OUTLINE

- The scope of the NOPR
- The basic thrusts
- Key issues
- Major research needs
- The White Paper on Wholesale Power Market
STANDARD MARKET DESIGN
OVERVIEW

- A single set of rules proposed for all wholesale electric markets
- A fundamental industry restructuring proposal
  - structure of wholesale energy markets
  - transmission ownership and operations
  - transmission pricing
  - generation and transmission planning and expansion
  - market power monitoring and mitigation
  - corporate governance structure
FERC’S PROGRESSION TOWARD SMD

- 1996: Orders No. 888 (open access transmission) and 889 (OASIS)
- 1999: Order No. 2000 (RTO)
- 2002: SMD NOPR
EXISTING AND EMERGING RTOs
HI! CRAZY PETE HERE WITH A FRIENDLY PLUG FOR PETE'S POWER "LOWEST PRICE PER KILOWATT HOUR" WE SHOCK THE COMPETITION!
The passengers and crew should have brought their own lifeboat!
The huge market capitalization declines in 2002 result in major dislocations in the industry; virtually, every energy merchant is impacted.

Note: integrated utilities, energy merchants and power producers as defined by Salomon Smith Barney.
PROJECT STATUS OF CUMULATIVE CAPACITY OF NEW BUILDS

GW

advanced development
proposed and early development
canceled
tabled
under construction
operating

monthly NewGen reporting date

### PROJECT STATUS OF CUMULATIVE CAPACITY OF NEW BUILDS

#### DECEMBER 2002

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<th>Status</th>
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FERC OBJECTIVES

- Prevent discriminatory practices in the provision of transmission services to ensure the smooth functioning of vibrant electricity markets
- Set up rules to facilitate economically efficient electricity trade by standardizing the design and operation of markets in wide geographic regions
- Facilitate the timely addition of new transmission capability
- Establish a regulatory backstop to protect customers against the exercise of market power
ITP is the new transmission provider
- participation no longer voluntary
- all shareholder-owned utilities must turn over control and operations of transmission to ITP

NOPR contains very specific ITP corporate governance rules; in effect the ITP cannot be for-profit because rules do not allow the setting up of a shareholder elected board

In addition to running the wholesale market and providing transmission service, the ITP has broad roles in two areas:
- regional resource adequacy
- regional transmission planning
INDEPENDENT TRANSMISSION PROVIDER (ITP)

- ITP Board selected by a stakeholder committee from the following six classes:
  - generators and marketers
  - transmission owners
  - transmission dependent utilities
  - public interest groups
  - alternative energy suppliers
  - end users and retail providers that do not own T or D assets

- ITP receives non-binding advice from the
  - Stakeholder Advisory Committee; and the
  - Regional State Advisory Committee (RSAC)
MARKETS, TRANSMISSION AND PLANNING

- Market approach based heavily on the functioning and design in PJM, NY ISO and ISO New England
- Day-ahead and real-time spot energy markets
- *Network access service* for transmission including bundled retail transmission
- Financially-based congestion management using locational marginal pricing (*LMP*) signals
- FERC extends its jurisdiction beyond markets and transmission to the areas of
  - resource adequacy
  - transmission planning
Single network access transmission service for all users to provide grid-wide access without rate “pancaking”

Price consisting of two charges – an access charge and a congestion charge for usage
Load serving entities get congestion revenue rights (CRR) for four years for their *native load* and existing wholesale contracts.

Options for pricing new transmission:
- participant funding (direct assignment)
- rolled in embedded cost
CONGESTION REVENUE RIGHTS

- Tools for hedging congestion rents
- May incorporate physical “scheduling priority”
- Must provide full payout to holders with any revenue shortfalls allocated to transmission owners
- Initial stage to have point-to-point obligations; subsequent stages to provide options and flowgates
RESOURCE
ADEQUACY REQUIREMENTS

- ITP forecasts the demand, helps determine adequate levels of resources, and assigns each LSE a share of the resource requirements
- ITP administers tariff and curtailment penalties if LSEs fail to meet their resource requirements
- In the past, the states made decisions on planning, reliability, and adequacy of service
- Under SMD, states establish overall reserve margin that has to be at least 12%
- FERC non-jurisdictional entities are not required to meet resource requirements
Inventory of a market-driven regional planning process allowing competition among generation, transmission and demand response

- Transmission owner is the “builder of last resort” if market does not respond
- ITP is ultimate resource decision maker
- States provide non-binding input into ITP planning process
- States’ role on siting and retail cost recovery continues
MARKET MONITORING

- Set up of a market monitor independent of all the market participants
- Market monitor reports to the ITP Board and to FERC
- Market monitor responsibilities include
  - identification of market power
  - design of mitigation plans
  - investigation of market manipulations/abuses
  - enforcement of penalties
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<td>March 2004 (1 year)</td>
<td>initial regional transmission plan issuance</td>
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<td>full ITP/SMD implementation</td>
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SOME KEY ISSUES

- Lack of uniformity on the application of SMD with exemption for non-jurisdictional entities opens the door to *leaