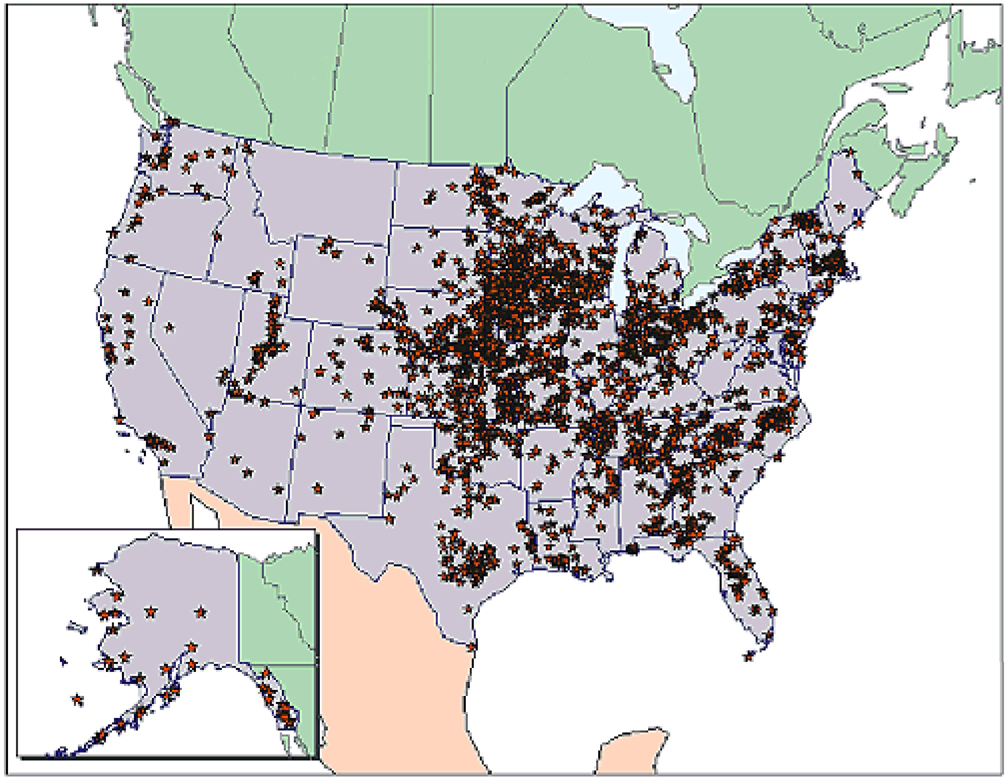
Service Areas of Federal Utilities



Publicly Owned Utilities in U.S.



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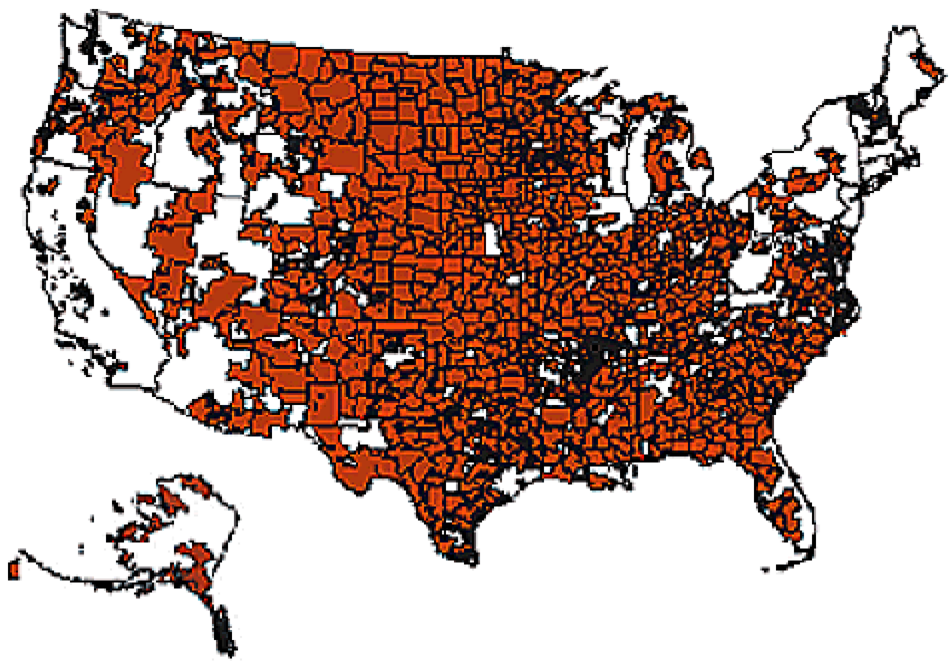
Service Areas of Cooperative Utilities



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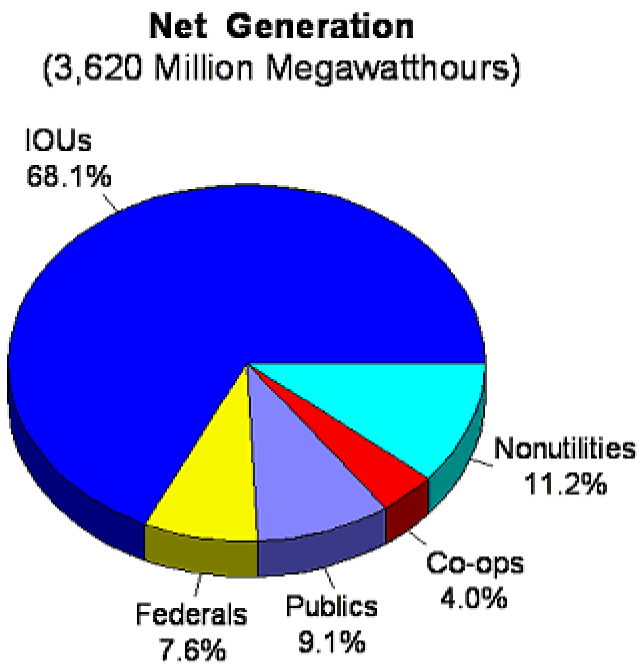
Share of Utility and Non-utility Net Generation by Ownership Category



A word about power marketers…

So what does this all mean?

CHARACTERISTICS OF U.S. SYSTEM ARE CHANGING

ISSUES

- **Concerns about consumer costs (gas)**
- **Concerns about reliability (DG)**
- **Concerns about climate change (Coal/Nuke)**
- **INVESTMENT DECISIONS ARE NOW!**

CONCLUSIONS

<u>NEED TO ATTRACT INVESTMENTS</u>

- **Sector in U.S. needs investments to grow**
- **Regulators attract new investments by creating consistent and fair rules.**

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An Overview of Electricity Regulation in the U.S.

March 2005

Andrew Spahn

NARUC

OBJECTIVE

- **To present a summary of state and federal regulatory authority in U.S.**

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A WORD ABOUT PUBLIC UTILITY REGULATION

- **U.S. regulators set rates and rules for telecommunication, energy, and water utilities.**

- **U.S. regulators ensure that utility services are provided at rates and conditions that are just, reasonable and nondiscriminatory for all consumers.**

- **U.S. regulators have an obligation to ensure the establishment and maintenance of such energy utility services as may be required by the public convenience and necessity.**

- **U.S regulators must set rules that balance the economic interest of utilities with the public interest of consumers.**

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ELECTRIC REGULATORY AUTHORITY IN THE U.S.

- FERC
- DOE
- State Public Utility Commissions
- Voluntary Standards: NERC
- Why a Hybrid System?

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WHAT DOES F.E.R.C. REGULATE?

- **FERC approves rates for wholesale electric sales & transmission services**
  - **ROR - Transmission**
  - **Market-based – Unbundled Gen.**
- **Hydroelectric power regulation**
- **Other Functions**

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WHAT DOES D.O.E. REGULATE?

- **International electric transmission lines**
- **Export of electricity**
- **Does <u>not</u> regulate electricity imports**

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WHAT ABOUT STATE AUTHORITY?

- **Traditional authority**:
  - G,T and D: ROR
- **Restructured authority**:
  - Only D: ROR
- **Dual authority**
  - **Siting**
  - **Planning**
  - **Reliability**

A FEW WORDS ON N.E.R.C.

- **Established after the 1967 New York City Blackout**
- **NERC regions**
- **Voluntary reliability standards**
- **Is voluntary enough?**

SUMMARY

- **State – Federal authority (tension is good)**
- **Cooperative federalism seem to work**
- **Traditional regulation**
- **Restructured regulation**
- **Future?**
  - **Re-regulate**
  - **Complete restructuring**
  - **Remain bifurcated**

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WHY IS REGULATION IMPORTANT?

Regulators set rules that

(if done correctly and applied consistently) will attract adequate investments

in the energy sector

QUESTIONS?

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Regulation and Investment in G&T: US Experience

(Midwest Regulated and RTO Perspective)

William H. Smith, Jr.
Executive Director
Organization of MISO States
www.misostates.org

March 1, 2005

- The Midwest region includes the Midwest ISO and areas served by the PJM regional organization

The Midwest ISO Control Room

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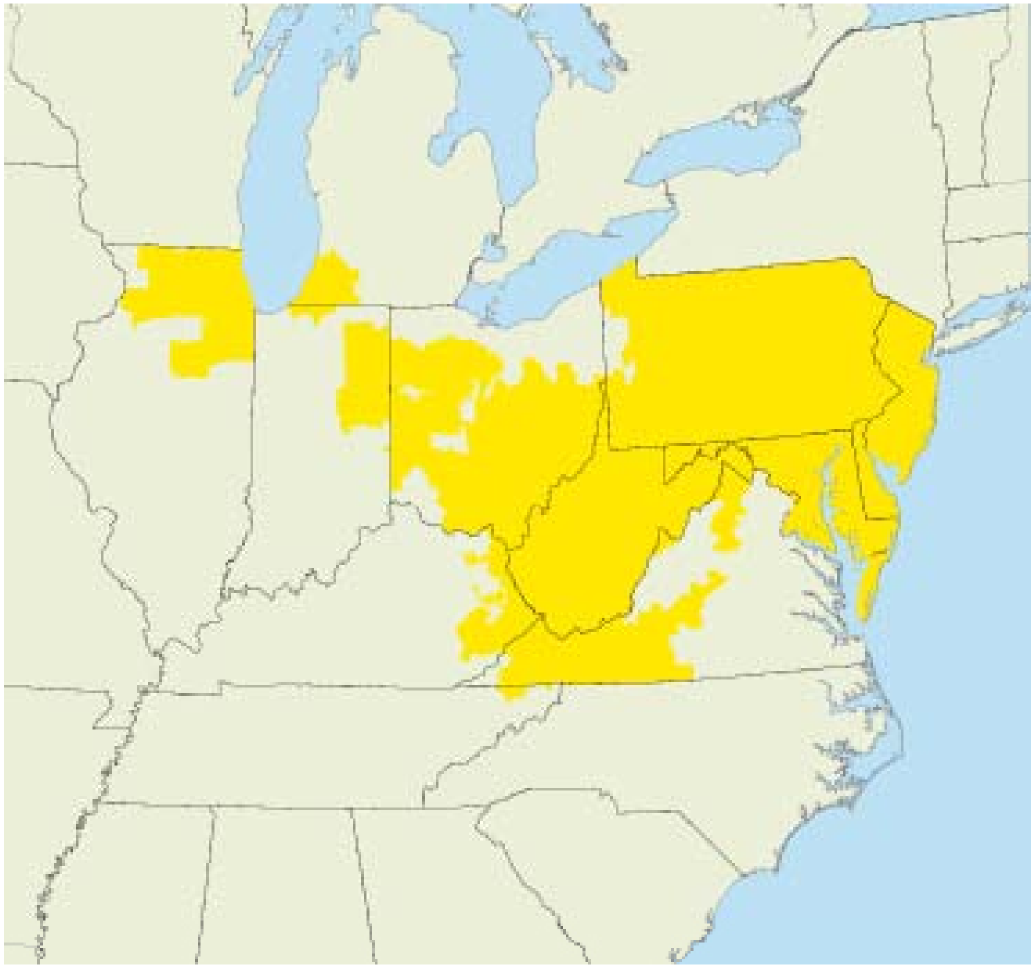
Focus on the Midwest ISO

MISO Facts

- 23 transmission owners
- 36 control areas
- 107,552 MW peak capacity
- 131,000 MW generating capacity
- 96,000+ miles of transmission lines
- 947,000 square miles
- 15.1 million customers
- 1504 generating units

PJM Region



PJM Facts

- •Population - 45.3 million
- 1001 Generating sources
- Generating capacity - 137,490 MW
- Peak demand - 110,700 MW
- Annual energy delivery - 625,000 million mwh
- Transmission lines - 49,970 miles
- Members/customers - more than 330
- Cumulative billing - $20.5 billion since 1997

MISO Serves Fourteen US states and One Canadian Province

- **A very diverse region**
  - Three states have moved to retail competition
  - Seven states use conventional rate-of-return regulation
  - One state has separated transmission from generation and distribution
  - Two states have a mix of retail competition and conventional rate-of-return regulation
  - One state and one province are fully served by public power
- **MISO 2004 Peak System Load: 107,552 MW**

Midwest Generation Markets

- Existing baseload plants include coal, nuclear, and a smaller amount of hydro
- New plants include several types:
  - Utility built fossil plants under conventional regulation
  - Utility built plants with regulatory incentives
  - IPP gas-fired plants, usually with utility purchase contract
  - IPP wind plants, usually with utility purchase contract
  - Other IPP models, including baseload plants with purchase contracts
- Divested plants – nuclear and coal baseload plants sold by utilities
- Proposed plants: 57 regulated; 44 unregulated; 7718 MW

Mixed Transmission Facilities

- Utility facilities of member companies are managed by MISO
- Utility facilities of non-members are self-managed, but connected to MISO (most are owned by cooperative or public bodies)
- The region has four stand-alone transmission companies (American Transmission Company, GridAmerica, METC, ITC)
- New facilities can be proposed for reliability or economic reasons

Pricing

- Principles for pricing for new regional facilities are still being developed
- Pricing methods for existing facilities must include transactions to and from the PJM zone
- Pricing uncertainty makes investment difficult

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Regulation and Investment: Getting the Rules Right

March 2005

The Honorable Diane Munns

NARUC 1st Vice-President

NARUC

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OVERVIEW

- A quick review of State and Federal Regulation
- A review of how utility regulation affects sector investments
- A review of regulatory approaches to enhance investment in the utility sector

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A WORD ABOUT PUBLIC UTILITY REGULATION

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- **U.S. regulators have an obligation to ensure the establishment and maintenance of such energy utility services as may be required by the public convenience and necessity.**

- **U.S regulators must set rules that balance the economic interest of utilities with the public interest of consumers.**

HOW ARE UTILITIES REGULATED IN THE U.S.?

- **Hybrid system of regulation in the U.S.**
- **Traditional Regulation**
- **Restructured Regulation**

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HOW ARE UTILITIES REGULATED IN THE U.S.?

Traditional Regulation

- **Federal regulation through FERC – Transmission**
- **State regulation through PUCs – Generation and Distribution**
- **Rate of return regulation (ROR) at State and Federal levels**

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HOW ARE UTILITIES REGULATED IN THE U.S.?

Restructured Regulation

- **Federal Regulation through FERC**
  - **- Transmission = Cost of service**
  - **- Wholesale sales = Cost of service**

- **State Regulation through PUCs – Distribution**

A WORD ABOUT INVESTMENT, RISK, AND RETURN ON INVESTMENTS

Investment Theories

- **Higher risk could mean opportunity for larger return for investors**
- **Higher risk can also mean opportunity for losses**
- **Lower risk usually means lower return for investors**

Regulators set rules that (if done correctly) will attract adequate investments

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HOW DOES UTILITY REGULATION AFFECT INVESTMENTS IN TRADITIONALLY REGULATED STATES?

- **Rate of return regulation- the higher the ROR equals higher return for investors**
- **Higher cost recovery certainty for utilities equals less investor risk**
- **Changes in the regulatory environment signals changes in investment environment**

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HOW DOES UTILITY REGULATION AFFECT INVESTMENTS IN <u>RESTRUCTURED</u> STATES?

- **Generation charges market-based rates**
- **Regulated Systems: transmission and distribution**
  - **- Distribution (State regulation)**
  - **- Transmission (Federal regulation)**

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WHAT TOOLS DO REGULATORS HAVE TO ENHANCE INVESTMENTS?

The right rules encourage investments

- **Clear rules – balancing consumer and utility needs**
- **Consistent use of rules**

WHAT TOOLS DO REGULATORS HAVE TO ENHANCE INVESTMENTS?

<u>Examples of regulations that can enhance Investment</u>

- **Accelerated depreciation of assets**
- **Performance based-regulation**
- **Special rate-treatment**

CONCLUSION

- Regulators can develop rules that will attract adequate investments (if done correctly).
- For 150 years regulators in the U.S. have assisted in the development of an affordable, reliable and efficient electricity system.

IPPs

History and Current Status

History of IPPs

- Merchant power plants are a product of the restructuring of the electricity industry
- In the past, utilities owned their own generating facilities or contracted with an independent power producer (IPP) to buy electrical output on a long-term basis
- Three key federal laws led to the development of the merchant generation sector – PURPA, EPACT, and FERC Order 888

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The PURPA Experience

- PURPA is the Public Utilities Regulatory Policy Act of 1978
- PURPA goals:
  - encourage the conservation and efficient use of energy resources
  - encourage the development of alternative power supplies
- PURPA requires electric utilities, when they need power, to purchase power from QFs at the utilities' avoided cost
- PURPA led to the development of IPPs in the U.S.

PURPA QFs

- QF is a Qualifying Facility under PURPA
  - QFs can be cogeneration facilities or small power plants
  - QFs use renewable energy sources
  - QFs cannot be more than 50 percent owned by an electric utility or a utility holding company
- Electric utilities are required to purchase the output of QFs at their avoided cost
  - Avoided cost is the cost the utility would have incurred had it supplied the power itself or obtained it from another source
- QFs do not directly serve ratebase customers therefore they are exempt from federal and state rate regulation
- QFs are not exempt from environmental regulations

EPACT

- EPACT is the Energy Policy Act of 1992
- EPACT was intended to encourage the development of a competitive wholesale power market.
- EPACT created a new class of "Exempt Wholesale Generators" (EWGs)
- An IPP is an Independent Power Producer, which can be a QF or an EWG
- EPACT also granted authority to the Federal Energy Regulatory Commission (FERC) to order access to wholesale transmission services

FERC Order 888

- FERC required open access to the transmission system
- This allowed independent generators to be sure that they could get their product to the market
  - Ended the tendency for vertically integrated transmission owners to favor their own generation in the dispatch process
  - Now all generators have equal access to the wires
- Open access is key to development of the merchant generation sector

Merchant Power Plants

- Merchant power plants are market-based
  - They are allowed to sell power at market-based rates
  - To do so, they must operated in a competitive market
  - Otherwise they must charge cost-based rates
- Unlike traditional utilities, merchant power plants compete for customers
  - Profits/cost recovery are not assured
  - Unlike traditional utilities they have no regulatory guarantees
- Merchant plants fill different niches in the market
  - some provide baseload supply to a power grid
  - others are used at peak when demand is highest

IPP Relationships

- IPPs can be affiliates of regulated utility companies
  - Affiliate abuse must be carefully monitored
- IPPs can sell directly to utilities (load serving entities such as retail distribution companies)
  - In many restructured states the LSEs no longer own generation
  - Thus they must purchase power under bilateral contracts or directly from the spot market
- Independent power producers can enter into various types of contracts with buyers
- Some merchant power plants may enter into agreements with regional power pools to provide regulation or reserve service

IPP Contracts

- Merchant power plants enter into various types of contracts
  - Some guarantee a minimum amount of power over a long period of time
    - Long-term PPAs
    - Full Requirements contracts
  - Many are short or medium-term
    - Slice-of-system contracts
    - Pure spot market purchases from RTO markets

Results – Success??

- **Success**
  - There have been many new merchant plants built across the U.S.
  - DATA????
  - Potential buyers are wary of locking in long-term contracts
    - Markets are volatile
    - Might overpay for future power
- Result – much of the output of the capacity and output from these plants is sold on the spot market
- Declining spot market prices – DATA??

Results – or Failure??

- Failures
  - There is a growing consensus that the energy markets alone are insufficient to –
    - Provide for the recovery of O&M and capital costs
    - Provide for a fair return on capital
  - There is concern that the capacity markets under-price long-term capacity
- Results – Many generators are in bankruptcy – DATA??

What does the future hold?

- Energy market revenues alone are not sustainable
  - Because prices in the energy markets are capped, generators cannot cover their costs
  - Prices in capacity markets are currently quite low (less than 50 cents per kw-month)
  - Very little capacity is being built -> concern about the future
- Capacity market reforms are underway
  - A better long-term capacity model is needed
  - New York has a new model in place; New England will soon follow; PJM is also considering capacity reforms
  - New design is built around a monthly auction in which supply is cleared against an RTO-designed demand curve that is intended to provide proper incentives for new investment

US Power Sector Experience Related to Electricity Market Development – Current Trends and Influences

William H. Smith, Jr.
Executive Director
Organization of MISO States
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March 1, 2005

The Financial Market Demands Earnings Growth

- Conservative returns no longer satisfy investors.
- The utility sector is willing to segment its businesses and concentrate on growth sectors.

Organization of MISO States

Business Models for Earnings Growth

- Divest generation
- Divest transmission
- Develop new markets outside the current regional market or outside the current RTO
- Improve performance rather than change business model

Strategy: Avoid Capital Commitments

- As the utility industry changes, investors are more selective
- Strategies are unclear
- Return <u>of</u> capital is uncertain
- Investment is no longer automatic
- Utilities are willing to consider dealing with IPPs and other third party suppliers
- Utilities are willing to purchase by contract

Regional Markets and Institutions Are Immature

- We have less than ten years experience with RTO markets
- Each regional market is unique; experiences do not transfer easily
- Bad experiences lead to more opposition
- Legal institutions are not well suited to regional markets; federal/state jurisdictional boundaries are less clear and may be less appropriate

BASIC COMPONENTS OF REVENUE REQUIREMENT

Determining a fair cost of generation and transmission

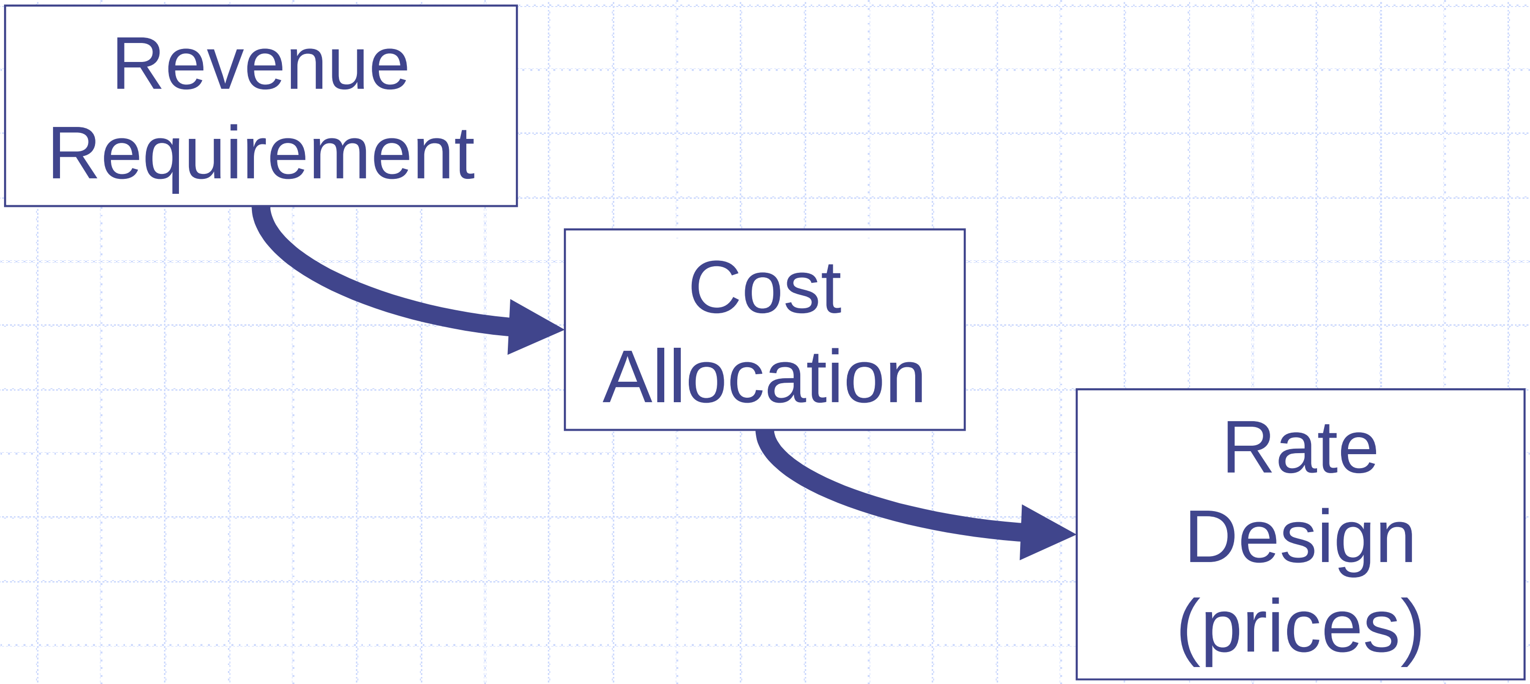
Process and Issues in Traditional Ratemaking

- Traditional Regulatory Goals
- The Rate-making Process
  - The Revenue Requirement
  - Cost Allocation
  - Rate Design
- Fairness vs. Efficiency

Traditional Regulatory Goals

- Limit exercise of market power
- Provide a surrogate for competitive pressure
- Maintain financial integrity of utility firms to ensure stable provision of service
- Encourage utility cost control and efficiency
- Encourage ubiquitous availability of utility services
- Ensure fair treatment of consumers

The Traditional Ratemaking Process



The Revenue Requirement

- The revenue requirement is an <u>estimate</u> of the total expenses a utility incurs in providing service
  - Operating and maintenance expenses
  - Depreciation and amortization
  - Taxes
  - A reasonable return on invested capital
- As a general rule, expenses excluded from rates that are found not to be in the public interest or are extraordinary or non-recurring in nature

Revenue Requirement Equation

$$RR = O\&M + D\&A + T + (r \times RB)$$

RR	=	Revenue Requirement
O&M	=	Operating and Maintenance Expenses
D&A	=	Depreciation and Amortization Expenses
T	=	Taxes
(r x RB)	=	Return on Investment (allowed return times rate base)

Contentious Issues in the Revenue Requirement

- Each component in the revenue requirement can be subject to considerable debate
- Questions include:
  - What expenses are allowable and disallowable?
  - How much investment is used and useful in providing service?
  - What is a reasonable rate of return on investment?

Concept of a Fair Rate of Return

- Economic theory says
  - A normal return is what a utility could earn on its capital in a competitive industry in the long run commensurate with the degree of risk assumed by investors
  - It is equal to the annual cost of a utility to pay investors for the use of their money

Fair Rate of Return *- continued*

- Under rate-of-return (ROR) regulation, regulators allow utilities to recover sufficient revenue to cover the cost of borrowed funds and to have an opportunity to earn a fair or reasonable rate of return to shareholders
- The implications of setting the rate of return (r) other than the cost of capital (c)
  - r< c (discouraging utility investment, confiscation of the investors' property)
  - r > c (encouraging excessive utility investment)

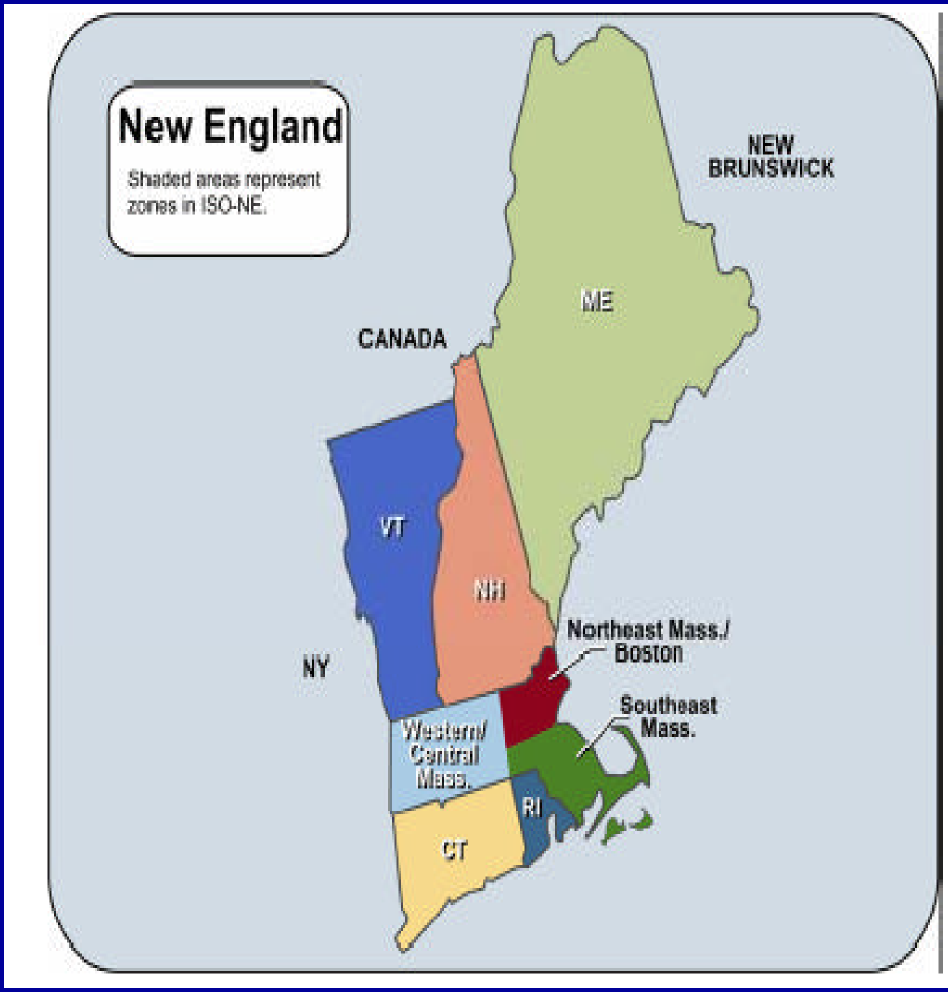
Conclusions

- Regulators can create an environment that encourages investment in new generation and transmission
- Regulatory rules must be fair and consistent to attract investment
- Regulatory rules must balance needs of consumers and industry
- Successful regulations attracts investment

Regulation and Investments in Generation and Transmission: The New England Experience

New England Regional Market Facts

- 6.5 million electricity customers
- 8 Zones
- 230 market participants
  - 7 transmission owners
  - 74 capacity owners
- 2003 annual peak load of 24,762 MW
- 31,000 MW of total supply
  - 30% gas-fired
  - 26% nuclear
  - 30% fossil fuel (coal or oil)
  - Hydro, wood, refuse, wind, imports (4.2%)
- 8,000+ miles of high-voltage transmission lines
  - 12 interconnections with systems in New York and Canada
- $4.5 billion total market value



The NE Regional Electricity Market

- Single, region-wide reliability and economic dispatch since 1971
- Open-Access Transmission Tariff in place: 1997
- Wholesale market opened: May 1999
- Standard Market Design and Locational Marginal Pricing implemented in March 2003
- RTO status granted Feb. 1, 2005
  - The RTO is now legally independent from all market participants including transmission owners and producers

Regional Market

- There are three levels of trading in the wholesale regional market:
  - Bilateral transactions (75% of trades)
  - Short-term forward market trading in the form of a day-ahead market
  - A spot market called the real-time market
- Market participants can choose to participate in any combination of these markets
- Most states in NE have restructured their retail markets
  - Many have retail choice
  - But customer participation is limited
- Most utilities are divested – they no longer own generation

Role of the NE RTO

- NE RTO is responsible for operation of the electric grid
  - ISO has complete authority for reliability
- NE RTO acts as the market operator for the New England electric market
  - NE RTO develops market rules
  - NE RTO performs least-cost security constrained dispatch of generation units to match load with supply
  - NE RTO is the settlement agent for all transactions
- NE RTO performs regional planning and coordination
  - For expansion of the transmission system
  - For ensuring resource adequacy in the region

Transmission and Regulation

- Transmission is still, mostly, a fully regulated industry
- Some merchant transmission has been built
  - Harbor Cable (NY/NJ); Empire (NY); Neptune (NY/NJ); LI Cable (CT/NY)
  - Costs are borne by the users who purchase the long-term rights to use the facility
  - Siting must still be approved by the regulatory agency

Regulated Transmission

- New Transmission in New England is underway
- Approval is through the annual NE RTO regional planning process
  - Planning process is integrated and shows all current and proposed generation, demand response and transmission projects
- Cost Allocation for transmission projects
  - Transmission can be built and costs socialized only when reliability is threatened or economic congestion exists
  - Costs for reliability and congestion upgrades are paid for by load across the entire region
  - All other transmission upgrades are paid locally

Regulated Generation

- Generation in traditional states generally is performing better than in deregulated states
- Traditional states still have vertically integrated companies
  - Generation is planned, bought, and sold by the parent
  - Even if not owned by a vertically integrated parent, generators sell under contract to fully regulated, vertically integrated companies
  - Wholesale markets are an adjunct, not a key structural element
- Regulators role in traditional states
  - Ensure that affiliate transactions are transparent and at arms length
  - Can influence and encourage new generation technologies including RE,EE, IGCC
  - Can ensure cost recovery for risky technologies that may have an environmental benefit (i.e North Carolina Clean Smokestacks Initiative)

Merchant Generation

- Merchant plants that operate in deregulated regions like NE are having serious problems
- The future of merchant generation will depend upon the reforms in the capacity markets
- Resource adequacy decisions have traditionally been the purview of the states
  - FERC is increasingly concerned about the impact of generation adequacy on wholesale markets
  - States and FERC must work together to resolve this
  - Adequate reserves are necessary but consumers should not overpay

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The Role and Structure of Power Exchange Bilateral and Spot Markets and Settlements

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March 2, 2005

With thanks to John D. Chandley, LECG Consulting

The Role of Regional Transmission Operators

They have evolved from their original purpose

➡Manage grid congestion

➡ Provide open access to regional transmission grid

➡Dispatch regional generation through a regional energy market

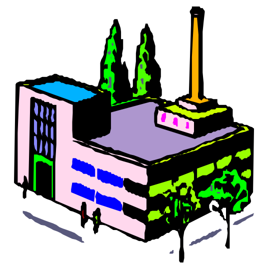
➡Provide system operation for the region

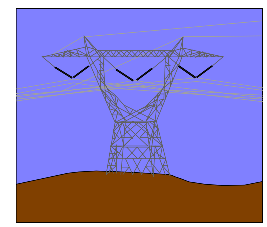
For Many, System Operations is a Black Box . . . But a Reliable Grid Depends On It

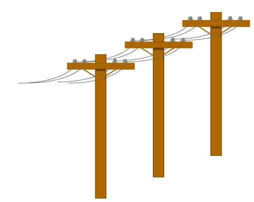
What Do System Operators Do?

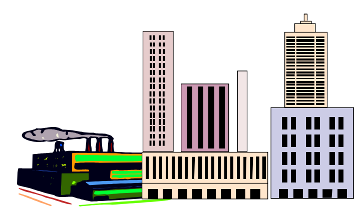
System Operators Keep the Lights On

- Dispatch generation
- Balance supply/demand
- Keep frequency @60Hz
- Maintain voltage
- Monitor/control grid flows
- Control transmission
- Monitor contingencies
- Manage reserves
- Handle emergencies. . .





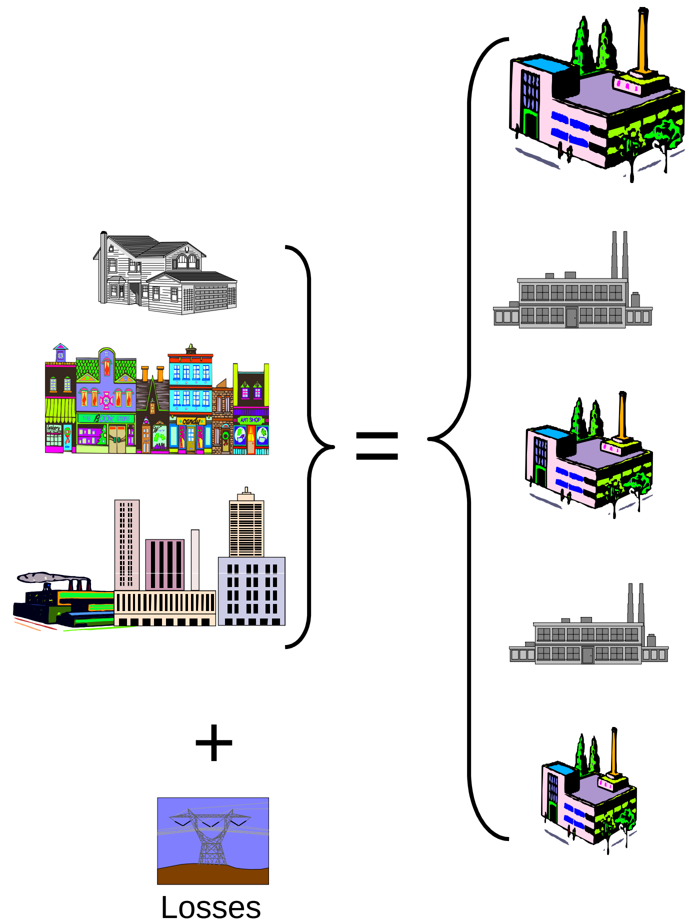




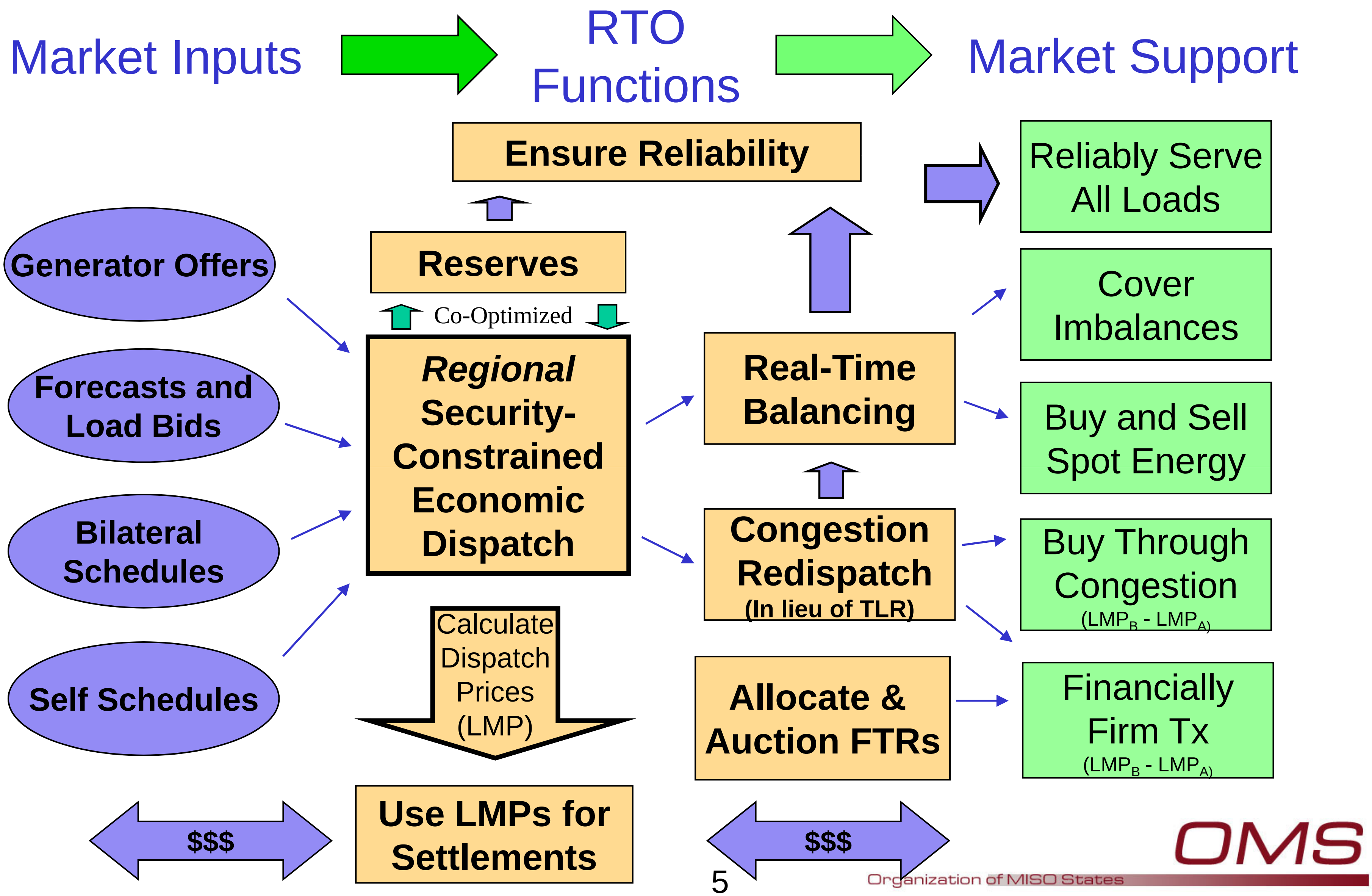
A System Operator's Dispatch Is The Essential Tool For Reliable Operations

- Dispatchers instruct generators how much to generate at each location in each dispatch interval (usually every 5 minutes).

  - There's virtually no "storage" in electricity, so electricity must be generated as it is consumed.
  - Automated "regulation" fine tunes output in seconds to balance supply/demand at all times.
  - Energy dispatch keeps frequency at 60Hz
  - Reactive power dispatch keeps voltage stable
  - These and other actions keep the lights on



RTOs with Standard Core Features
Enhance Grid Reliability – And Create Spot Markets



The Energy Spot Markets Are "Voluntary"

No one is forced to "buy" energy from the RTO spot markets

- Any LSE/utility can self-schedule its own generation to its own loads – load is served at the LSE/utility's generation costs

- Any LSE/utility can schedule bilaterals to serve its own loads – load is served at the contract price of the bilateral

But parties that use the spot market must accept its settlements

- Parties that have imbalances/deviations settle at spot prices

- Parties that buy/sell "extra" energy through the dispatch also settle at spot prices.

Why Are Locational Marginal Prices Used for Spot Energy Settlements?

LMP defines the prices paid to sellers and paid by buyers for "spot energy" and imbalances . . .

- An LMP is *the lowest dispatch cost for serving an increment of load* (1 more MW) at each location, given the available offers/bids and the transmission limits faced by the dispatch

- So its both fair and efficient to charge/pay LMP for imbalances and spot energy purchases and sales.

LMPs provide essential incentives for both reliable operations and adequate investments.

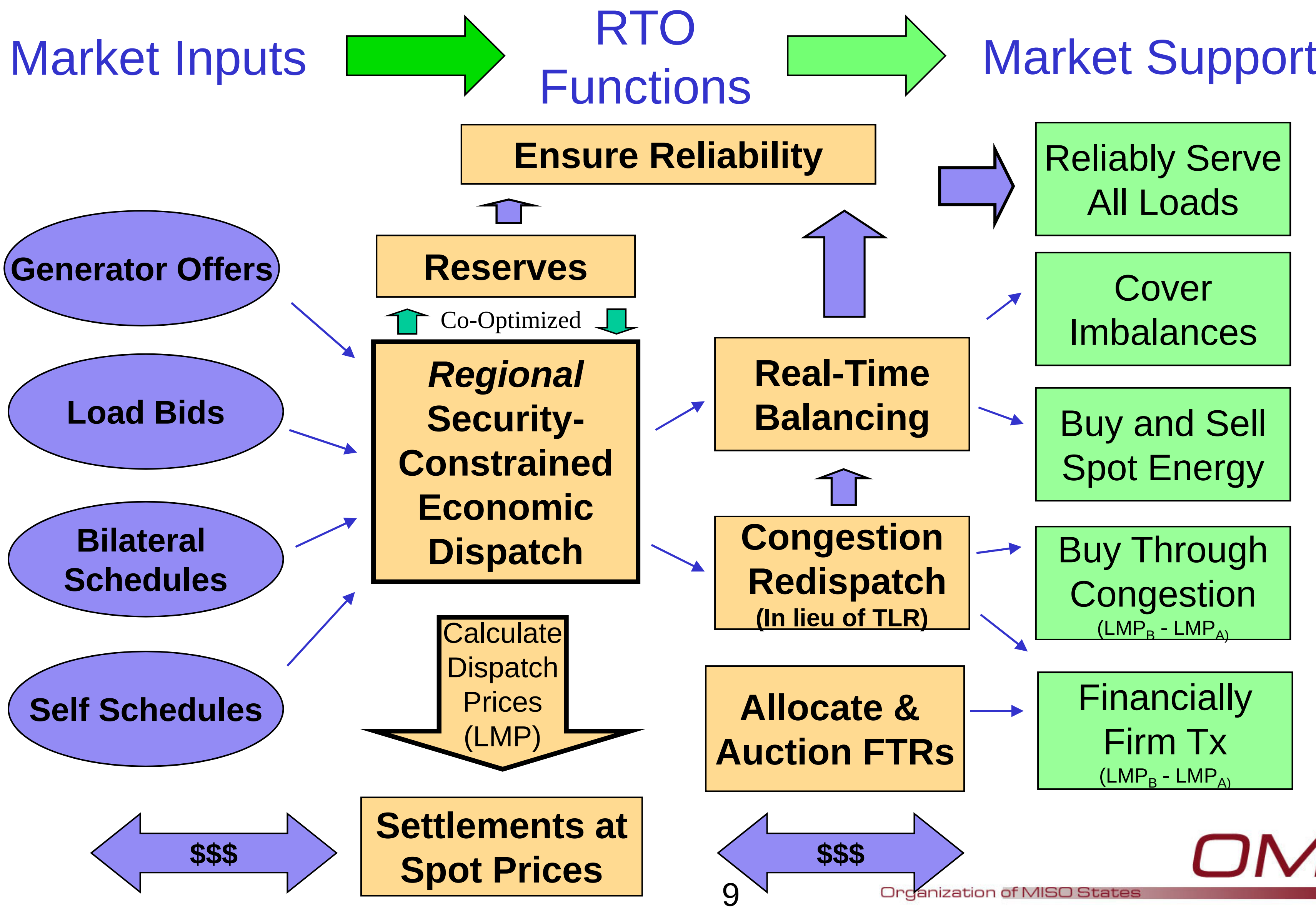
Pricing a Dispatch With LMP

Once an RTO creates a regional dispatch . . .

- Generators have to be paid for their injections
- Loads must be charged for their withdrawals
- Bilateral schedules must pay/receive redispatch costs for any transmission they use
- And all parties must pay or be paid for imbalances and deviations from schedules.

How should the RTO price spot energy & transmission?

RTOs with Standard Core Features Enhance Grid Reliability – And Create Spot Markets



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MISO Will Use A "2-Settlement" System

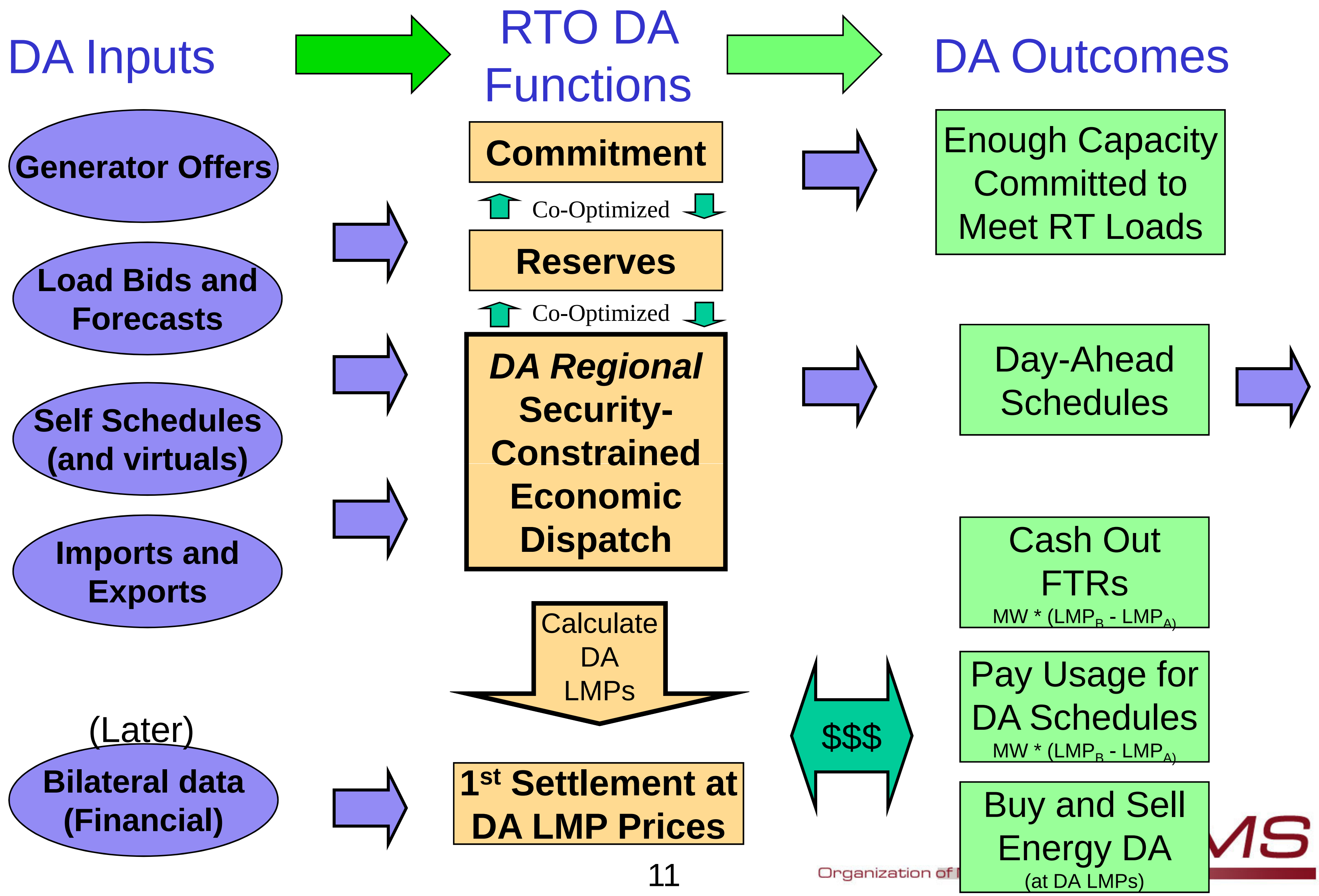
A party that schedules (or buys/sells) in the Day-ahead (DA) market . . .

- Settles spot sales and purchases at DA spot prices = LMP_{DA}
- Settles spot transmission at DA transmission (usage) prices
  - Usage charge = MW times (LMP_{sink} – LMP_{source})
  - FTR Credit = MW times (LMP_{sink} – LMP_{source})

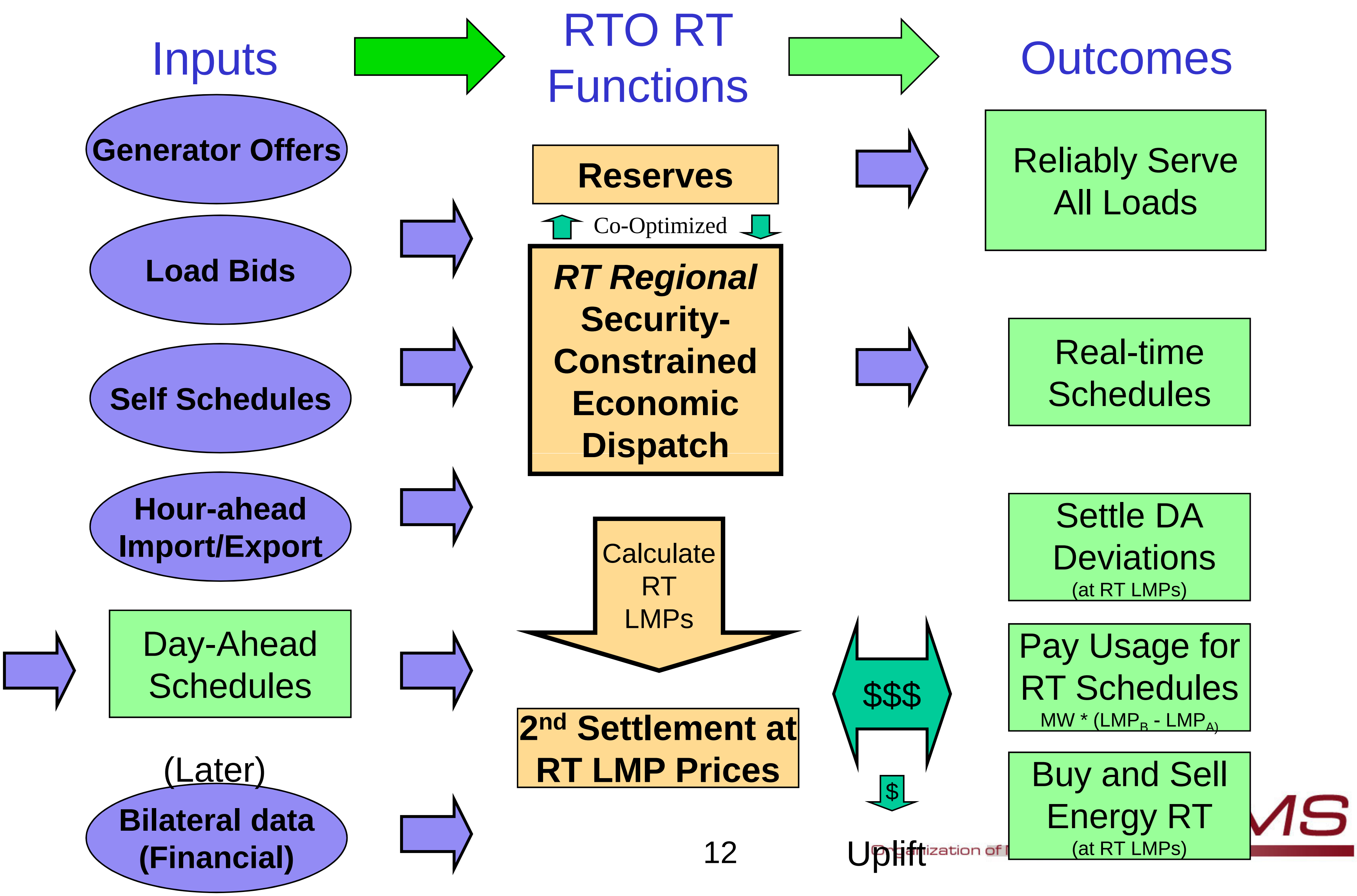
A party that deviates from its day-ahead schedules in real time . . .

- Settles the deviations at the real-time spot prices = LMP_{RT}

Day-Ahead Market
Sets Up Real-time Reliability and Dispatch



Real-Time Market:
Deviations Are Settled at Real Time Prices



RTO Markets Often Use "Net" Settlements

A party that schedules a bilateral transaction from point A to point B is settled on a "net" basis:

- Party receives a credit for its net injections at the source (A)
- Party gets a debit for its net withdrawals at the sink (B)

The settlements are based on LMPs at source (A) and sink (B).

- If there is no congestion, LMPs at A and B are the same
  - Net settlement is zero (ignoring losses)
- If there is congestion, LMPs will be different at A and B
  - Net Settlement = LMP_B - LMP_A
  - Net Settlement = marginal cost of redispatch

Roundtable Discussions on the Development of Power Markets in India
(September 5-6, 2006)

ROUNDTABLE DISCUSSIONS ON THE
DEVELOPMENT OF POWER MARKETS IN INDIA
September 5-6, 2006 ~ New Delhi

AGENDA

Day 1: 5 September 2006

10:00 **Welcome Remarks and Introductions**

Session 1: Generation
Moderator: Ram Sharan Sharma, Director of Commercial, NTPC

Fair Cost of Supply
Jess Totten, Director Electric Industry Oversight Division, Texas PUC, NARUC
David Mead, Senior Economist, Office of Energy Markets and Reliability, FERC

- Basis for determination of return
- Treatment of depreciation
- Long-run marginal costing, etc.
- Market base rates

Merchant Power Plants
Antony Rodrigues, Transmission Account Executive, Bonneville Power Administration
Kenneth Laughlin, Vice President of Markets Coordination, PJM Interconnection

- US experience in merchant generation
- Opportunities and challenges
- Arrangements for evacuation
- Tariff regulation

Session 2: Transmission
Moderator: Ram Sharan Sharma, Director of Commercial, NTPC

Planning and Investment
Antony Rodrigues, Transmission Account Executive, Bonneville Power Administration
Kenneth Laughlin, Vice President of Markets Coordination, PJM Interconnection

- Mechanism for attracting investment in transmission
- Merchant transmission

Pricing
David Mead, Senior Economist, Office of Energy Markets and Reliability, FERC
Jess Totten, Director Electric Industry Oversight Division, Texas PUC, NARUC

- Various models for transmission tariff: postage stamp, MW-mile, point of connection, locational marginal Pricing, etc.
- Transmission pricing for power market development in India, loss allocation

Lunch

Session 3: System Operation
Moderator: Ram Sharan Sharma, Director of Commercial, NTPC

Various Options for Network System Operation
Kenneth Laughlin, Vice President of Markets Coordination, PJM Interconnection
Jess Totten, Director Electric Industry Oversight Division, Texas PUC, NARUC
Antony Rodrigues, Transmission Account Executive, Bonneville Power Administration

- Independent system operator (ISO)
- Transmission system operator (TSO) and related issues

Session 4: Market Development
Moderator: Ram Sharan Sharma, Director of Commercial, NTPC

Conditions for Successful National Power Market & Power Exchange
Kenneth Laughlin, Vice President of Markets Coordination, PJM Interconnection
David Mead, Senior Economist, Office of Energy Markets and Reliability, FERC

- Financial transmission rights and auction revenue rights
- Bidding process
- Market settlement
- Spinning reserve
- Payment obligation for spinning reserve
- Market based regulation
- Ancillary services, etc.

18:00 **Concluding Remarks**

Day 2: 6 September 2006

11:30 Meeting with officials from the Central Electricity Regulatory Commission (CERC)

15:00 Visit to NRLDC (Northern Region Load Dispatch Centre), New Delhi

Merchant Power Plants

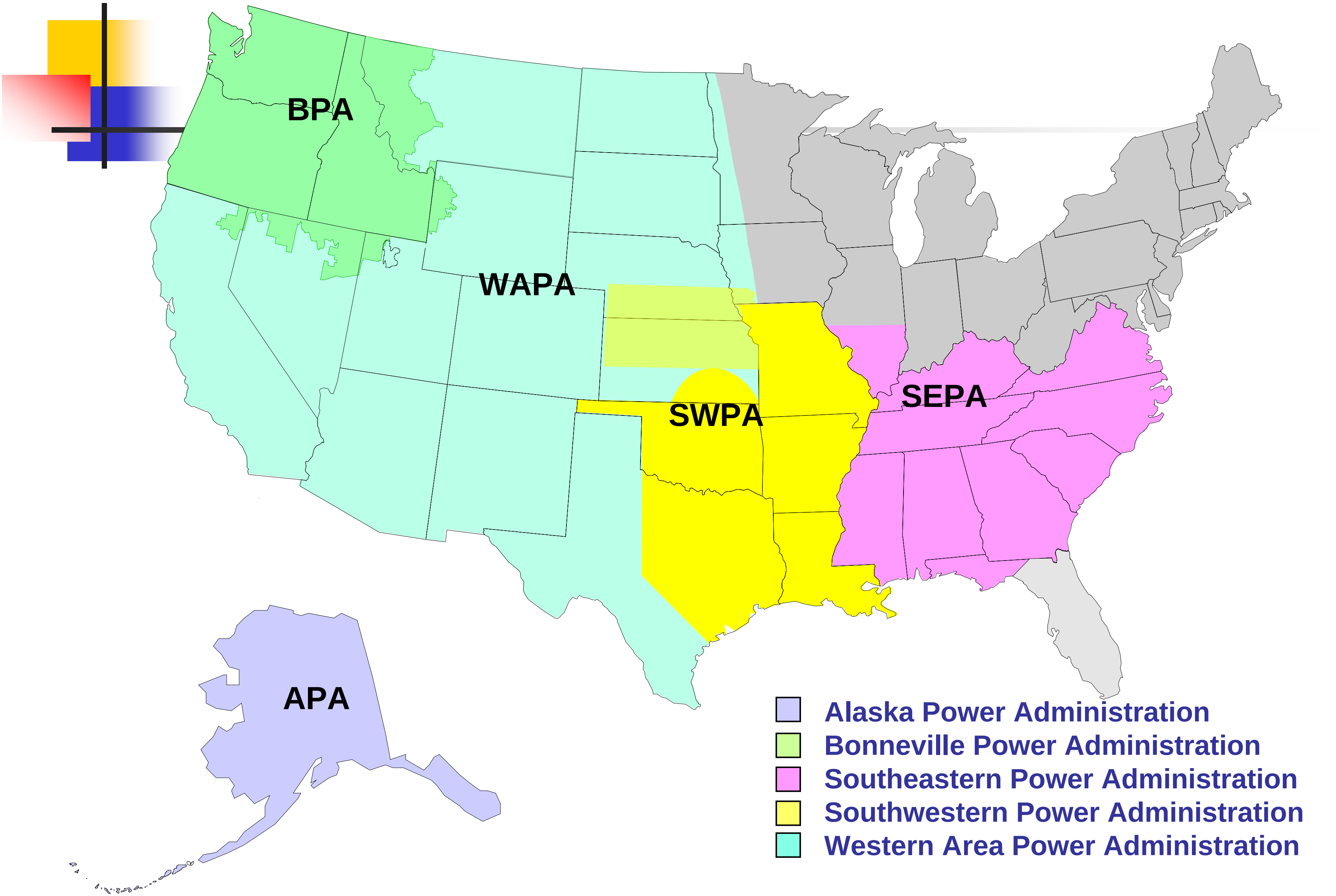
Developments of Power Marketing In India

September 5,2006

Presented by: Tony Rodrigues, P.E

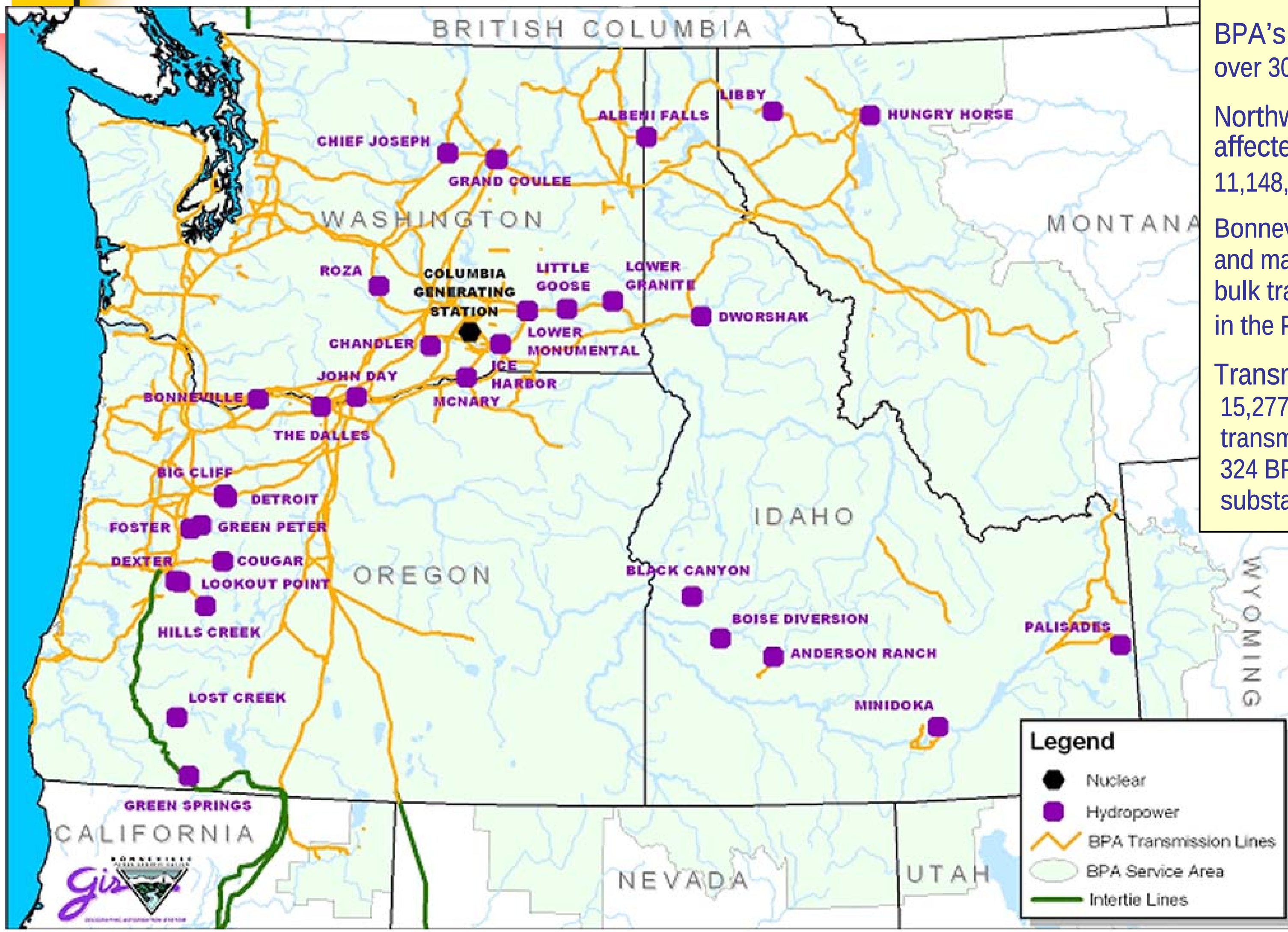
Discussion Topics

- US Generation Interconnection Process
- Opportunities and Challenges
- Arrangements for Evacuation
- Tariff Regulation



BPA
WAPA
SWPA
SEPA
APA
Alaska Power Administration
Bonneville Power Administration
Southeastern Power Administration
Southwestern Power Administration
Western Area Power Administration

Federal Columbia River Power System Generation and Transmission



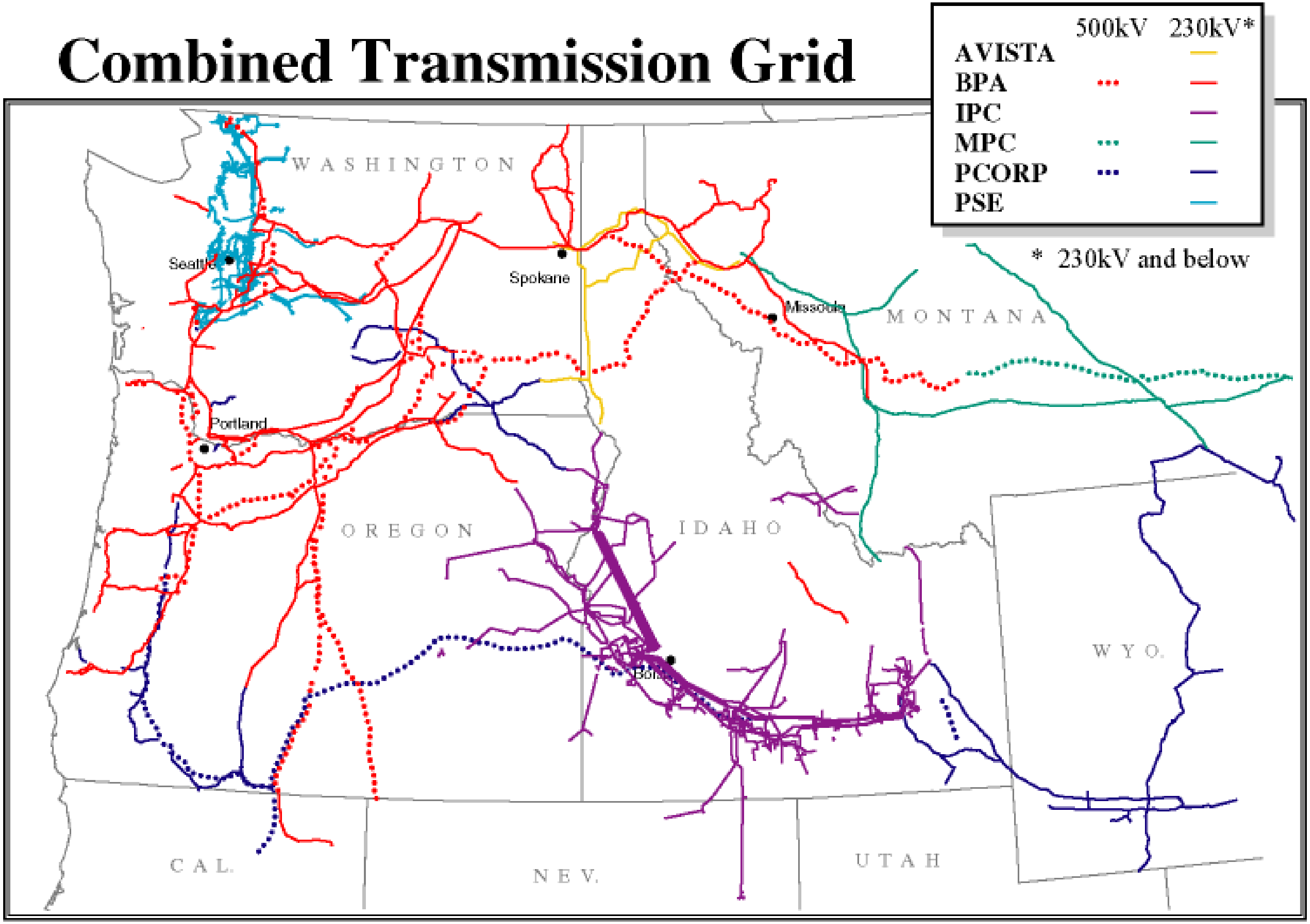
BPA's service area: over 300,000 sq. miles

Northwest population affected:
11,148,341 people

Bonneville has constructed and maintains 75% of the bulk transmission capacity in the Pacific Northwest

Transmission System:
15,277 circuit miles of transmission line, and 324 BPA-owned substations

Combined Transmission Grid



USA - Business Practices

- Open access
  - Separate organizations for generation and transmission
  - Tariff and rate for use of the grid
  - Impartial grid operator
  - Rules and regulations
- Standards of conduct
  - Establish rules to assure that transmission capacity and information are equally available to all power marketers
  - Open Access Same-time Information System (OASIS)

Generation Interconnection Projects

- Under FERC order 2003, utilities are required to interconnect new generating facilities to its transmission system to meet increasing demand for power
- Generator must provide details of their project to make proper evaluation
- Service requests must be submitted in writing
  - Date and time stamped upon receipt
  - Entered into generation interconnection request queues based upon date and time of receipt

Large Generation Interconnection Process (LGIP)

- GI Request-establish queue position
  - Valid ?
  - Site Control
  - Scooping Meeting
  - All fees paid ?
- Study Agreements
  - Feasibility Study
  - Impact Study
  - Facility Study
  - Fees and time line for all stages
  - Must follow to stay in queue

Planning Standards (Reliability Criteria)

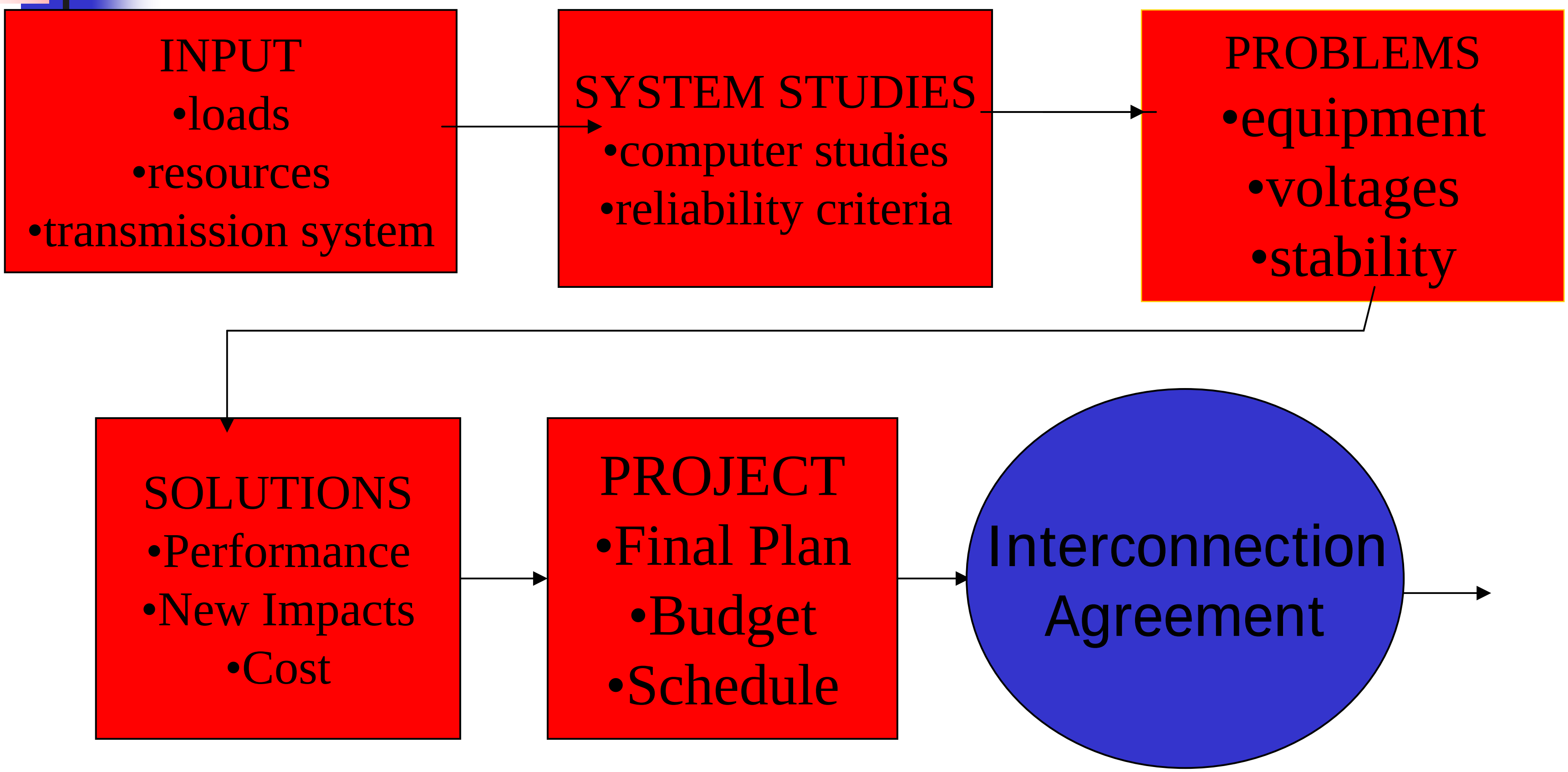
NERC / WECC / Company

Compliance Enforcement Program

- **Annual Assessments and Corrective Plans**
- **Compliance Templates**
- **Annual Regional Report to NERC**
- **Annual Audit**

LGIP Continued

- Environmental Agreement
  - Interconnection Facilities
  - Generation Facilities
- Final Electrical Plan
  - Cost
  - Schedule
- Land Requirements



Generation Planning Process

Large Generation Interconnection Agreement (LGIA)

- LGIA is offered after Environmental Process and after final engineering plans and cost are firmed up
  - Engineering and Procurement (E & P) Agreements may be offered to expedite Project schedule.
  - LGIA has project plans, costs and schedule
  - Network and Direct Assignment Classifications
  - Operating Requirements
    - Reactive Supply
    - Power Factor

Interconnection Ownership

Transmission Provider often retains the right & obligation to maintain and operate the grid, including some of the interconnection facilities for a fee.

- Transmission Provider may also connect other interconnection customers, apply late comer fee for equitable cost sharing.

Credits for Network upgrades

- Interconnection Customer finances interconnection project in advance for both interconnection facilities and grid modifications

- Interconnection Customer is able to recoup the investment from the transmission provider for grid modifications (Network Upgrades)

- The Transmission Provider has a transmission rate for the use of the transmission system to wheel power and then credits that rate against the outstanding balance of advance payment.
  - The Interconnection Customer receives FERC interest on the initial investment

Opportunities and Challenges

- Opportunities
  - Profit,rate of return for investors
  - Increases energy Supply
  - Could lower energy prices
  - May solve some grid problems
  - Increase reliability, back up for other resources
  - Economic development-Industries
  - Local employment and service jobs
  - Local tax support for communities

Opportunities and Challenges

- Challenges
  - A very long process
    - Permits/ approvals
    - Power Purchase Agreements(PPA)
    - Finances
  - Interconnection Facilities-cost/schedule
  - Lack of evacuation facilities/impact to others
  - Operating Agreements
  - Sale of generation facilities
  - Acquisition/Merger of companies
  - Credit worthiness/Bankruptcy
  - Terms and conditions for termination

Opportunities and Challenges

Evaluation of Risks

- Power purchases can come in many types and quantities and costs.
- Knowing what is needed and how the power will be used is critical.
- Knowing how the power will integrate with other resources and the transmission system is critical.
- Understanding the risks being incurred can determine the success of any venture.

Arrangements for Evacuation

- Request for evacuation service from generating Station (POR) to delivery points(POD)
- State MW level and duration of contracts
- Requests could be from generators, utility purchasers,marketers,extra regional..etc.

Requesting Evacuation Service

- Evacuation Service requests must be submitted in writing
  - Date and time stamped upon receipt
  - Entered into BPA's long term Transmission service request queues based upon date and time of receipt(LTRQ)
- BPA determines whether request can be granted
  - Available Transfer Capability(ATC)
  - Impact and Facility Studies if no ATC
- If request can be granted, contract is offered to customer

Merchant Power Plants

- **Transmission providers assume different financing strategies to satisfy the market needs of power producers/marketers**
  - **Transmission providers are sometimes not willing to assume risk for market driven projects**
    - **Interconnection Cost for future grid needs**
    - **Evacuation Cost**
  - **In general, requires the market participants to finance the project in advance**

Evacuation Project Proposals

- Fixed policy: Transmission Provider must respond in a particular manner when various criteria are met.
  - FERC Policy
  - Published Business Practices

- Transmission Provider may assess each case based on economic factors and operational issues including Transmission Providers interest in the project
- Offer Construction agreement for evacuation facilities to finance projects in advance
  - Specify cost recovery methods

Open Access Transmission Tariff

- Tariff outlines terms and conditions for providing transmission service
  - FERC Per forma
- Rates outlines cost for various types of wheeling service
  - Revenue requirement
  - Rate Design
- Public process is needed to change Tariff and rates
- Rate changes every two years, less risk.
- Tariff changes less frequent.

Point-to-Point Transmission Service

- Transmission service from Point of Receipt to Point of Delivery(PTP)
  - Long-term service for period equal to or greater than one year and in increments of a year
  - Short-term service for period of less than one year and in increments of months, weeks, days, or hours
- Long-term Point-to-Point transmission service requires detailed analysis
  - Short-term service is purchased electronically via OASIS

Network Integration Transmission Service

- Long-term transmission service only
  - For period equal to or greater than one year and in increments of a year
- Delivers capacity and energy from designated network resources to service network loads
- Ideal for distribution utilities

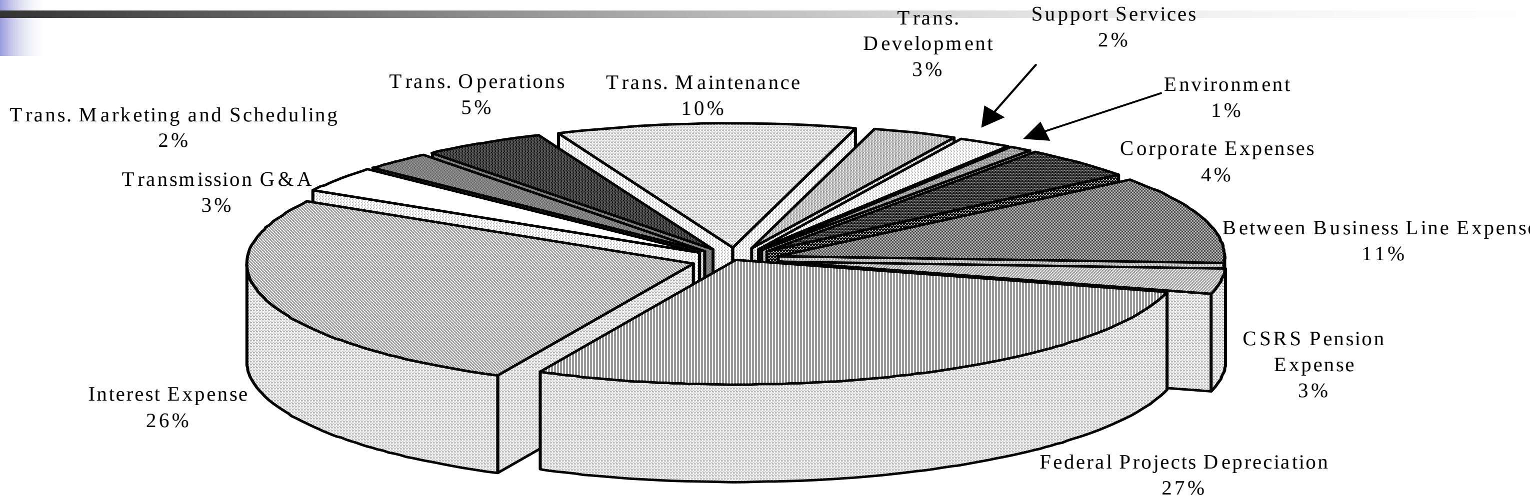
Ancillary Product Services (APS)

- Scheduling, System Control, and Dispatch
- Reactive Supply and Voltage Control
- Regulation and Frequency Response
- Energy Imbalance
- Generation Imbalance
- Operating Reserves – Spinning and Supplemental

Transmission Rates

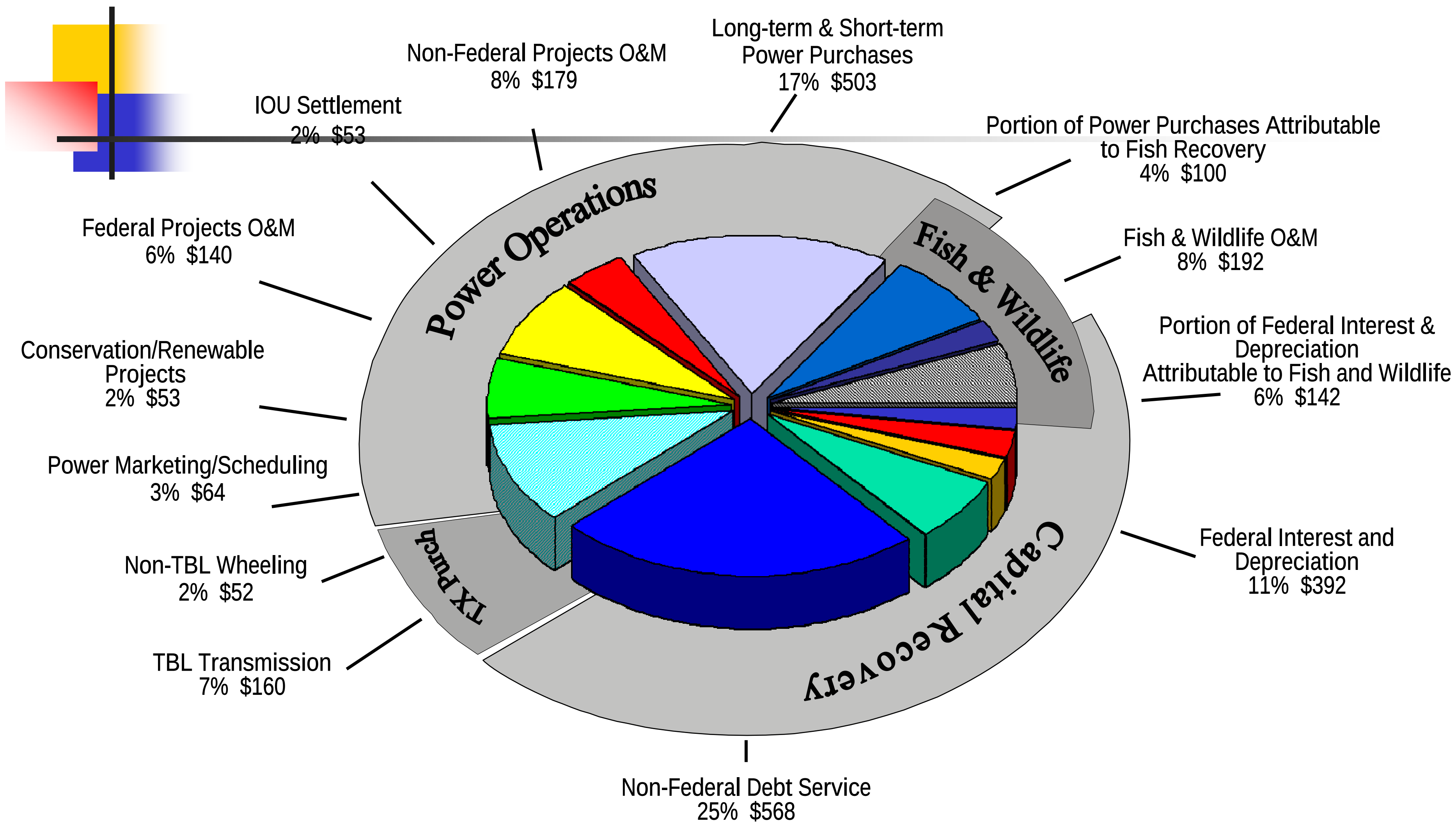
- Postage Stamp on Network facilities
  - Short distance discount if less than 125 KM
- Additional rate to use extra regional grid facilities
- Incremental rate if postage stamp cannot recoup new investment in a given period
- Must arrange or pay for APS

Composition of Transmission Operating & Interest Expenses
FY 2002-2003 Average



($ in millions)

	FY 2002	FY 2003	Average	
Transmission G&A	$ 22.2	$ 23.8	$ 23.0	3%
Transmission Marketing and Scheduling	$ 15.2	$ 15.7	$ 15.5	2%
Transmission System Operations	$ 31.0	$ 32.1	$ 31.6	5%
Transmission System Maintenance	$ 71.3	$ 73.4	$ 72.4	11%
Transmission System Development	$ 21.4	$ 21.6	$ 21.5	3%
Support Services	$ 11.9	$ 12.2	$ 12.1	2%
Environment	$ 5.1	$ 5.3	$ 5.2	1%
Corporate Expenses	$ 30.0	$ 28.1	$ 29.1	4%
Between Business Line Expenses	$ 77.3	$ 77.3	$ 77.3	11%
CSRS Pension Expense	$ 27.6	$ 17.6	$ 22.6	3%
Federal Projects Depreciation	$ 181.7	$ 194.0	$ 187.9	28%
Interest Expense	$ 176.3	$ 178.1	$ 177.2	26%
Total Transmission Expenses	**$ 671.0**	**$ 679.2**	**$ 675.1**	**100%**



Total Generation Expenses $2,358 M

Rates for different types of services

- Segment revenue by expected use of various types of service contracts.
- Set rates to recover the Revenue Requirements, risks and rates of return on investment.
- Contract Templates, tariff and rates are on our website

- Website Information http://www.transmission.bpa.gov/Business/Rates_and_Tariff/

Thank you

TEXAS ELECTRIC CHOICE
THE POWER IS YOURS. USE IT.

FAIR COST OF SUPPLY

The Development of Power Markets in India

September 5, 2006 ~ New Delhi

Jess Totten
Director, Electric Industry Oversight Division
Public Utility Commission of Texas

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Are Rates for the Enterprise or an Operating Unit?

- In US rates for utility are set for the enterprise
- Rates for purchase from generating plant set in contract that recognizes:
  - Incentives for efficient operation
  - Plant cost and financing
  - Variability of fuel costs
  - Changes in O&M costs over the plant's life

Process Options for Utility Rates

- US commissions typically use a quasi-judicial process for setting rates
  - Written application, testimony, discovery, hearing, order, judicial review
- Other regulators use an administrative approach
  - Extended consultation and information gathering between commission and utility

Timing Options

- Rate cases at prescribed intervals
- Rate cases when needed
  - Utility may initiate case if rates are inadequate
  - Commission requires regular reports of revenues and expenses and may initiate case if rate are excessive
- Interval between cases provides opportunity to improve efficiency

Rate Principles

- Assure rates, operations, and services that are just and reasonable to the consumers and to the utilities
- Permit the utility a reasonable opportunity to earn a reasonable return on invested capital that is used and useful in providing service to the public and reasonable and necessary operating expenses

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Steps in Setting Rates

1. Determine overall revenue requirement
2. Assign revenue requirements to customer classes
3. Design rates to recover revenue from each class
4. Fuel rates set more frequently, may be subject to reconciliation

The Ratemaking Formula

Revenue requirement = Invested capital x rate of return + expenses

Formula allows for the recovery of expenses, return of investment (through depreciation) and return on investment

Test Year Concepts

- Historical test year based on financial data for the most current 12 months for which information is available
  - In setting rates test-year costs adjusted for known and measurable changes to develop rates for rate period
- Forecasted test period–some regulatory commissions use a forecasted test year to set rates

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Information Provided at the Beginning of a Rate Case

- Schedules of revenue requirements
- Cost allocation schedules
- Testimony describing programs and supporting schedules
  - Rate of return, depreciation, taxes
- Historical information
  - Financial, consumption

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Investment Capital Issues

- Utility plant must be used and useful
- Costs must be prudently incurred
- Valuation basis
  - Historical cost (original cost minus depreciation)
  - Replacement cost
- Preferred approach is historical cost

Construction Capital

- Carrying costs during construction of an asset can be capitalized and included in the value of the plant
- Some commissions allow contemporaneous recovery of carrying costs, through Construction Work in Progress
  – Invested capital would include investment in projects that are not complete

Rate of Return

- How is rate of return calculated?
  - Identify sources of capital used to finance utility assets (debt and equity)
  - Identify "cost" of each source of capital
  - Calculation of debt and preferred stock cost not controversial

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Estimating Return on Equity

- Market approach
  - Discounted cash flow—expected earnings from dividends and appreciation of value (growth)
- Comparable earnings approaches
  - Capital Asset Pricing Model—utility equity return compared to risk-free investment
  - Bond yield risk differential method—equity return compared to debt interest

Depreciation Expense

- Depreciation study analyzes mortality characteristics of assets:
  - Useful life
  - Salvage value and cost of removal
- Depreciation rates generally require commission approval, supported by depreciation studies
- Depreciation rates must recognize capital additions to plant

Issues for Operating Expenses

- Reflect normal operations
  - Exclude extraordinary items
  - Exclude impact of abnormal weather
- Reflect known changes
- Appropriate accounting
- Prudently incurred
- Reasonable and necessary
- Not excluded by law

Fuel Costs

- Volatility of fuel cost has resulted in special treatment
  - Fuel adjustment clause permits monthly adjustment of fuel rate
  - Fixed fuel rate may be adjusted more frequently
  - Fuel costs and power plant operations and dispatch may be reviewed on regular basis

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Cost Allocation

- Cost of service study allocates each component of cost on an appropriate basis to various customer classes with similar end uses
  - Frequently referred to as cost causation
  - Which customer or class of customers causes the cost to be incurred
  - Cost causation is part science, part art
- Cost of service study is a guide to allocating costs to customer classes

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Rate Design

- Rates set to:
  - Collect authorized revenue requirement for each class of customers
- Other considerations:
  - Rate stability
  - Revenue stability
  - Fairness
  - Competition
  - Time-of-use

Marginal Cost Pricing for Customers

- If utility costs are higher than marginal costs, a customer may have lower-cost supply alternatives
- Loss of customer may result in increase in costs borne by other customers who do not have options
- Marginal-cost rates may be appropriate for such customers
- Can remaining customers be insulated from impact of MC rates?

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Market-Based Rates for Generators

- FERC permits generators to offer market based rates based on market structure
  - Rates must be just and reasonable
- Texas has mandated structural changes in market and competitive generation sector
  - Prices to be determined by forces of competition

Partial Output Contract with Generating Plant

- Contract for part of a plant's output may be of value to both parties if there is a market for power
- Contract should be clear about right to capacity and allocation of fuel and other operating costs

Attracting and Supporting Merchant Generation

Kenneth W. Laughlin

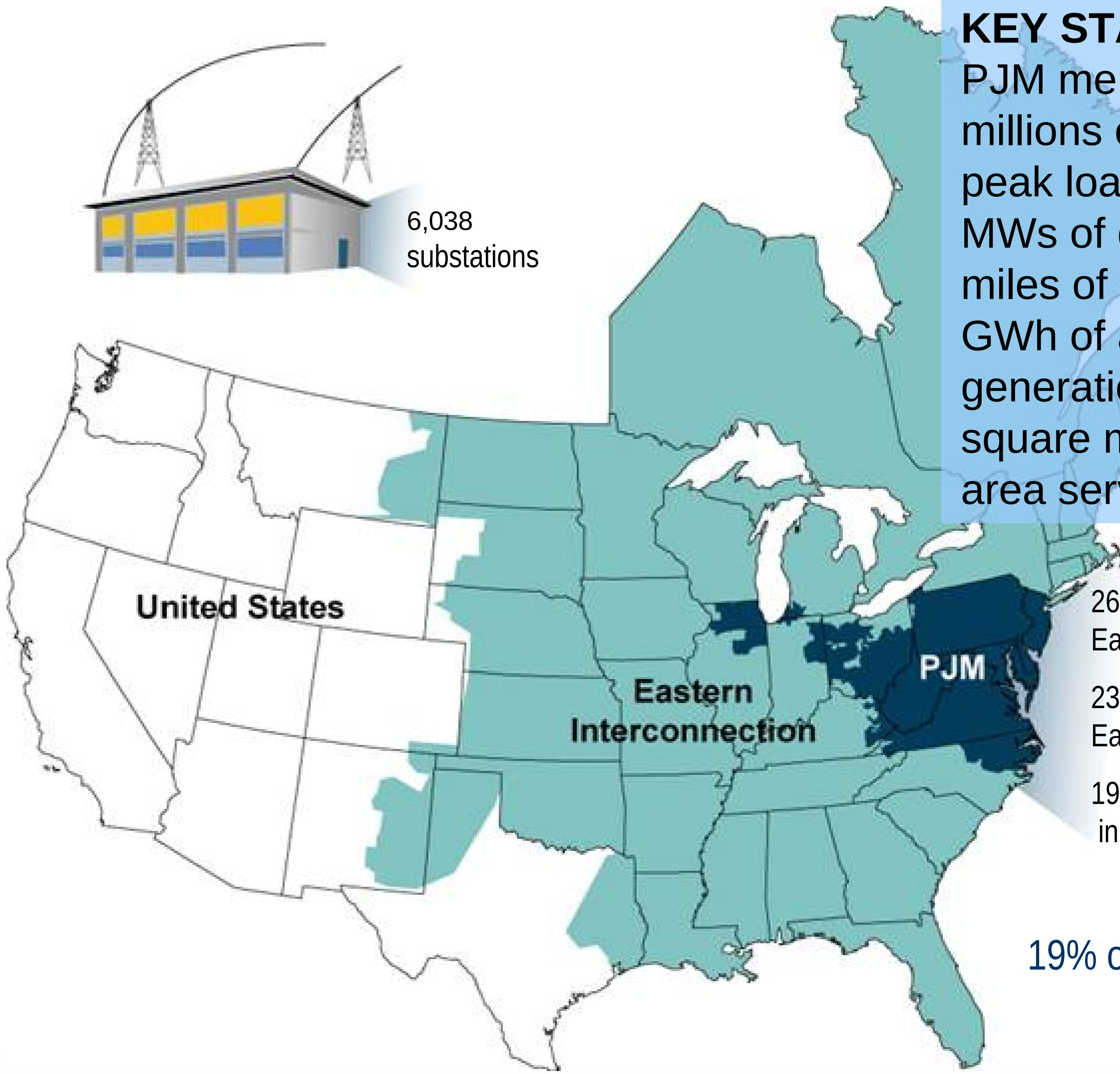
PJM, USA

September 5, 2006

PJM as Part of the US Eastern Interconnection

KEY STATISTICS

PJM member companies	400
millions of people served	51
peak load in megawatts	145,000
MWs of generating capacity	165,303
miles of transmission lines	56,070
GWh of annual energy	728,000
generation sources	1,271
square miles of territory	164,260
area served	13 states + DC



26% of generation in Eastern Interconnection

23% of load in Eastern Interconnection

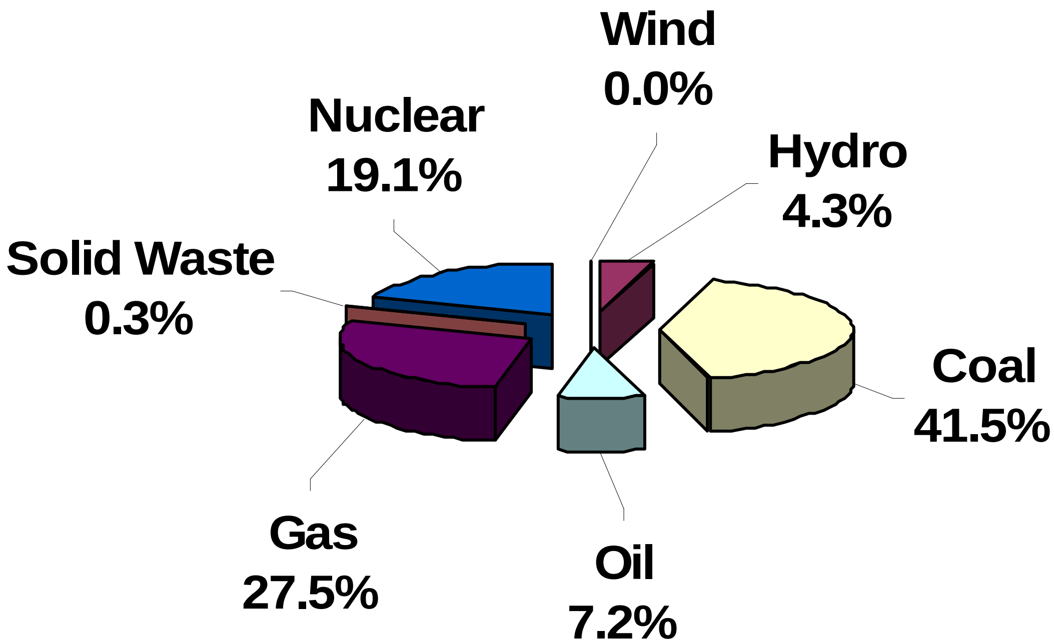
19% of transmission assets in Eastern Interconnection

19% of U.S. GDP produced in PJM

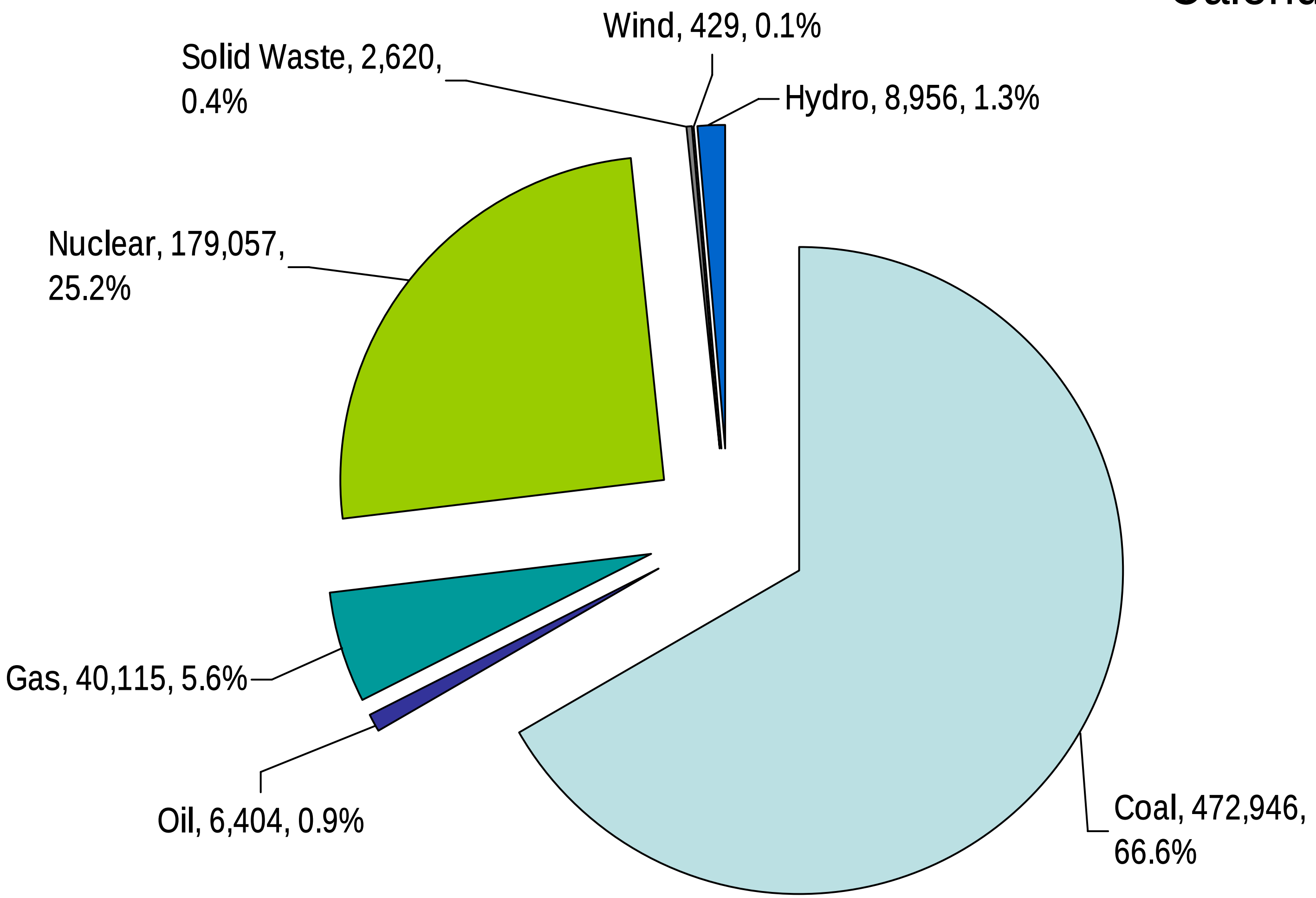
What is a Regional Transmission Organization ?

- An independent entity that is responsible for:
  - Operating competitive wholesale markets
  - Administering transmission tariff
  - Safe and reliable operation of regional power grid
  - Ensuring competitive open access to transmission where no member or member group has undo influence
- RTO owns no transmission or generation assets and has no financial interest in the wholesale market or in any of the market participants

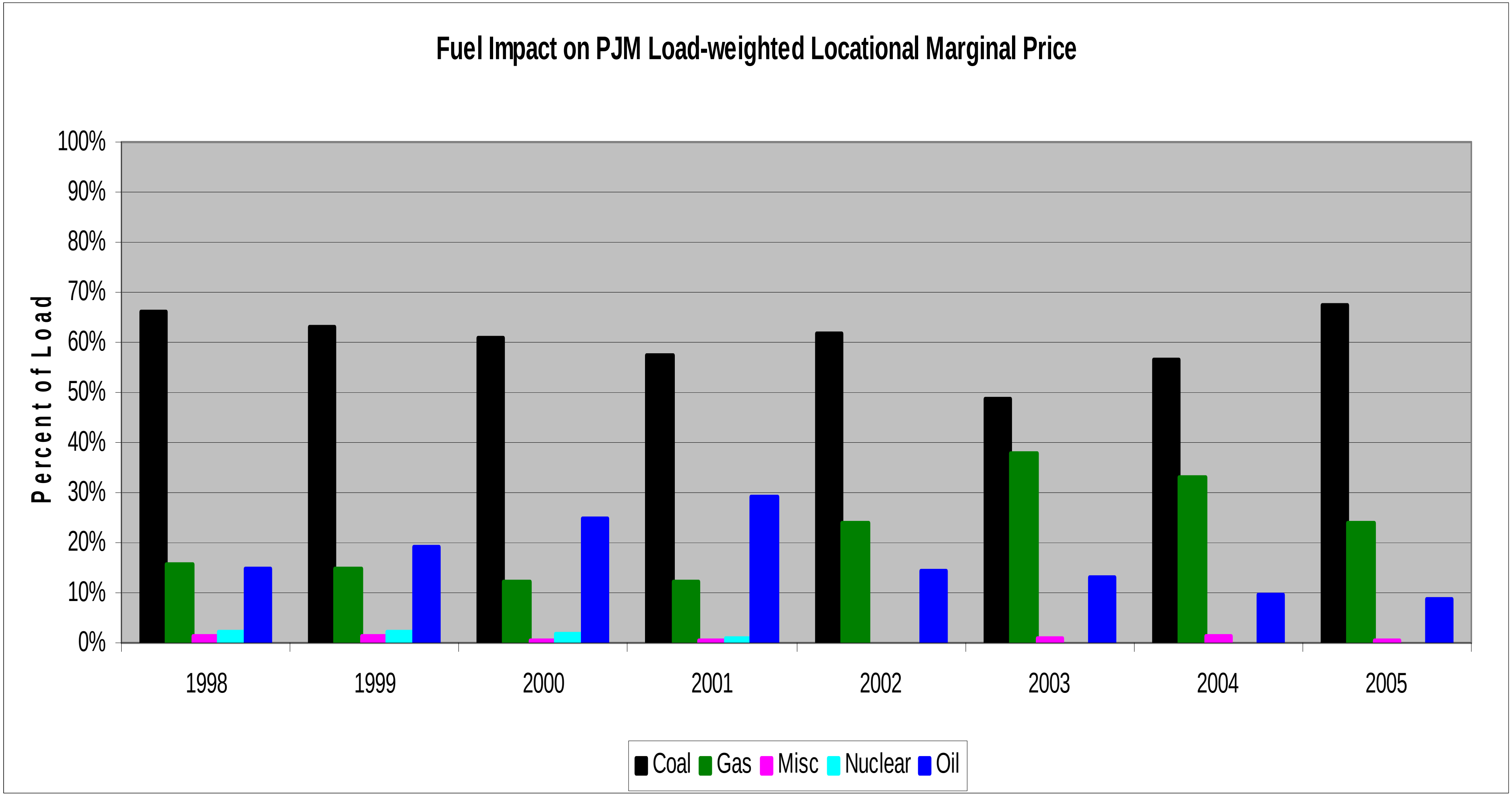
PJM RTO Capacity (2005)



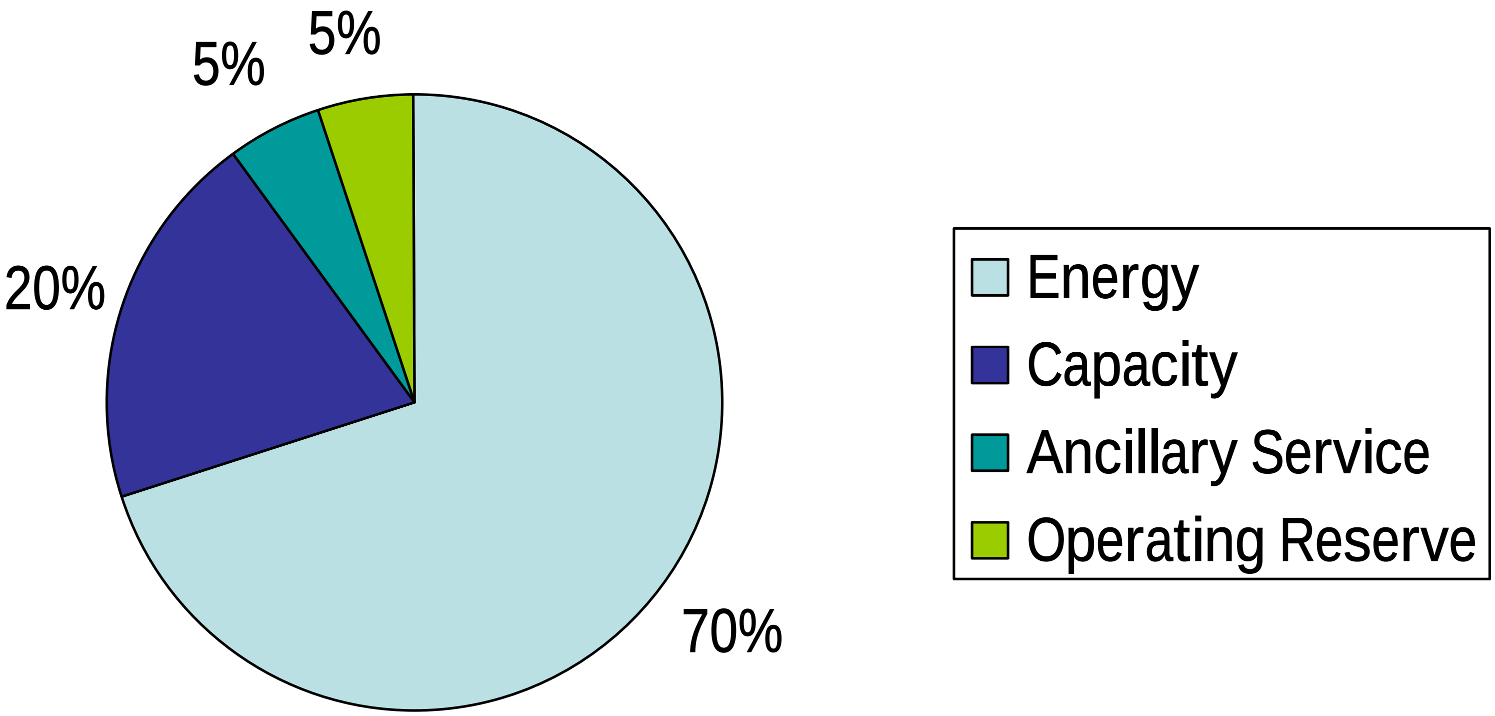
PJM Generation GWH, by fuel source
Calendar year 2005



Impact of Various Fuels on PJM Marginal Price
Market Pays Marginal Price



Generation Revenue by Category of Service



- To attract generation investment you must offer ***<u>Fair, Equitable and Predictable Financial Expectations !!</u>***
  - – Access to friendly financial markets
  - – Interconnection agreements
  - – Treatment in dispatch
  - – Ability to support bilateral contracts
  - – Getting paid for energy produced
  - – Revenue streams for products

Generation Functions

RTO Functions

- Perform Real-time generation dispatch
- Accept Generation offers in Day-ahead and real-time markets
- Unit commitment, Generation scheduling
- Send generation control signals
  - Load following
  - Regulation
  - Spin
- Coordinate generation outage schedules
- Administer capacity, energy and ancillary services markets

Generation Owner

- Schedule generation outages
- Manage generator offer information
- Operate generating plants, Maintain plants, etc.
- Offer various products (energy, capacity, regulation, spin, etc)
- Manage generation portfolio w/ three alternatives:
  - Self-schedule
  - Bilateral sale or
  - Submit offer and follow RTO dispatch

- Futures
  - NYMEX PJM West Hub Contract
- Forward Market
  - Energy Brokers
  - RTO Day-ahead Energy Market
- Real-time Balancing Market
  - RTO Security–constrained, economic dispatch
- Ancillary Services Markets
  - Regulation, spinning, black start, reactive
- Capacity Market
  - Call contract

- Generation is incented to follow real-time dispatch instructions:
  - If generation is following real-time dispatch instructions then it is eligible to set LMP, otherwise it become a price taker.
  - If generation is scheduled by PJM and is following real-time dispatch instructions then it receives a revenue guarantee of at least its specified offer data, otherwise there is not revenue guarantee.
- No penalties are imposed for over or under generation

ISO Regulation and Pricing Model Definition

- Transmission is a natural monopoly and is priced at “cost-plus” by regulators
  - *Build decision made by PJM, Regulator*
  - *Bad decision* risk *resides with retail customers*

- Generation is bid competitively (wholesale)
  - *Build decision by owner on speculation*
  - *Bad decision* risk *resides with generation owners*

- ISOs price their services at cost of service

Basic design of a successful market

Bilateral schedules at difference of nodal prices

License plate Transmission Access charges

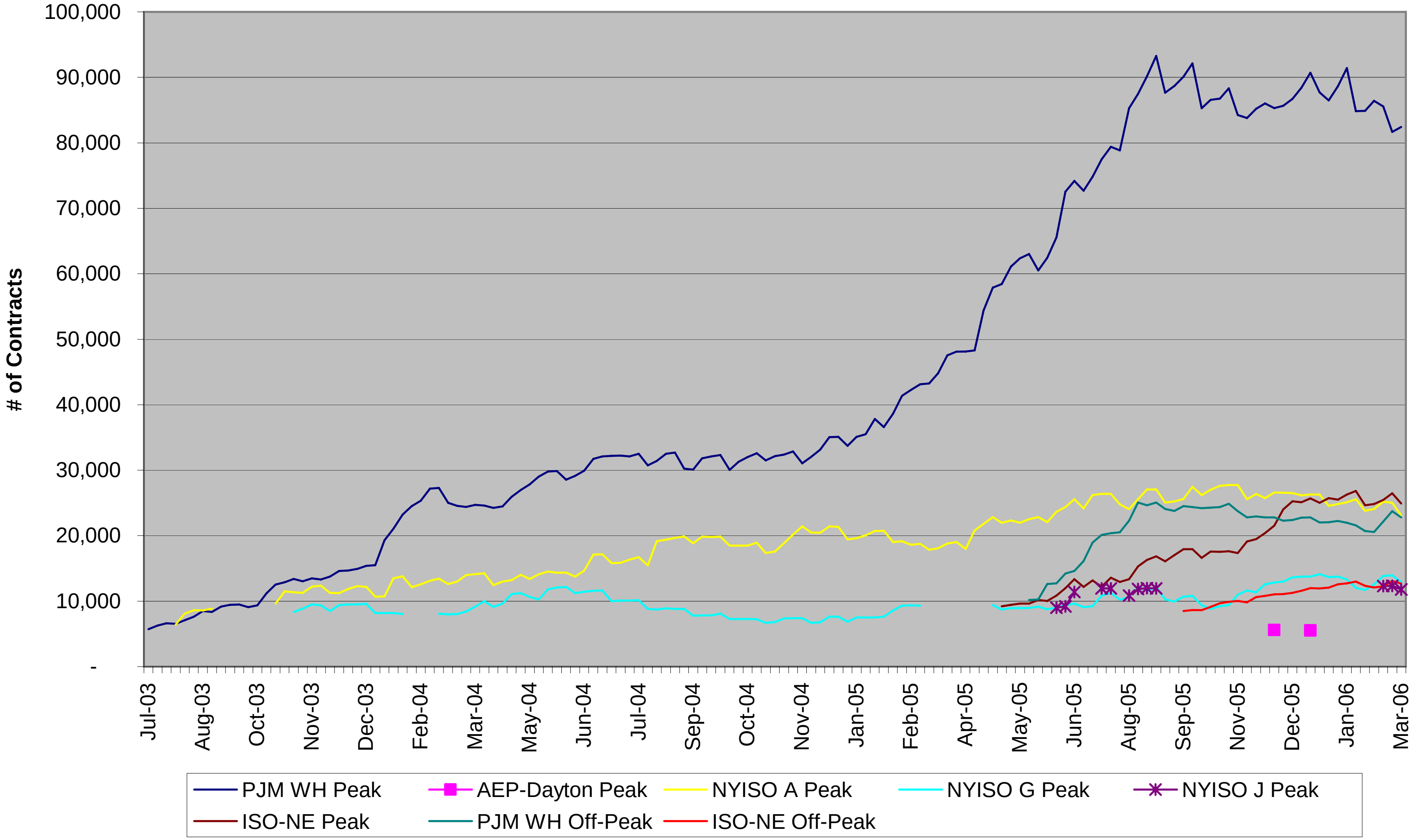
Coordinated spot market

Bid-based, security–constrained, economic dispatch with Nodal Prices

Market driven investment

Financial Transmission Rights

NYMEX Open Interest
(Futures *plus* Delta-adjusted Options)



What does this mean for customers?

- **Regional planning investment**
  - > 20,000 MW of new non-rate based generation added since 1997
  - Assign Transmission upgrade costs appropriately, generation interconnection sees true entry cost.
  - Over $2.4 billion dollars of transmission investment directed since 1999
  - Renewable generation facilitated through lower barrier to entry

Transmission Pricing Issues

David E. Mead

U.S. Federal Energy Regulatory Commission

Development of Power Markets in India

New Delhi, India

5 September 2006

Who Pays for Transmission Fixed Costs in the U.S.?

- Primarily, buyers not generators
- Generators pay for some interconnection costs
- Generators may pay for exporting out of control area

Alternative Ways to Charge Buyers for Fixed Costs

- Postage stamp rate
- MW-mile rate
- License plate rate
- Rolled-in versus incremental cost rates

Two Economic Objectives

- Efficient use of existing capacity
  - Efficient dispatch of generation
  - Meet load at least cost
- Efficient new investment
  - Efficient transmission size and location
  - Efficient generation siting
    - Close to, or remote from, load?

Promoting Efficient Use of Existing Transmission Capacity

- How to recover fixed costs of existing transmission facilities?
- How to recover variable transmission costs?

Postage Stamp Rates

- Same rate for all customers within a single utility's service territory
  - Spread fixed costs over peak MWs or total MWhs of load
  - Common in the U.S.

MW-Mile Method

- Transmission charge varies with increasing distance
- Spread fixed costs over MW-miles of transmission service
- Not common in the U.S.

The Pancaked Rate Problem

- "Pancaked" rates
  - Customers pay multiple embedded cost rates for transmission service across multiple utility service territories
- Pancaked rates may discourage purchases from distant generators
  - Inefficient when there is spare transmission capacity and no congestion

License Plate Rates

- Customers in one service territory:
  - Pay rate to recover fixed costs of its local utility, regardless of generation source
  - Receive transmission service across multiple service territories
  - Customers in different areas pay different rates
- Eliminates rate pancaking
  - Fixed cost recovery doesn’t affect short run choice among generation sources
- Common in U.S. Regional Transmission Organizations (RTOs)

Rates for Short Run Efficiency

- Efficient prices for short run transmission service reflect short-run marginal costs
  - Marginal losses
  - Opportunity costs
    - Congestion or marginal redispatch costs
  - Don’t explicitly recover fixed transmission costs
- Result: Load met from lowest-cost generators, considering all constraints

Locational Marginal Pricing (LMP)

- Energy price at each location reflects marginal cost of delivering energy
- Short run transmission price equals the energy price differences between locations
  - Reflects the marginal cost of moving energy between locations
- Creates revenue surplus for transmission operator
  - Surplus can fund financial transmission rights used to hedge short run transmission prices

A Note on Losses

- Marginal losses are a component of the marginal cost of delivering energy
- By charging marginal losses, transmission operator will collect a surplus
  - Marginal losses exceed average losses
- Other loss methods
  - Scaled marginal losses
  - Average losses

Conclusion: How to Promote Efficient Use of Existing Capacity?

- Charge transmission prices for short-run service that reflect short-run marginal variable costs
- Recover fixed costs of existing transmission capacity in a way that doesn't affect short run choice of transmission path or choice of generator to serve load

Promoting Efficient Investment

- What to charge for new capacity?

Incremental versus Rolled-In Prices: Who Should Pay For Transmission Upgrades?

- The party who asks for the upgrade?
  - Rationale: Creates incentive to upgrade only when benefits exceed costs
- All designated beneficiaries?
  - Rationale: Removes “free rider” problem
- All customers?
  - Rationale: Most upgrades ultimately benefit everyone

What Price for New Transmission? Service: A Variation on Incremental Pricing.

- Embedded cost rate, if no new construction is needed
- "Or" rate, if new construction is needed:
  - Pay the higher of:
    - Incremental cost of new construction, or
    - Embedded cost rate
    - But not both incremental and embedded cost
- Avoids construction delays where incremental costs decline with subsequent upgrades

Prices for Interconnection in the U.S.

- Generator pays for tie lines between generator and grid
- Transmission owner ultimately pays for other needed upgrades to grid
    - New generator pays initially
    - Transmission owner refunds payment after generator becomes operational
    - Transmission owner recovers costs from buyers

Merchant Transmission in the U.S.

- Market-based rates for merchant transmission if it:
  - Lacks market power
  - Holds an open season
- Only a few merchant transmission projects in the U.S.

Conclusion: How to Promote Efficient Investment?

- Can the beneficiaries of transmission upgrades be identified?
- Efficient pricing for upgrades depends on the answer

TRANSMISSION PLANNING AND INVESTMENT

Developments of Power Marketing In India

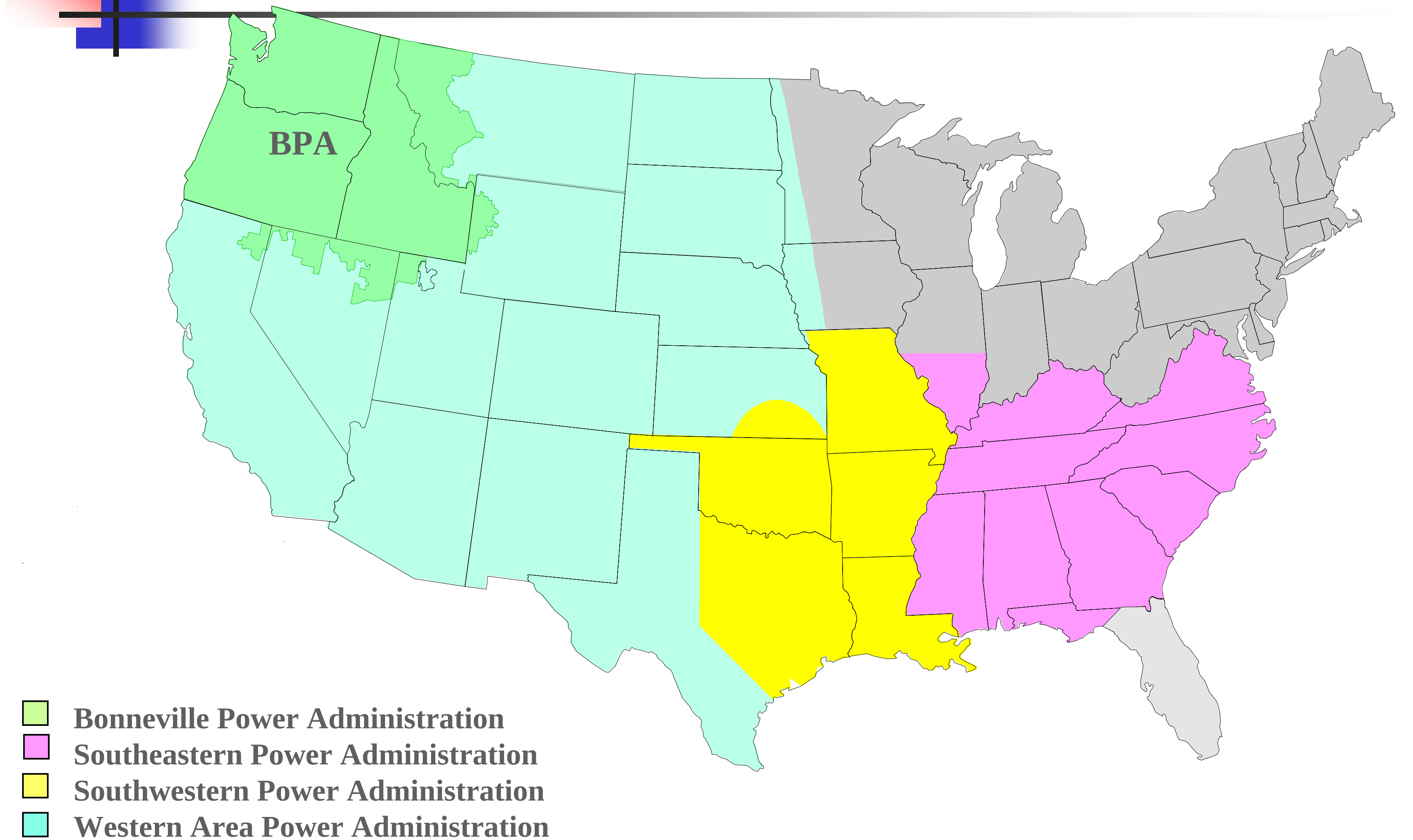
September 5,2006

Presented by: Tony Rodrigues, P.E

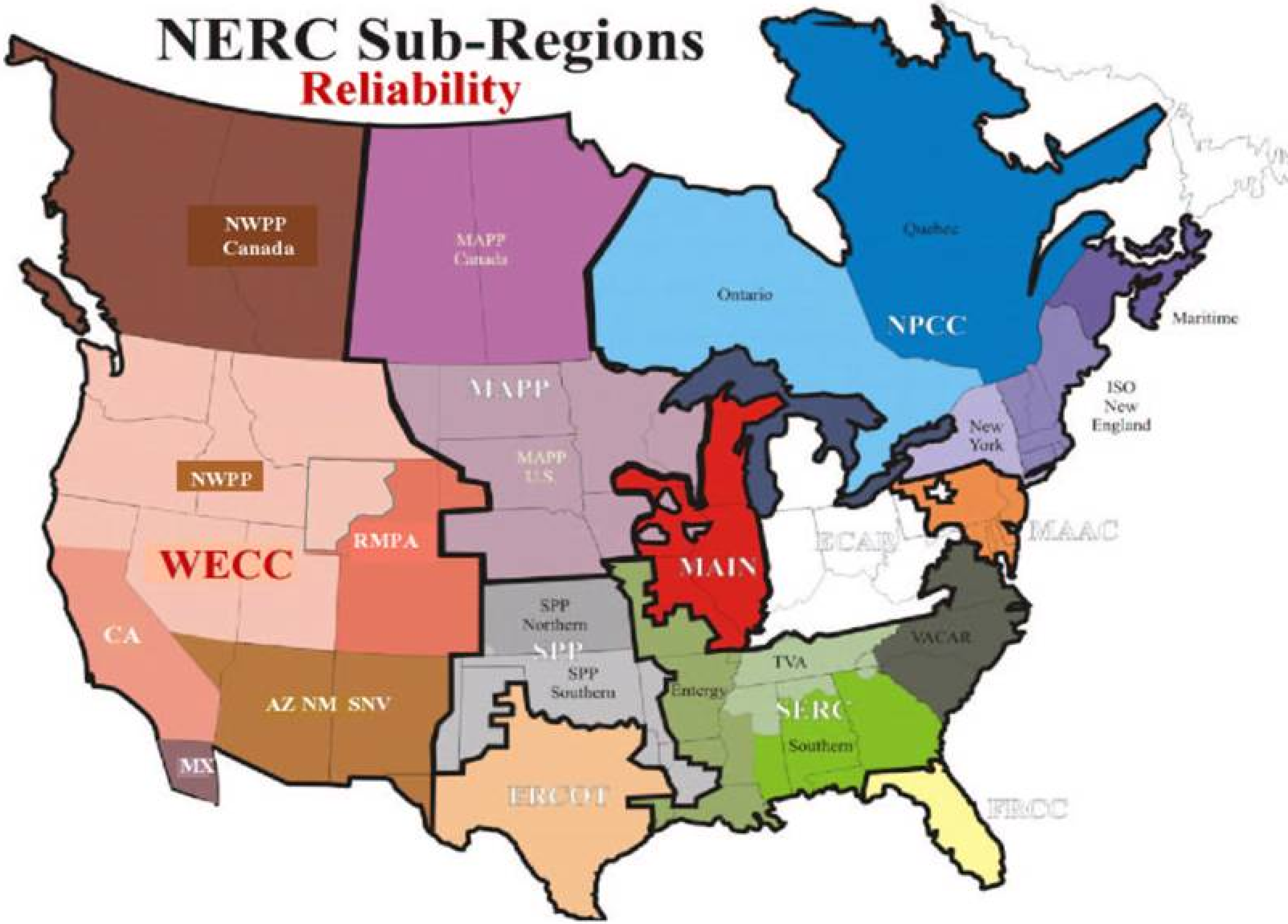
Discussion Topics

- Transmission Planning Process
- Transmission Investment Options

USA-POWER MARKETING REGIONS

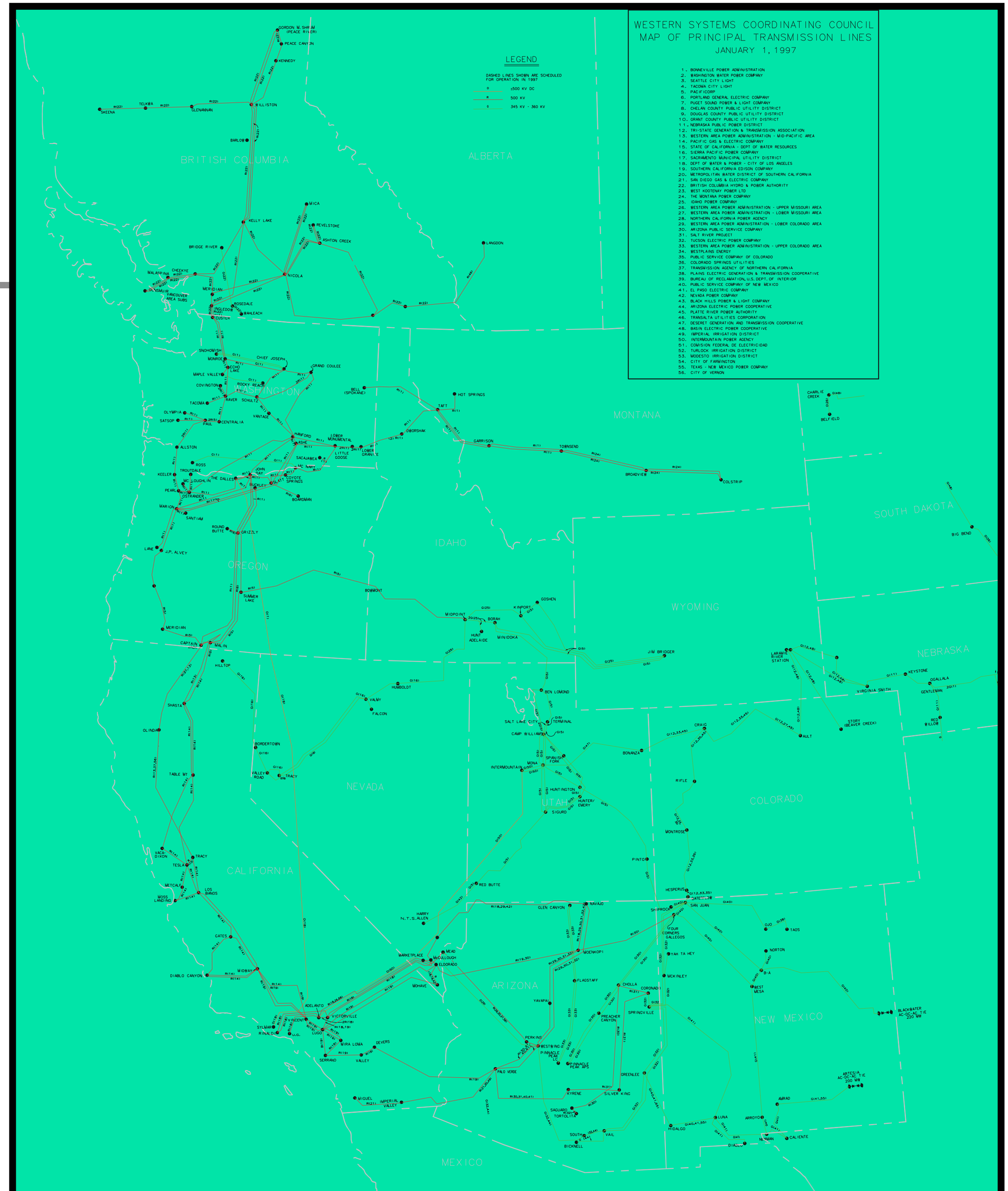


NERC Sub-Regions
Reliability

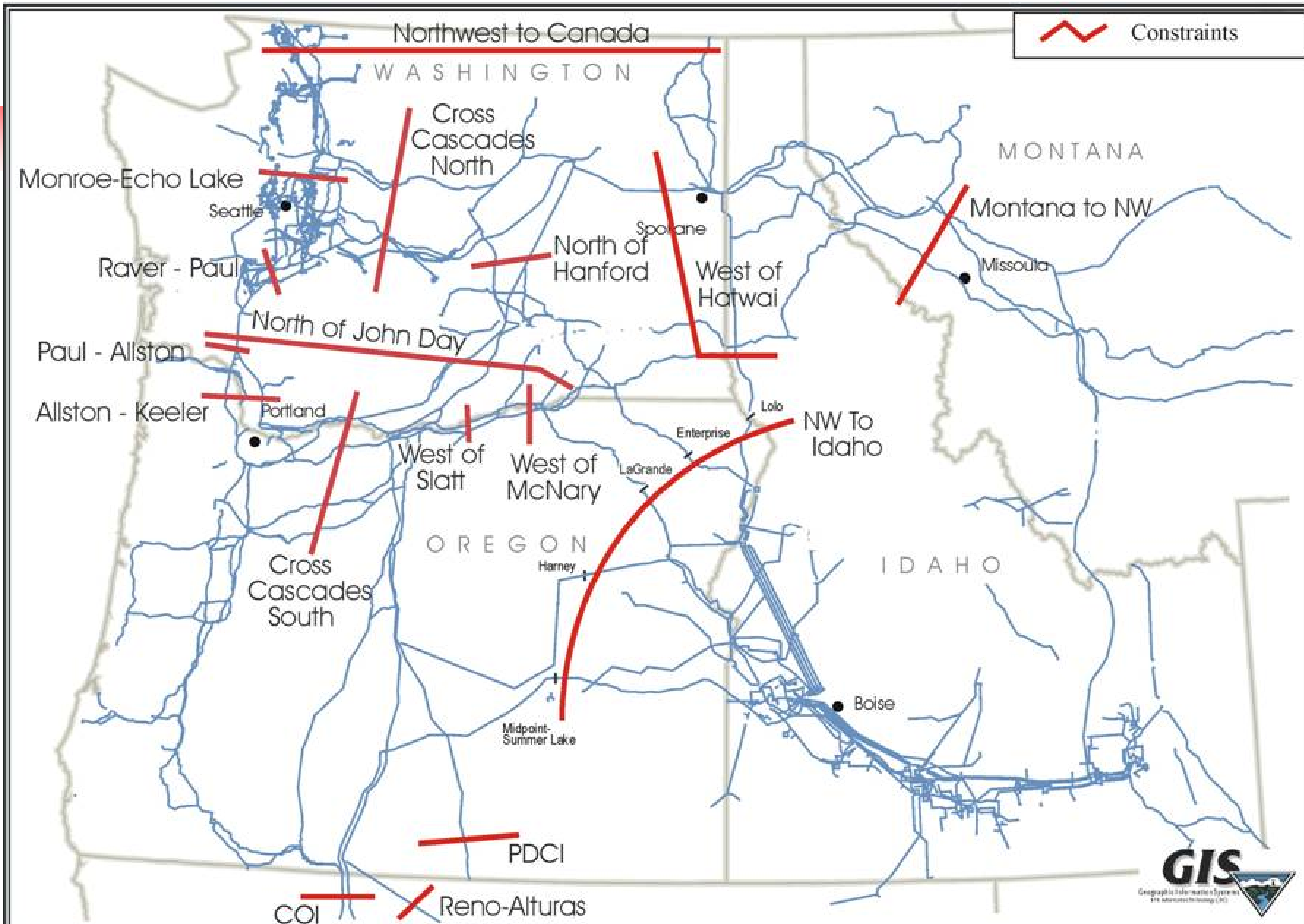


Canada and US West Coast Grid Connections.

Western Electric Coordinating Council (WECC)



Network Path Constraints



Planning Standards (Reliability Criteria)

NERC / WECC / Company

Compliance Enforcement Program

- **Annual Assessments and Corrective Plans**
- **Compliance Templates**
- **Annual Regional Report to NERC**
- **Annual Audit**

Joint Planning Process

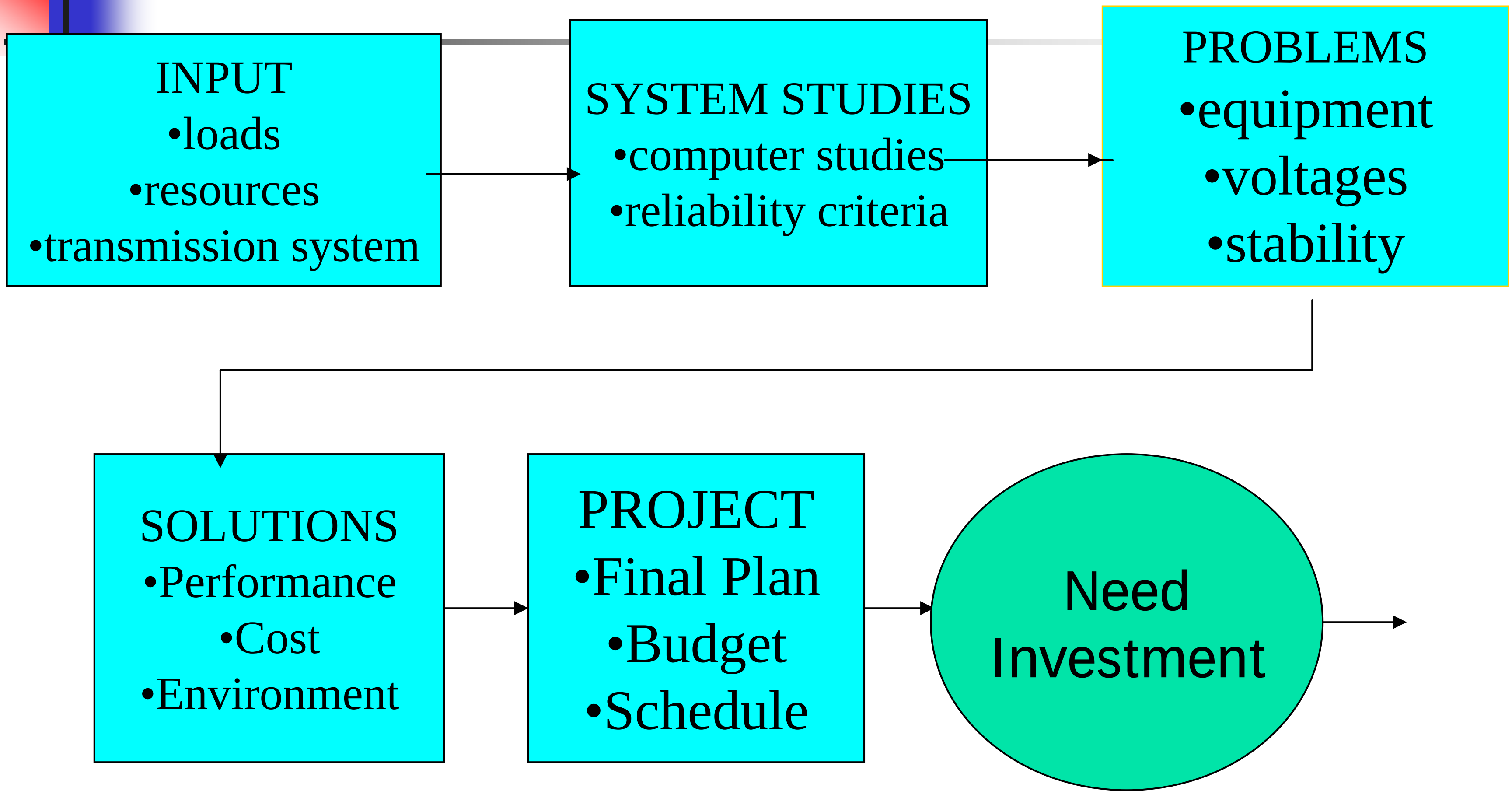
- Data System for Base Cases
- Requirements for Data in Base Cases
- Development and Selection of Plans
- Announcing Plans
- Annual Ten-Year Case Schedule
- Path Ratings

Need for Transmission Path Rating

- **Market Participants must be aware of path long term and and short term path capabilities.**
- **Generators cooperate and respect path ratings.**
- **Energy Prices could vary based on path constraints.**
- **Maximize path usage, yet secure and protect the Transmission System and all equipments.**
- **Path rating information must be transparent at all times to all parties.**

Agreed upon Interconnection Ratings in Western USA

- Canada to NW 3150 MW
- NW to California 4800 MW (AC)
- NW-California 3100 MW (DC)
- NW-Nevada 300 MW



Transmission Planning Process

Mechanism for attracting Investment in Transmission

- Publish Strategy for Transmission Expansion
- Transmission Project – an Investment Opportunity
- Establish Partnerships
- Mitigate Investment Risks

Transmission Investment Strategy

- **Grid reliability**
- **Availability**
- **Sufficiency/adequacy**
- **Net revenue**
- **Economic Development**

Why invest in transmission?

- Social Factors
  - Cost of Power
  - Transmission cost is about 10% of Power cost
  - National economic growth, stability or securirty
- Investment
  - Rate of return from investment
  - Opportunity costs (other investment possibilities)
- Merchant Transmission Line
  - Ownership other than Generators
    - Open Access, Standards of conduct, market power

Reliability Driven vs. Market Driven

- **Transmission providers sometimes assume different financing strategies depending on whether a project is reliability driven or if it is being built to satisfy only the market needs of power producers/marketers**
  - **Reliability projects are more likely to be treated as a service obligation by the transmission provider – which assumes financing responsibility to meet grid codes**
  - **Transmission providers are sometimes not willing to assume risk for market driven projects – requiring the market participants to finance the project in advance**

Transmission Provider Position

- Fixed policy: Transmission Provider must respond in a particular manner when various criteria are met.
  - FERC Policy
  - Published Business Practices

- Economic/Operational Model: Transmission Provider assesses each case based on economic factors and operational issues
  - Issues like: are credits given, what is the rate of return (ROR) which is granted, etc. are determined based on the Transmission Providers interest in the project

Transmission Project Partners

- Investment Partner
  - Transmission Provider
  - Government
  - Potential users of transmission
  - Investors
- Investment Partners will have different motivations
  - Not necessary for all the parties to have the same motivation
  - Individual parties may have multiple motivations

Investment Partnership with Transmission Provider

- Transmission Provider
  - Rate of Return/Other possible uses for capital
    - Net Present Value of capital assessment should be calculated
  - Risk of return
    - Who will use the capacity, for how long will they use it, how much will they use – how certain is this?
  - Asset Management
    - Investment may support other portions of the infrastructure
    - Investment may make other additions or changes possible or less costly

Project Financing Partner -Government

- Government would finance project at government borrowing rate at various terms.

- Government borrowing rate could vary depending on source of funds.

- Transmission Company would build, operate and retain ownership and payback government by collecting tariff from Transmission users.

Investment Partner: Transmission Users

- Other than the Transmission Provider, these parties have the most complicated assessment to make in determining whether to invest or not
  - Direct return on investment?
    - By credits, lease, or ownership
    - Direct assignment costs – resulting in no direct ROR
  - Indirect return on investment
    - Will the grid expansion result in competitive power deals? The ROR on a power transaction may easily be significant enough to warrant treating the transmission investment as a line item cost.

Investment Partner: Rates of Return

- Two questions the investor must decide on before making the investment
  - Projected return versus the cost of money
    - Could the capital be invested elsewhere, resulting in a higher ROR?
    - Time horizon for the investment, is this the best investment for the period concerned
  - Risk profile of the investment
    - How probable is the projected rate of return? The more likely the return the lower the ROR can be.

Transmission Capacity Ownership

- <u>Capacity Ownership by Merchants</u>
- One or more parties may finance a transmission system expansion in exchange for capacity ownership rights on the network.
- Party or Parties with the ownership rights sets their own tariff.

<u>Operation and Maintenance</u> of the lines would be the financial liability of the third party, but may be performed by Transmission Company.

Lease/Purchase from Merchant

- Third party would finance the expansion and the Transmission owner would lease the capacity rights with an option to buy at the end of lease from the merchant.
- Operation and Maintenance of the lines would be the financial liability of the third party, but may be performed by Transmission Company.

Transmission Credits

- Transmission User finances project and is able to recoup the investment from the transmission provider
- Transmission Provider leases a portion of the capacity to the transmission user
- The Transmission Provider determines the fee for the use of the transmission system then credits that amount against the outstanding balance it is "paying" the transmission investor
  - the transmission investor receives its ROR in avoided costs of transmission service
- Transmission Credits can be for any amount and the transmission investor may receive interest on the initial investment

Prepayment for Long-term Transmission

- Transmission Company receives up-front payment for transmission system expansion from party with who is seeking long-term firm transmission contract.
- May conduct an open auction for to invite all who need transmission along the path.
- Long-term firm contract gets credits for their monthly transmission usage based on tariff rates
- Transmission owner gives to party a reasonable return for interest.
- The lump sum repayment after the negotiated term of the long-term firm contract.

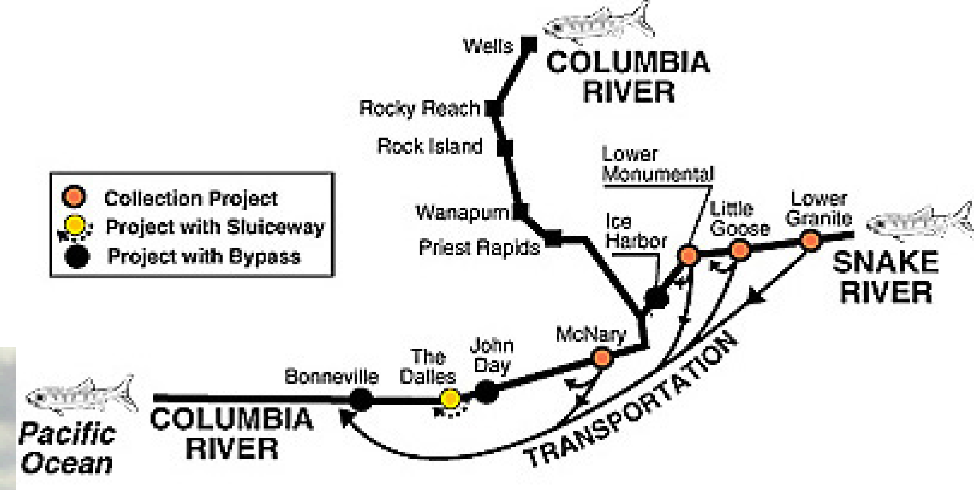
Transmission Ownership

- The transmission investor (whether a transmission user or not) may receive ownership of the transmission project, or – typically – a portion of the capacity of the project, to either use or lease to others – as the mechanism for its ROR
- Transmission Provider often retains the right & obligation to maintain and operate the grid, including the transmission project in question
  - Transmission Provider may also serve as an agent to lease the capacity to others, for the transmission investor

The Key to Success

- Mix and Match to met the needs of the particular case
- Assess the interests of various parties and use varying financial solutions to meet those needs
- Develop multiple partners
- Develop multiple transmission options
- Have a thorough understanding of your business partners business case – to assure that you are responsive to their needs and to assure that you can exert the maximum leverage possible

Pacific Ocean
Washington
Montana
Idaho
Columbia River
Willamette River
Chief Joseph
Grand Coulee
Wells
Rocky Reach
Rock Island
Wanapum
Priest Rapids
Lower Monumental
Lower Granite
Little Goose
Ice Harbor
The Dalles
Bonneville
John Day
McNary
Albeni Falls
Libby
Hungry Horse
Dworshak
Hells Canyon
Oxbow
Brownlee
Chum Salmon
Chinook Salmon
Steelhead
Sockeye Salmon
White Sturgeon
Bull Trout

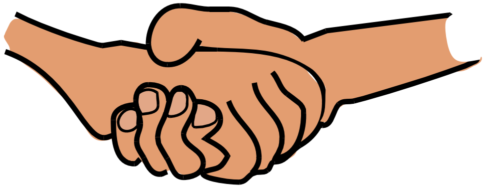


Collection facilities at four dams

•**22 million juveniles transported**

Requires Cooperation of All Players

- All Players Must Know & Follow the Rules
  - Agree on Project and Investment Plans
- All Players Must Follow the Orders of The Grid Operator



Transmission Planning and Investment in PJM

Kenneth W. Laughlin

PJM, USA

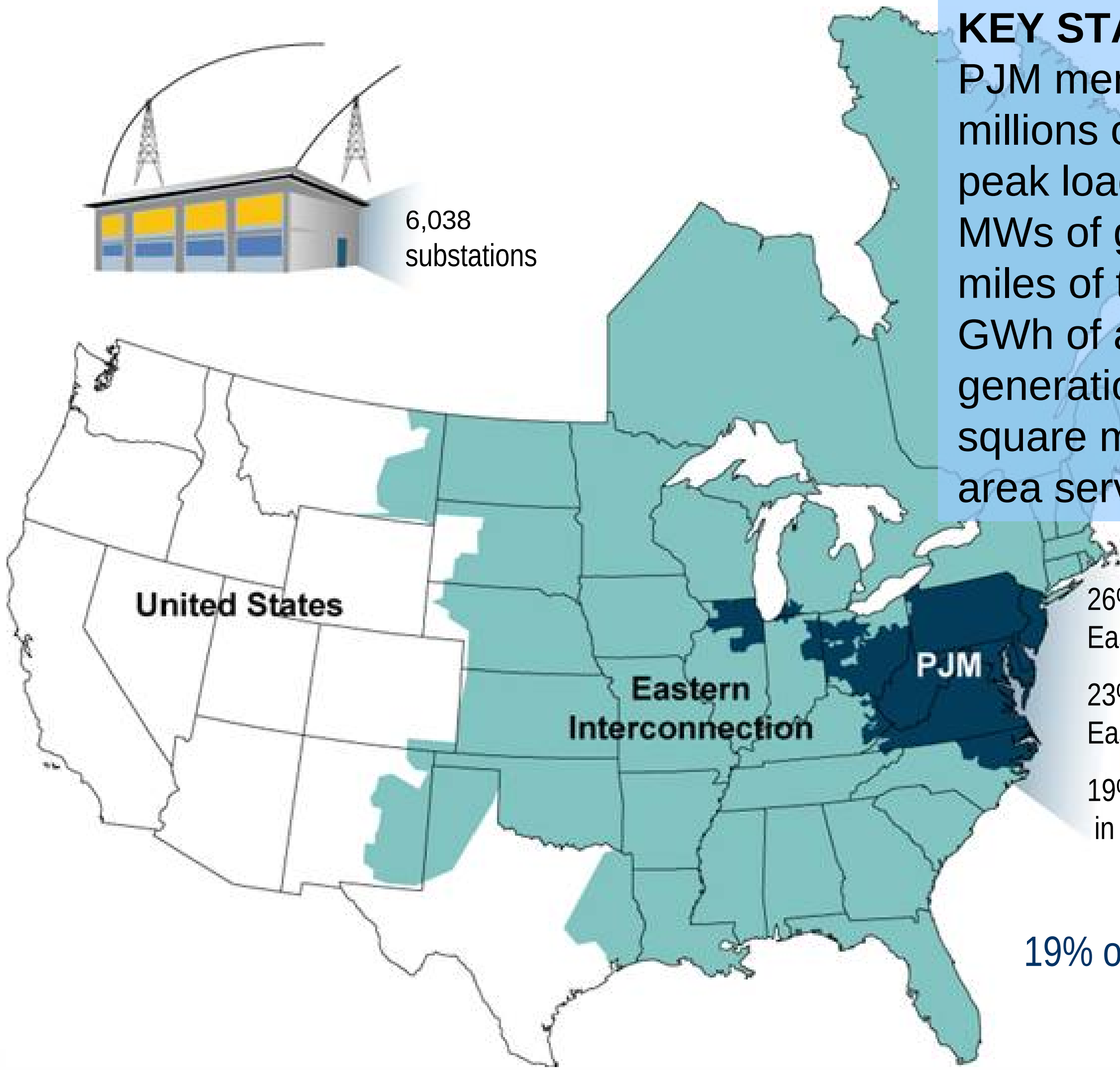
September 5, 2006

PJM as Part of the US Eastern Interconnection

6,038 substations

KEY STATISTICS

PJM member companies	400
millions of people served	51
peak load in megawatts	145,000
MWs of generating capacity	165,303
miles of transmission lines	56,070
GWh of annual energy	728,000
generation sources	1,271
square miles of territory	164,260
area served	13 states + DC



26% of generation in Eastern Interconnection

23% of load in Eastern Interconnection

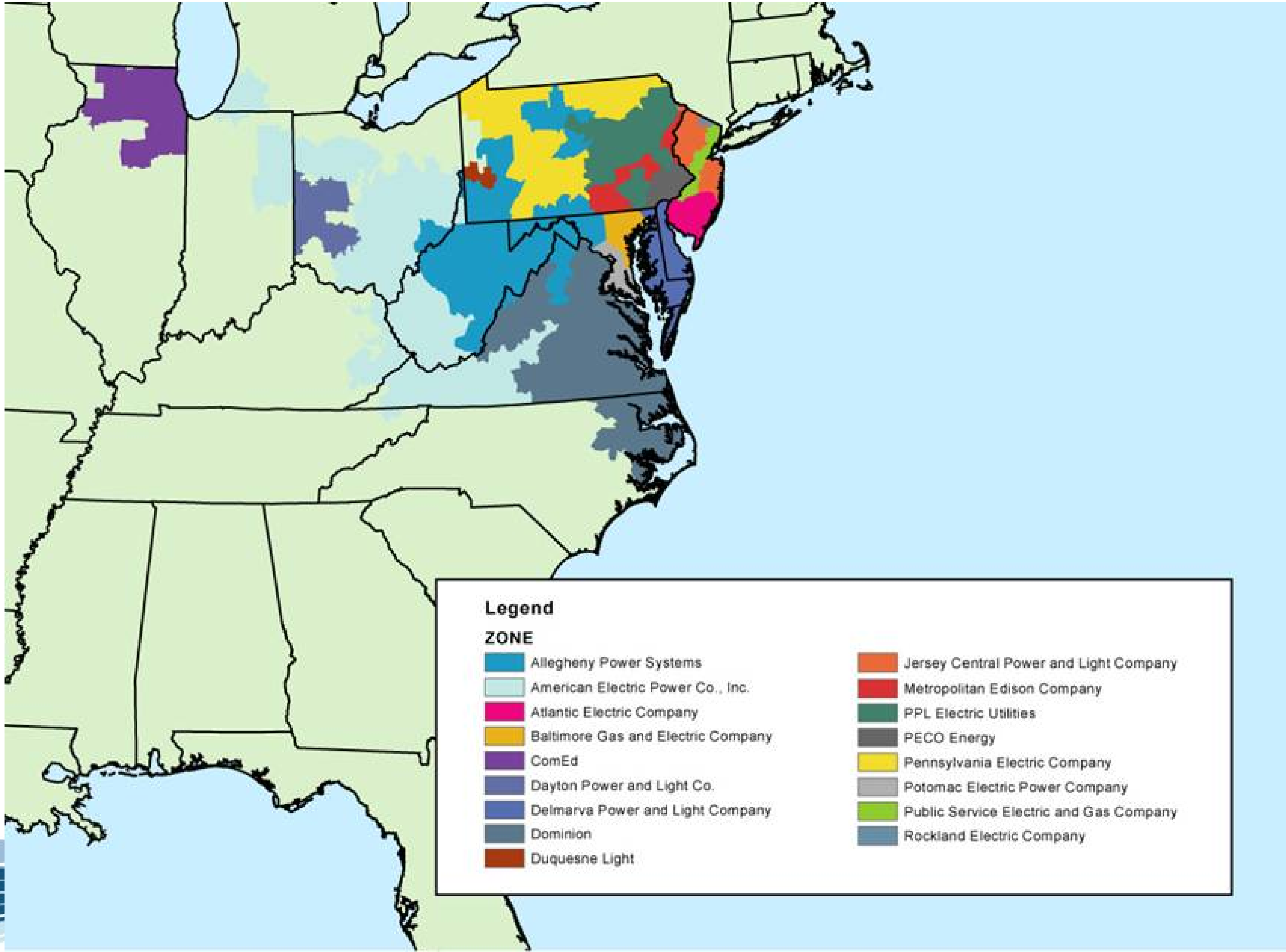
19% of transmission assets in Eastern Interconnection

19% of U.S. GDP produced in PJM

What is a Regional Transmission Organization ?

- An independent entity that is responsible for:
  - Operating competitive wholesale markets
  - Administering transmission tariff
  - Safe and reliable operation of regional power grid
  - Ensuring competitive open access to transmission where no member or member group has undo influence
- RTO owns no transmission or generation assets and has no financial interest in the wholesale market or in any of the market participants

PJM Transmission Zones

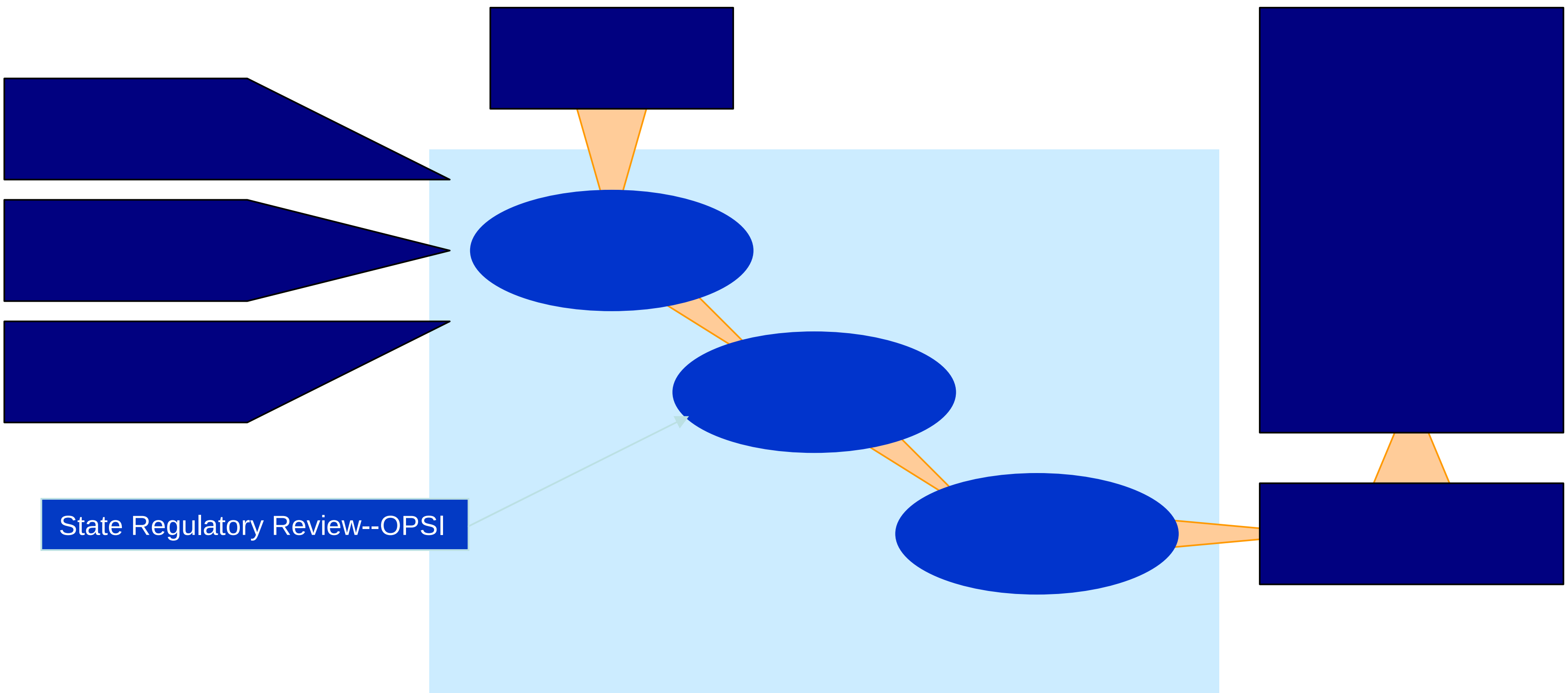


RTO Functions

- Transmission provider/ tariff administration
- Coordinate switching and outage scheduling
- Security analysis / maintain operational reliability of grid
- Regional transmission planning
- Generation interconnection analysis
- Transmission capacitor deployment
- Set reactive transfer limits

Transmission owner

- File transmission rates with FERC
- Schedule transmission outages
- Perform maintenance and switching
- Set equipment ratings
- Distribution capacitor deployment
- Transmission operations (LTC and PAR settings)


State Regulatory Review--OPSI

- PJM Transmission Tariff
  - License plate tariff set by transmission zones
  - Transmission rate paid for all load in transmission zone at rate approved by federal government
  - Grandfathered, physical-delivery transmission contracts supported as financial contracts

- PJM Performs Transmission Planning
  - Transmission owners must build as defined by PJM
  - Planning for Reliability criteria and for economics

- Must have an integrated solution – need generation and transmission
  - Cannot build enough transmission fast enough to resolve problems
- Need locational price signals
  - Need to build generation in proper location based on deliverability shortfall
- Need price signals and sufficient lead time
  - Generators must have sufficient incentives and time to respond in order to compete with transmission

- Integrate all needs and all solutions
- Stakeholder involvement
- State focus
- Fully Integrated Planning, Markets, and Operations
- Infrastructure Management as an Integrated System; Single Entity Decision-Making
- Well defined cost allocation / cost recovery
- Risk assessment, aging infrastructure

Transmission Expansion Plan Results

- **Approx. 2/3 of planned investment was to support generation interconnection requests**
  - Some generation projects withdraw from queue based on high cost of transmission to deliver energy
  - RMR contracts required for retiring generators due to transmission construction times
- **Numerous upgrades to existing infrastructure to mitigate load deliverability criteria violations**
  - Primarily additions of transformers, and upgraded conductors and station equipment
  - New construction and significant upgrades to existing infrastructure to mitigate baseline violations

Transmission Expansion Drivers

- **Generation interconnection requests**
  - Larger projects in west, many wind projects
- **Transmission congestion**
  - Significant west to east congestion costs based on access to western base load resources
- **Operational performance issues**
  - Exacerbated by west to east transfers
- **PJM Load deliverability criteria violations**
  - High load growth plus generation retirements plus few new generation projects in east

- **Enhance Reliability Through Fully Integrated Planning, Markets and Operations**

Network System Operation

Locational Marginal Pricing and System Dispatch in PJM

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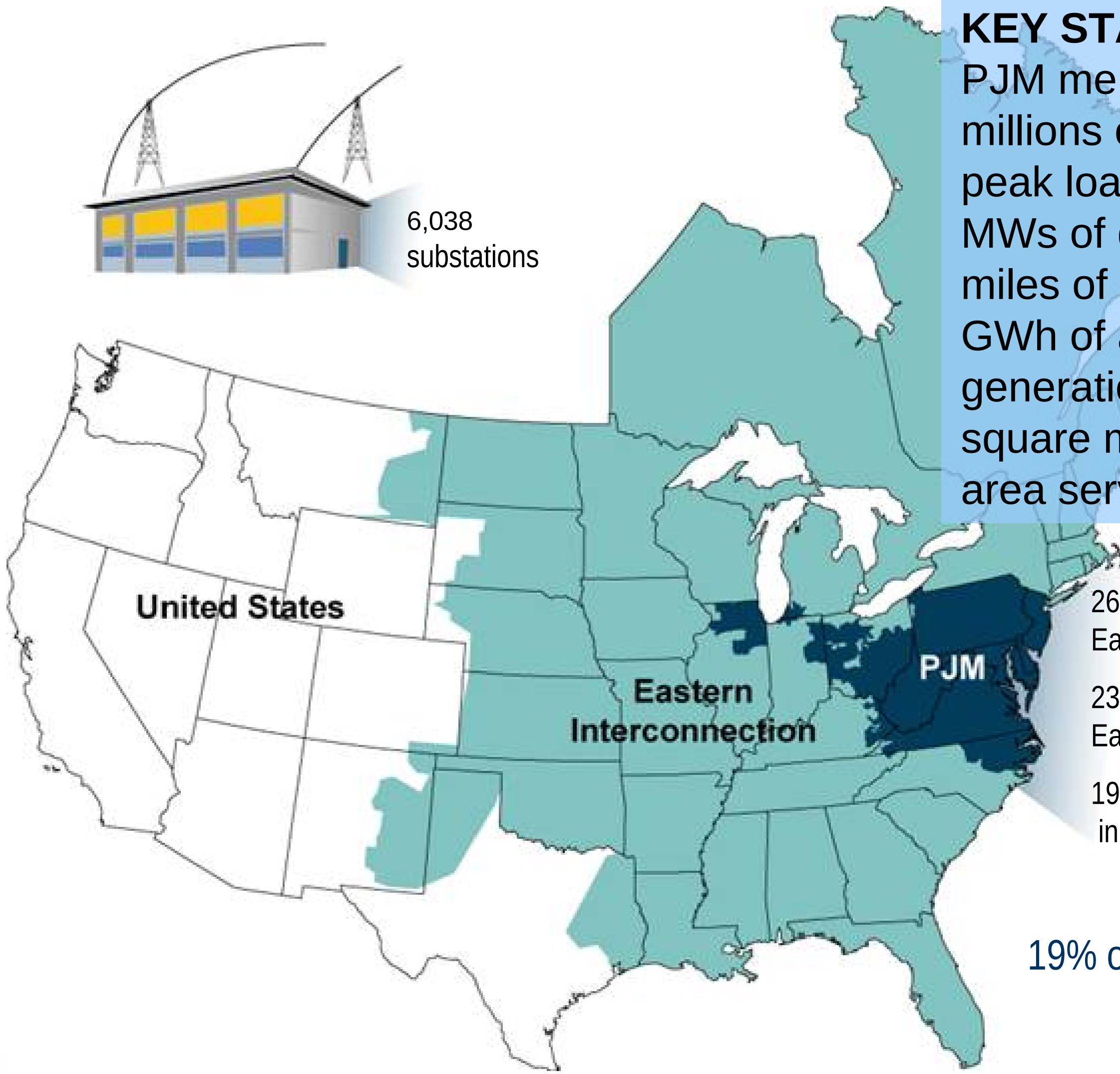

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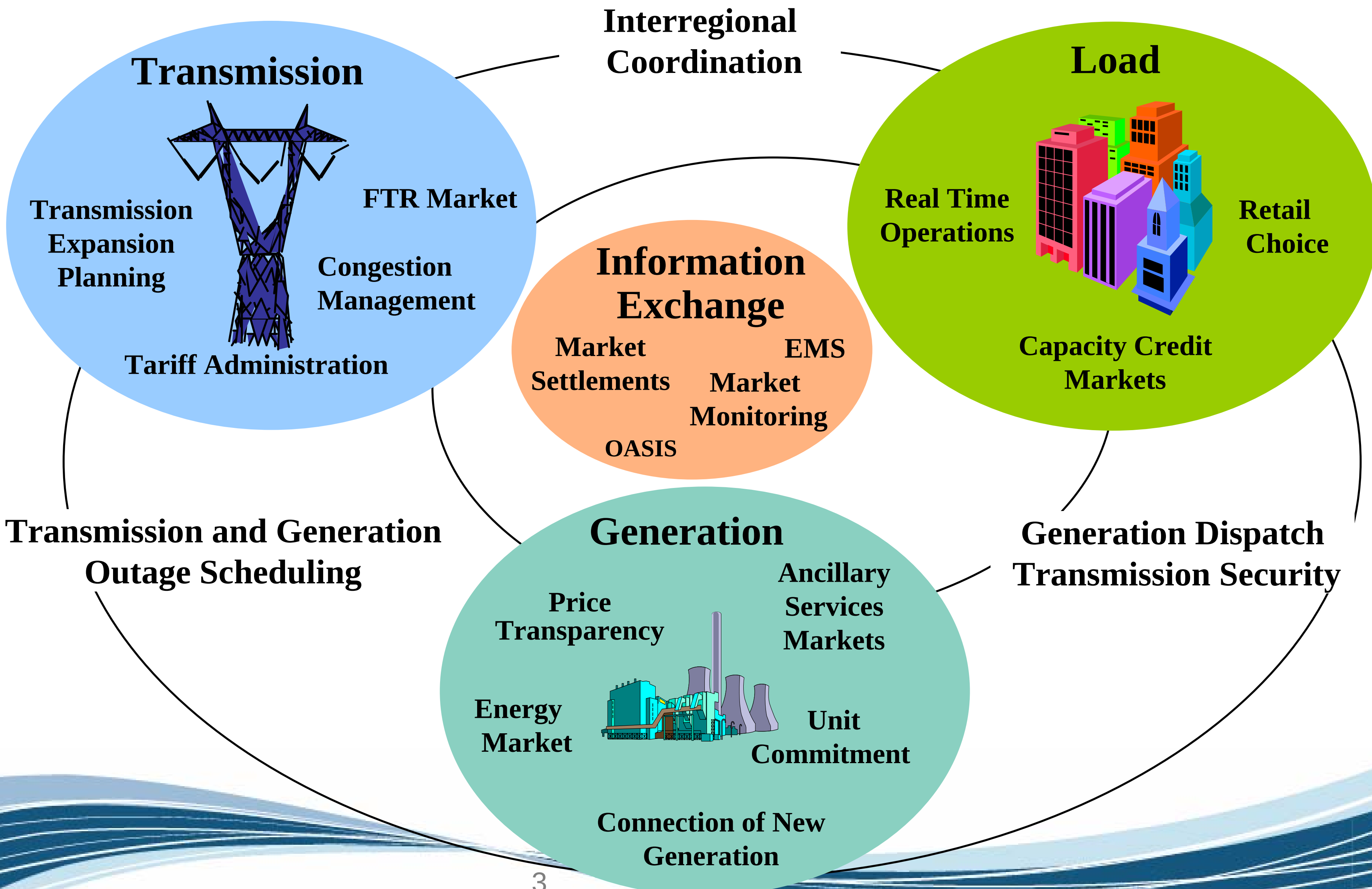
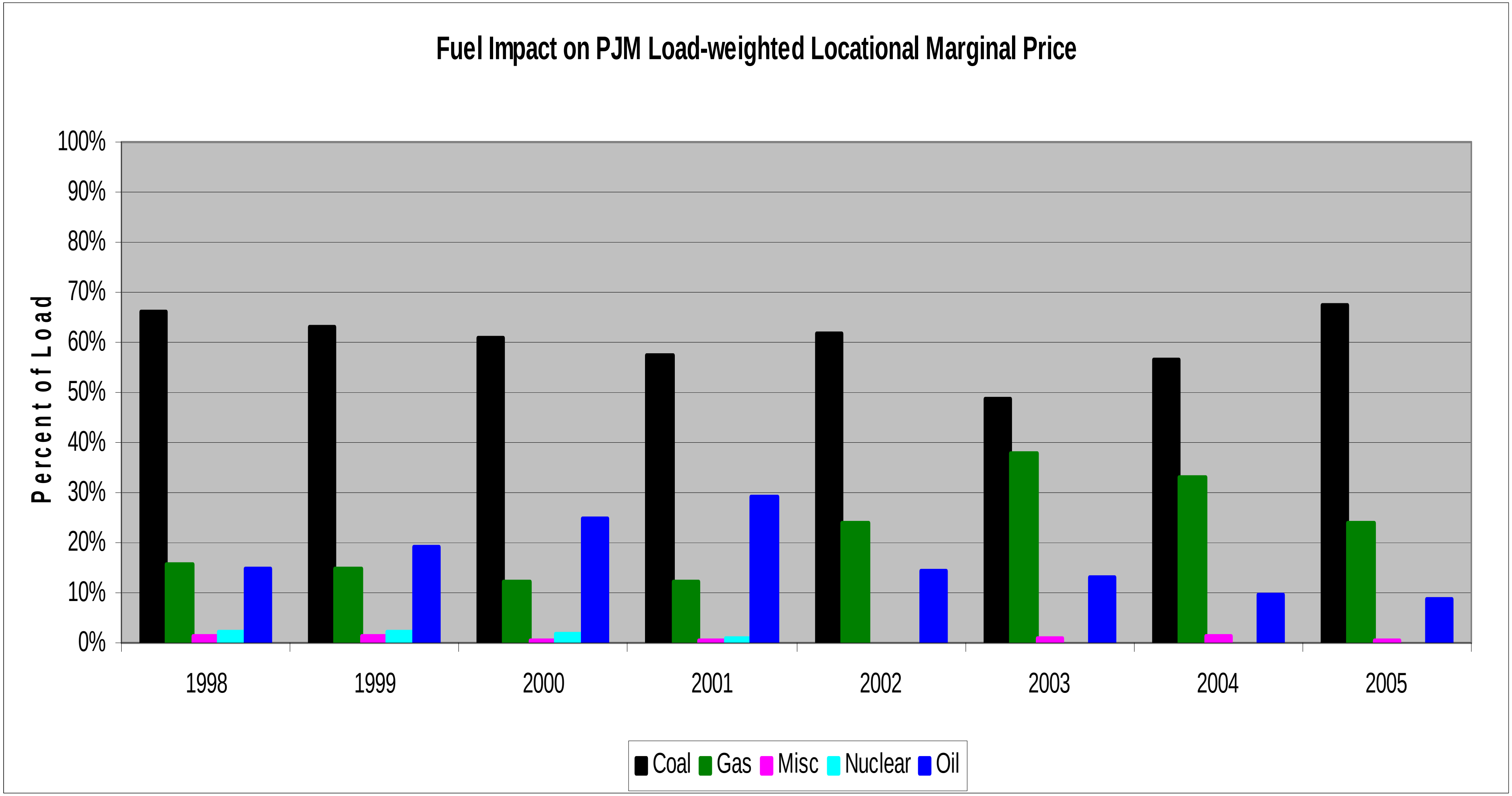
RTO Operation



Impact of Various Fuels on PJM Marginal Price
Marginal Unit sets Price



RTO performs Control Area functions

- Manage Control Area ACE
- Set operating reserve, regulation and spinning reserve targets
- Generation Scheduling
- Real-time security-constrained economic generation dispatch
- Regional Reliability coordination, reporting and compliance
- Deploy regulation, spinning and operating reserves
- Operate all of the markets

RTO Functions

- Load Forecast for reliability analysis
- Ensure adequate generation scheduled and dispatched to satisfy load forecast
- Accept demand bids in Day-ahead market
- Administer Demand Response
- Set operating reserve requirements
- Set installed capacity requirements

Load Serving Entities

- Load forecast for commercial position
- Manage energy supply requirements
- Manage generation adequacy contracts
- Enter into hedging contracts

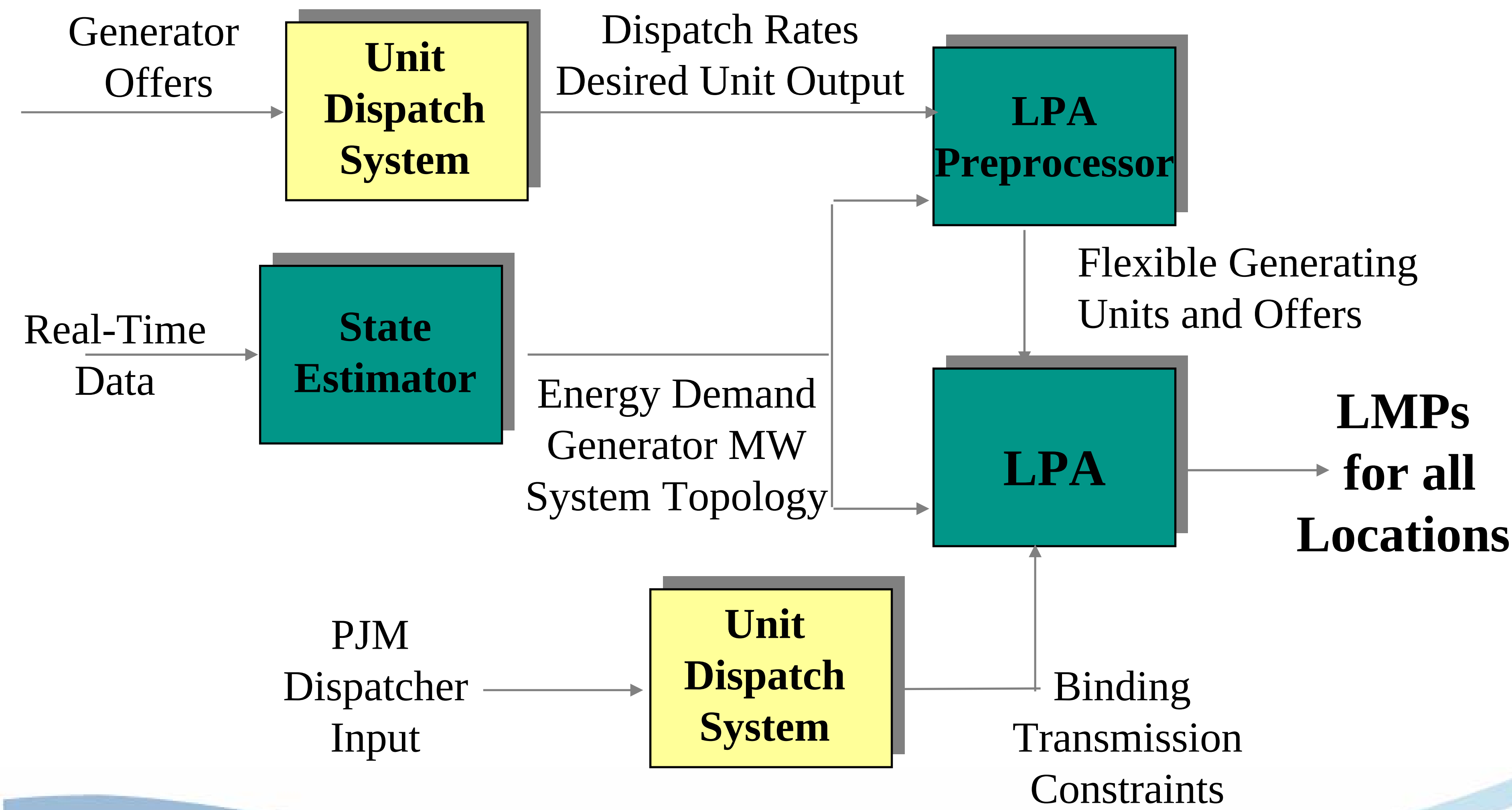
RTO Functions

- Perform Real-time generation dispatch
- Accept Generation offers in Day-ahead and real-time markets
- Unit commitment, Generation scheduling
- Send generation control signals
  - Load following
  - Regulation
  - Spin

Generation Owner

- Schedule generation outages
- Manage generator offer information
- Operate generating plants, Maintain plants, etc.
- Offer various products (energy,capacity,regulation ,spin,etc)
- Manage generation portfolio w/ three alternatives:
  - Self-schedule
  - Bilateral sale or
  - Submit offer and follow RTO dispatch

LMP Functional Model



- Least-cost, security-constrained, economic dispatch optimizes energy and reserves and calculates unit specific dispatch instructions for the next five-minute period. (ex-ante dispatch)
- LMP values calculated every five minutes based on actual generation response to dispatch instructions that were sent in the previous five minute period (ex-post pricing)

- Generation is incented to follow real-time dispatch instructions:
  - If generation is following real-time dispatch instructions then it is eligible to set LMP, otherwise it become a price taker.
  - If generation is scheduled by PJM and is following real-time dispatch instructions then it receives a revenue guarantee of at least its specified offer data, otherwise there is not revenue guarantee.
- No penalties are imposed for over or under generation

- LMP pricing, pricing based on actual system operating conditions
- State estimator updated continuously (every minute)
- Same model for day-ahead market, system scheduling, dispatch, and settlements
- High degree of consistency between dispatch instructions and generator LMP prices
- Consistency results in market confidence

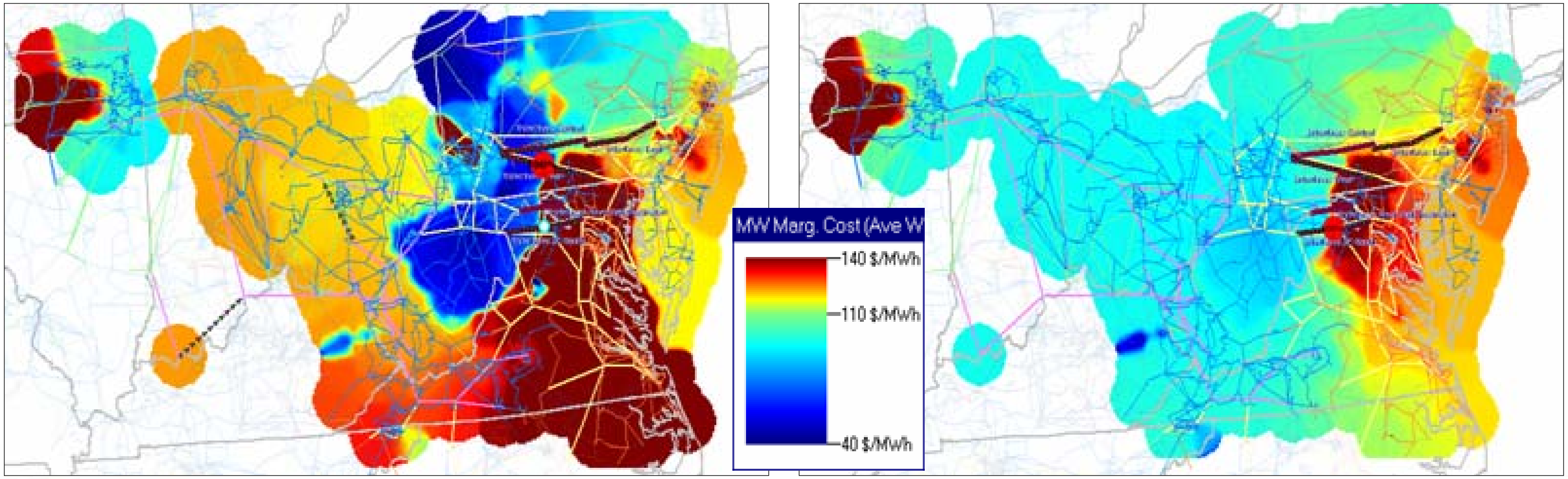
- **Locational Marginal Pricing**
  - System generation forced outage rate reduced from 11% before markets to 7% by 2003
  - Coordinated regional dispatch - improved ability to respond to system disturbances
  - LMP to manage congestion
    - Market response to congestion signal has achieved transmission control performance that is 7 to 10 times faster that pre-market response

Increased Efficiency

- **Lower energy prices across the expanded PJM region**
  - ESAI's technical study: region-wide energy price without integration would be $0.78/MWh higher in 2005 than with integration.
  - Spreading these savings over the total PJM RTO's energy demand of 700 terawatt-hours (TWh) per year yields aggregate savings of over $500 million per year.

Pre-Integration Price Pattern

Post-integration Energy Price Pattern



Key Issues for New Customers

- Develop understanding of Locational Marginal Pricing.
- Understand how Self-scheduling alternative coupled with Financial Transmission Rights is equivalent to physical right to deliver.
- Paradigm shift for generation plant management
- Develop hedging strategies

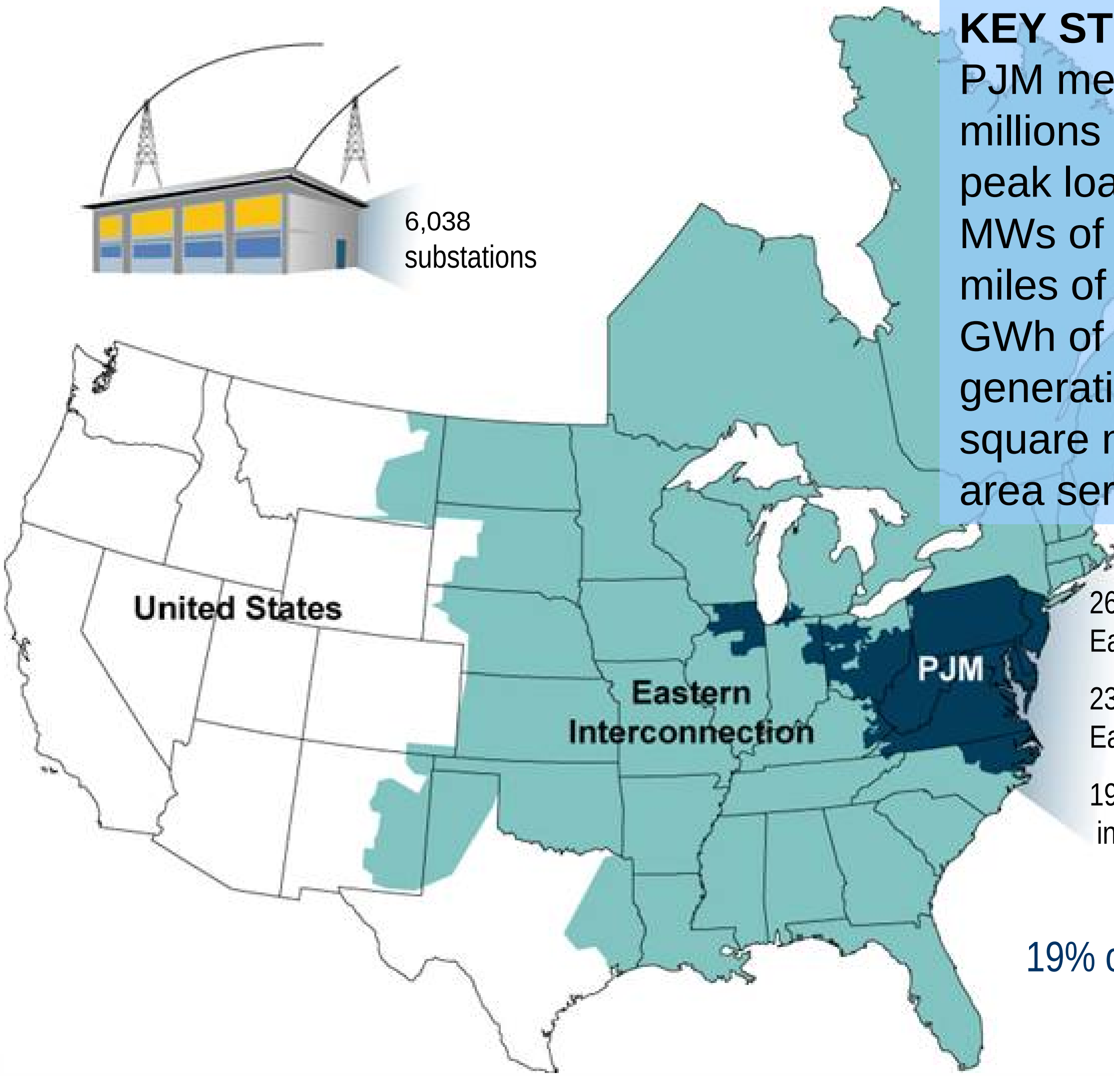
PJM Electricity Markets
Institutional, Technical and Economic Aspects

Kenneth W. Laughlin

PJM, USA

September 5, 2006

PJM as Part of the US Eastern Interconnection



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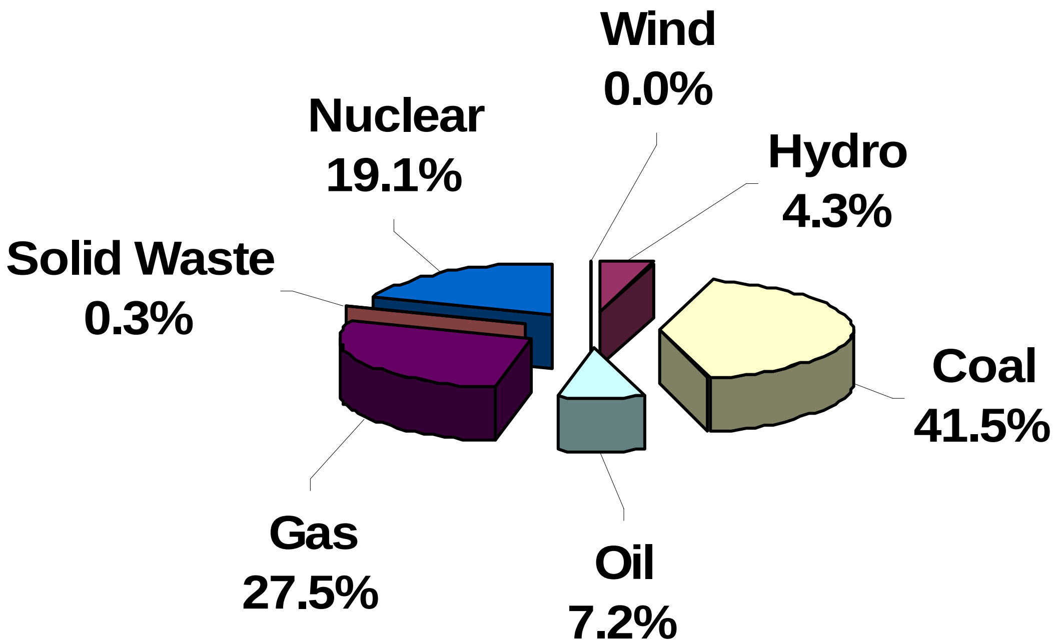
PJM RTO Capacity (2005)



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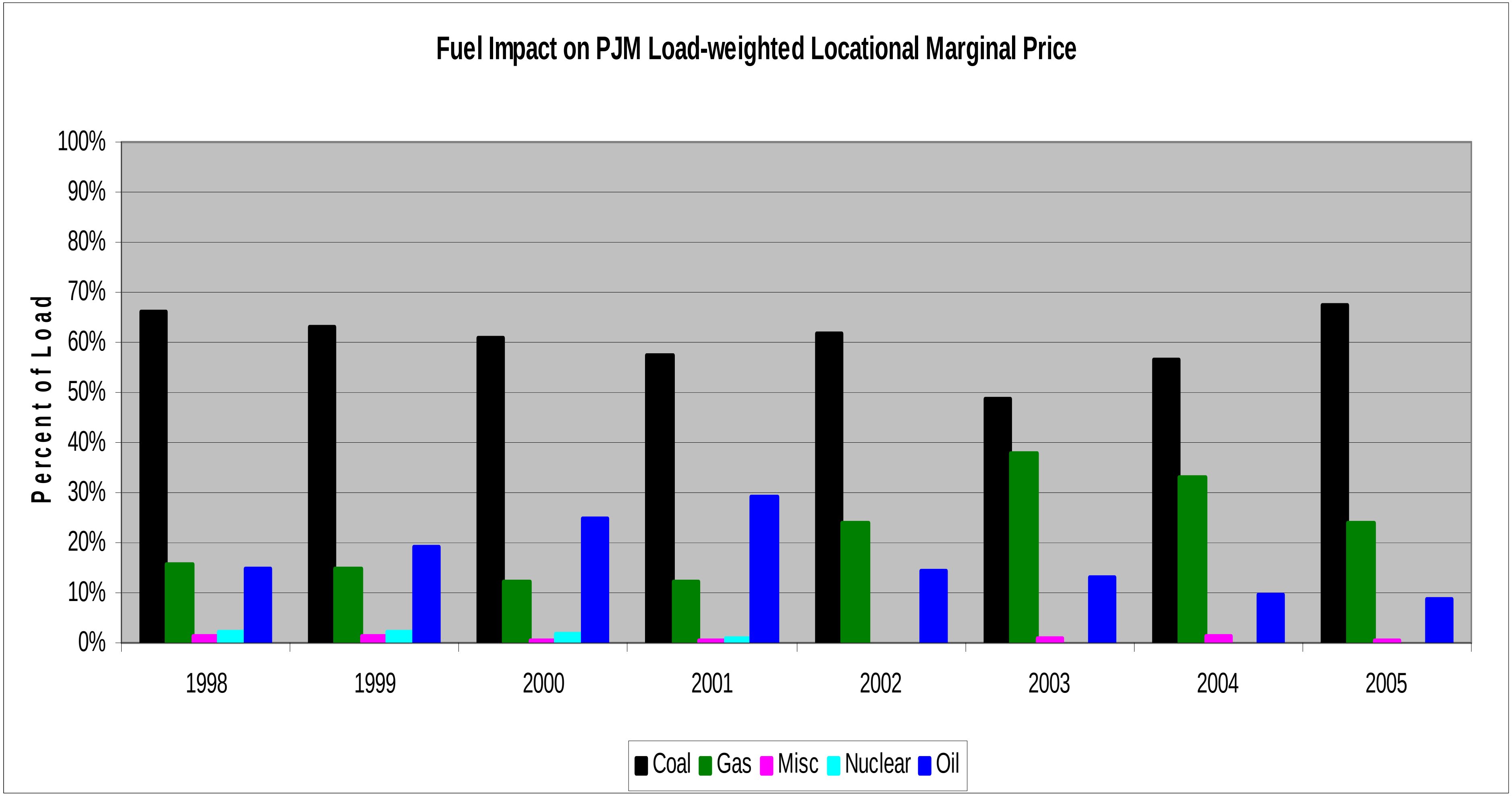


- Bilateral transactions (and self-supply) properly form the bulk of trades
- Participants should have all available options to meet their needs
- Energy is the market focus; ancillary services are ancillary
- Transparent Pricing and customer confidence encourage investment

- Electric energy prices are volatile by nature; risk management tools are necessary
- Cost Causation - Costs should be borne by those who cause them
- Markets must support Retail Access and Demand Response programs
- Native load customers must receive priority for transmission utilization

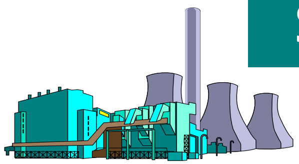
- Markets should be incentive-based; actions to enhance system reliability should be in the financial best interest of the participants

- The heart of an energy market is the bid-based, security-constrained unit commitment and dispatch

- Congestion Management can only be correctly done by full (nodal) Locational Marginal Pricing;
  an accurate model of the transmission system is critical

PJM Member Options in Time for Energy Supply

Forward Contracts



Self-scheduled own resources

Bilateral Transactions

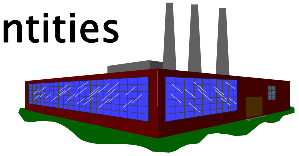
PJM Day Ahead Market

PJM Real-Time Energy Market

Retail Load Profile True-up

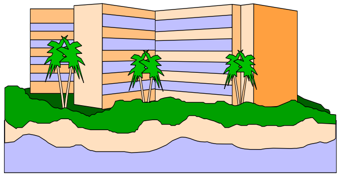
Customers

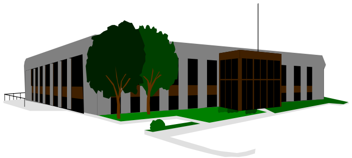
Industrial Load Serving Entities



Residential **LSEs**

Commercial LSEs





Other Buyers, Load Aggregators

- Transmission is a natural monopoly and is priced at “cost-plus” by regulators
  - *Build decision made by PJM, Regulator*
  - *Bad decision* risk *resides with retail customers*
- Generation is bid competitively (wholesale)
  - *Build decision by owner on speculation*
  - *Bad decision* risk *resides with generation owners*
- RTOs price their services at cost of service

Basic design of a successful market

Bilateral schedules at difference of nodal prices

License plate Transmission Access charges

Coordinated spot market

Bid-based, security–constrained, economic dispatch with Nodal Prices

Market driven investment

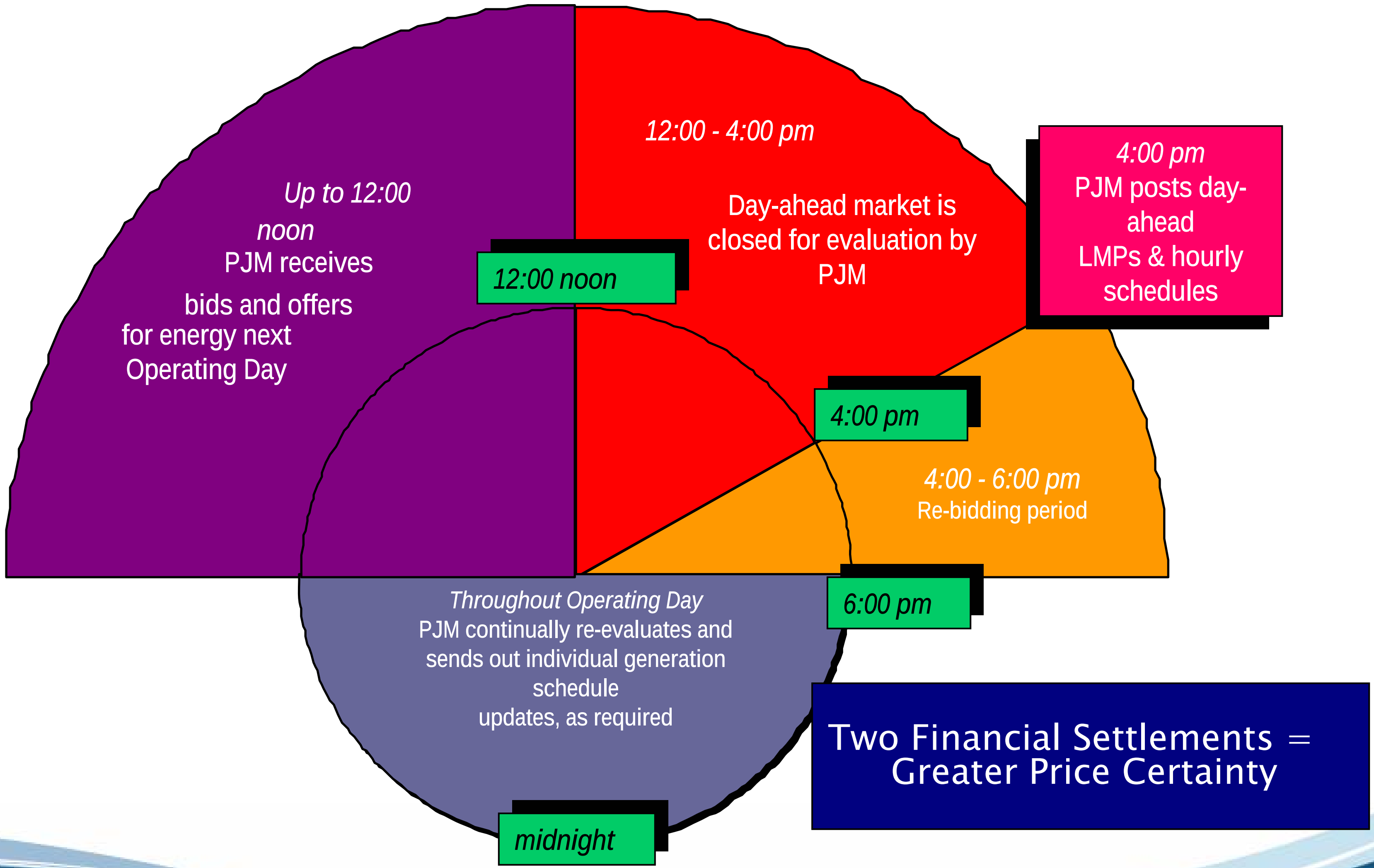
Financial Transmission Rights

- Futures
  - NYMEX PJM West Hub Contract
- Forward Market
  - Energy Brokers
  - RTO Day-ahead Energy Market
- Real-time Balancing Market
  - RTO Security–constrained, economic dispatch
- Additional hedging alternatives
  - Financial Transmission Rights
- Ancillary Services Markets
  - Regulation, spinning, black start, reactive
- Capacity Market
  - Call contract

- Day-Ahead Energy Market
  - develop day-ahead schedule using least-cost security constrained unit commitment and dispatch. Based on full transmission network model.
  - calculate hourly LMPs for next operating day using generation offers, demand bids, bilateral transaction schedules, virtual bids / offers

- Real-Time Energy Market
  - calculate hourly LMPs based on actual system operating conditions

PJM Market Timeline



- Day-Ahead Market Settlement
  - based on scheduled hourly MW quantities and day-ahead LMPs

- Balancing Market Settlement
  - based on hourly MW quantity deviations between real-time and day-ahead
  - MW quantity deviations settled at real-time LMPs

- Virtual supply offers and demand bids
  - offer/bid to sell/buy block of energy at a price
  - do not require physical generation or load
  - submitted at any location for which PJM calculates an LMP
- Virtual supply offer looks like a spot sale or dispatchable resource
- Virtual demand bid looks like a spot purchase or price-sensitive demand

- Voluntary Bid-Based Market
  - Unit Specific (start-up, no-load and energy bids)
  - External Transactions: Unit specific or Slice of System (energy only)
  - generation may offer or self-schedule
  - Bids “locked in” by noon day before with rebid period for generation not selected day-ahead
- Generation status and self-scheduled quantities can change in-day with 20 minute notice

- Generation is incented to follow real-time dispatch instructions:
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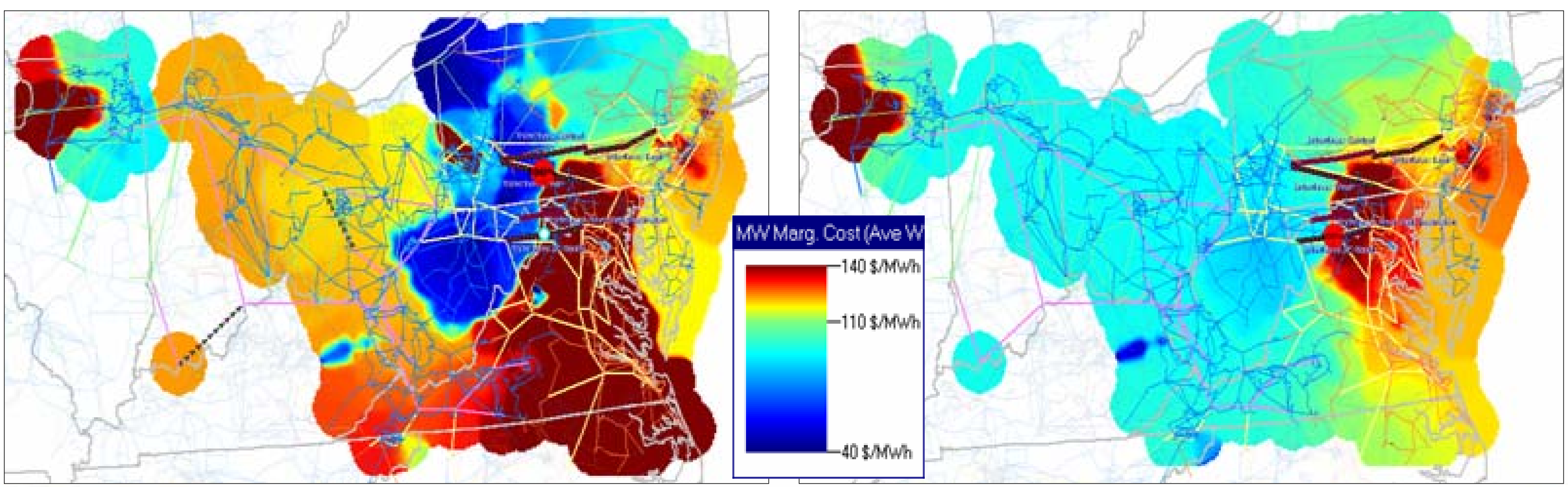
Post-integration Energy Price Pattern



Operations ⟷ Markets

EMS must coordinate with and support Markets Systems to give coherent results

EMS	**Markets**
• Data acquisition • Data management	• Same data
• Supply (generation) applications	• Supply decisions
• Transmission network and security applications	• Same network applications

- Develop understanding of Locational Marginal Pricing.
- Understand how Self-scheduling alternative coupled with Financial Transmission Rights is equivalent to physical right to deliver.
- Paradigm shift for generation plant management
- Develop hedging strategies

Implementation Lessons Learned

- Incremental Implementation Approach
  - Market Matures through evolutionary process
- Market Flexibility
  - Support bilateral transactions
  - Self scheduling of supply
  - Spot Market access
- Market Information
  - Internet posting system
  - Participant Training
- Market Incentives
- Market Adaptation

Interaction between NARUC representatives & NTPC officials

On 5th September, 2006

1. **Generation**

- **Fair Cost of Supply**

  a. In the event of regulated pricing whether pricing is done for the utility as a whole or it is done station wise? What should be the right approach?

  b. What is the treatment of depreciation in determining fair cost of supply in a regulated pricing? Is it retirement of capital or replacement of assets?

  c. Concept of Long Run Marginal Cost and its relative advantages /disadvantages.

  d. Whether Power Purchase Agreements signed with generating companies are for a defined period say 10 – 15 years or for supply of power on perpetual basis?

- **Renovation & Modernization of Power plants**:

  a. Treatment of capital expenditure for renovation and modernization of power plant after its useful life

  b. How the tariff of renovated station is determined?

- **Tariff setting:**

  a. O&M expenses: How the increased expenses due to aging of Power plants are factored into the tariff?

  b. Depreciation: In a year when the performance falls below the normative level (Target Availability) whether the depreciation recovery is lost or it get merely postponed?

  c. NFA (Net Fixed Asset) concept or GFA (Gross Fixed Asset) concept for tariff determination: Which is applicable in USA?

  d. Tariff determination of part regulated and part merchant Power station.

- **Power Trading**

  a. Whether trading margins are capped?

  b. Whether trading between two traders is allowed?

  c. How the price of traded electricity is being determined? Is it regulated or market based?

- **Merchant Power plants**

a. How is the US experience in merchant generation?

b. What are the issues in Merchant power plants?

c. How the Tariff for merchant generation determined? Any kind of regulation for Merchant Tariff?

d. How the risk of evacuation from merchant generation is mitigated?

2. Transmission

- **Planning and Investment**

a. What are the mechanisms for attracting investment in Transmission sector?

b. How the Merchant transmission system is planned and operated in the US?

- **Pricing**

a. How the Transmission tariff is determined in USA?

b. Description and analysis of various models for Transmission Tariff like Postage Stamp, MegaWatt-mile, Point of Connection, Locational Marginal pricing, etc.

c. Suggestions on the Transmission Pricing for Power Market Development in India, Options for Loss allocation in Transmission pricing?

d. Which Transmission pricing mechanism is suitable for power exchange?

3. System operation

a. What are the issues with network system operation?

b. Transmission system operator (TSO) vis-à-vis Independent system operator (ISO)- Which model is preferable?

c. Comparative analysis of various options for network system operation like ISO and TSO.

4. Market Development- Power Exchange

a. What are the conditions for development of successful National Power Market & Power Exchange?

b. What are the Financial transmission rights and auction revenue rights?

c. How the Bidding done in Power exchange for sale of power: Same price for all the settlements OR Pay-as-bid?

d. What is the Market settlement mechanism? How it functions?

e. What are the Spinning reserve requirements? How it is determined and maintained within the system?

f. What is the payment obligation for spinning reserve?

g. How the Market based regulation functions, what are the major issues?

h. How Ancillary services are being maintained?

Annex 4- Task 4 Deliverables

h) United Nations Framework Convention on Climate Change (UNFCCC) Ninth Conference of Parties (COP 9)- December 1-12, 2003

i) United Nations Framework Convention on Climate Change (UNFCCC) Tenth Conference of Parties (COP 10)- December 6-17, 2004

United Nations Framework Convention on Climate Change (UNFCCC)
Ninth Conference of Parties (COP 9)
(December 1-12, 2003)

UNFCC Ninth Session of the Conference of the Parties to the Climate Change Convention (COP 9), December 1-12, 2003, Milan, Italy

Synopsis:

The 188 Parties to the United Nations Climate Change Convention met in Milan from 1 to 12 December to assess progress in addressing climate change and to set the global agenda for the coming year. During the Conference, NARUC conducted a "Kick-Off" meeting for the ICEC project on Friday, October 25th from 2-3 pm. The session focused on brining policy, finance and technology experts together to address global climate change, it was attended by NARUC representatives:

- David Hadley, Commissioner, Indiana Utility Regulatory Commission
- Frederick Butler, Commissioner, New Jersey Board of Public Utilities
- Jim Burg, Commissioner, South Dakota Public Utilities Commission
- Andrew Spahn, NARUC

United Nations Framework Convention on Climate Change
(UNFCCC) Tenth Conference of Parties (COP 10)
(December 6-17, 2004)

ENB the earth negotiations bulletin on the side

published by IISD, the International Institute for Sustainable Development
in cooperation with the Climate Change Secretariat

International Institute for Sustainable Development

UNFCCC

Special Report on Selected Side Events at UNFCCC COP-10

6 - 17 December 2004 | Buenos Aires, Argentina

Daily Web Coverage & Daily Reports:

Monday 6	Tuesday 7	Wednesday 8	Thursday 9
Friday 10	Saturday 11	Monday 13	Tuesday 14
Wednesday 15	Thursday 16	Friday 17	Analysis

Events convened on Saturday, 11 December 2004

Update on climate actions in US States

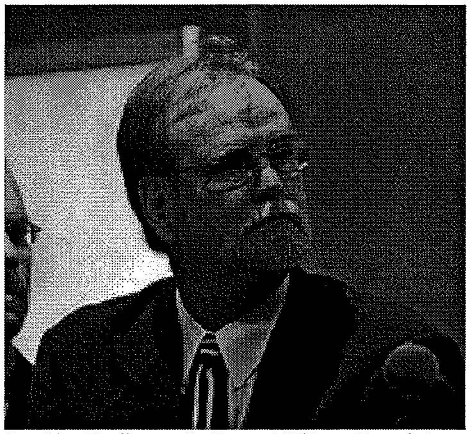
Presented by Northeast States for Coordinated Air Use Management (NESCAUM) and National Association of Re(
Utility Commissioners (NARUC)

Kenneth Colburn, NESCAUM, indicated that 17 US States now have requirements for

Kenneth Colburn, NESCAUM, indicated that the Northe recognize the need for early action on climate change, and st these States have a history of leading by example on en\ legislation. He outlined actions in California to address emissions, with the "Pavley" law requiring a 30% carb emissions reduction by 2016. He indicated that these provisic echoed in the Northeast, to cover 30% of the US automobil Acknowledging that technology development is vital, he str States are seeking to create drivers.

Frederick Butler, State of New Jersey, introduced the Regi house gas Initiative (RGGI), which includes the participati Northeast and Mid-Atlantic States. He outlined RGGI's ir develop a multi-State "cap-and-trade" program for carb emissions from power plants, indicating that the design of tl renewable energy use

should be completed by April 2005.


David Hadley, Indian Utility Regulatory Commission, indicated that the world economy currently uses 14,000 terra watts of electricity, noting that this is expected to rise to 35,000 terra watts in 50 years

David Hadley, Indian Utility Regulatory Commission, consider of public utility commissioners in promoting climate change ini indicated that the US is on the verge of a major building cycle generation, stressing that this represents an economic oppo companies to shift toward cleaner power plant technologies that while natural gas is increasingly expensive and nuclear p a feasible option, coal provides a cheap, reliable ener highlighting the potential role of coal gasification in reducing from coal-fired power stations. He stressed the need for policy promote a technology shift and for education to ensure com developing solutions.

Andrew Spahn, NARUC, introduced the report "Ending t Stalemate," which provides a fresh look at US climate commitr domestically and internationally. He said the report considers can work cooperatively to develop initiatives encouraging renewable energy. He said the report recommends that Congre a "cap-and-trade" program for carbon dioxide, relying on permits to reduce the emission intensity of pow

Jim Marzilli, State of Massachusetts, indicated that limited public awareness of climate change results in limited legislative activity. He emphasized that climate change must be framed as an security issue to bring it onto the US legislative agenda, and stressed that the US is not go leadership on climate change emerging from the federal government. However, he highlighted State actions pursued across the country at the municipal and State levels. He identified two c namely ensuring effective communication with the public, and bringing State and local poli together to discuss direct international engagement to allow them to go beyond action by t government.

Discussion: Participants commended US State-level action on climate change, and considere international community can encourage the re-engagement of the US federal government in t regime. Colburn acknowledged that the Presidential target to reduce green house gas (GHG) ir 18% by 2012 represents business as usual, since it follows current trends in energy efficiency i participant flagged the danger of the federal government reducing the capacity of US States climate change.

More information:	**Contact:**
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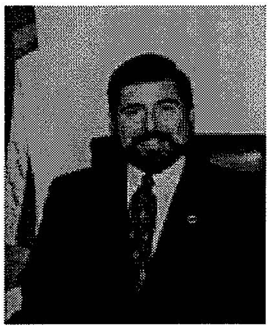
The contribution of regional governments in tackling climate change

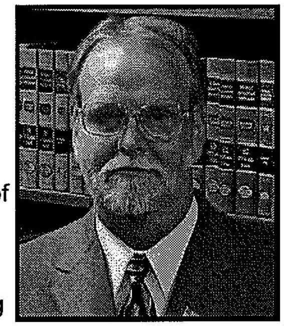
Presented by the Government of Belgium

NARUC DELEGATION HIGHLIGHTS STATE-FEDERAL COOPERATION ON GLOBAL CLIMATE CHANGE



Com. Butler

Buenos Aires, Argentina (December 7-15, 2004) - New Jersey Commissioner Frederick Butler (Chair of NARUC's Ad Hoc Committee on Global Climate Change) and Indiana Commissioner David Hadley (Chair of the NARUC-DOE Clean Coal and Carbon Sequestration Partnership) spearheaded NARUC's participation in the 10th Conference of Parties (COP-10) of the United Nations Framework Convention on Climate Change. The NARUC delegation conducted a series of high-level meetings with U.S. and international officials on regulatory issues affecting the reduction of carbon dioxide emissions from the energy sector. The collaboration was punctuated by a face-to-face meeting with U.S. Representative Joe Barton (TX), U.S. Senator Craig Thomas (WY), and U.S. Senator Larry Craig (ID). The Congressional delegation commended NARUC's work on promoting voluntary and cost-effective approaches to address climate change.



Com. Hadley

COP 10 Background. Since 1997 NARUC has been participating in the COP process as a non governmental organization (officially recognized by the United Nations). NARUC was the only State-based organization to attending the Buenos Aires conference.

COP 10 was a watershed meeting. The convention came against the backdrop of Kyoto's impending entry into force (setting the stage to reduce global greenhouse gas emissions to below 1990 levels). With Russia's ratification in November, the Protocol is set to take effect on February 16, establishing the first binding international commitments to limit greenhouse gas emissions and an international emissions trading system to promote cost-effective reductions. Carbon dioxide is considered the primary "greenhouse gas" that seems to accelerate the warming of the earth's atmosphere.

Following U.S. rejection of Kyoto in 2001, the annual COPs had been marked by deep uncertainty over the fate of the Protocol. While Kyoto's resurrection by Russia provided some air of relief in Buenos Aires, that mood quickly gave way to a new anxiety: whether it will be possible to strengthen the international effort beyond 2012 (the end of the first commitment period under Kyoto). Most experts understand that any meaningful global approach to addressing global climate change must include the United States. Many agree that the U.S.may eventually develop mandatory carbon dioxide limits.

NARUC Hosts a Workshop. In an effort to highlight the need for the States to work cooperatively with the Federal government to voluntarily reduce greenhouse gas emissions, the NARUC delegation hosted an event during COP 10 entitled, "U.S. State Actions to Address Climate Change". The workshop was "standing room only" and was attended by representatives from over forty countries. During the workshop, Commissioner Hadley discussed the role of public utility commissioners in promoting State climate change initiatives. He indicated that the U.S. is on the verge of a major building cycle for energy generation, stressing that this represents an economic opportunity for companies to shift toward cleaner power plant technologies. He noted that while natural gas is increasingly expensive and nuclear power is difficult to site, coal provides a cheap, reliable energy source. In his remarks Commissioner Hadley highlighted the potential role of coal gasification in reducing emissions from coal-fired power stations. He stressed the need for State and Federal policy drivers to promote a technology shift and for education to ensure commitment to developing solutions.

In a separate presentation, Commissioner Butler discussed the Regional Greenhouse Gas Initiative (RGGI), which includes the participation of nine Northeast and Mid-Atlantic States. He outlined RGGI's intention to develop a multi-State "cap-and-trade" program for carbon dioxide emissions from power plants, indicating that the design of the program should be completed by April 2005. Commissioner Butler stressed that the RGGI is a voluntary program. He also noted that NARUC does not officially endorse the RGGI effort but the organization does support voluntary approaches to address climate change.

NARUC Continues to Explore Climate Change Issues. NARUC has several efforts underway that enhance the ability of the States to reduce greenhouse gas emissions by improving the environmental performance of the energy sector including the DOE-NARUC Partnership for Clean Coal and Carbon Sequestration and the DOE-NARUC International Clean Energy Collaborative. NARUC also works closely with the U.S. EPA to assist States develop model incentives to improve the environmental performance of base-load generation facilities. For more information on these activities visit www.naruc.org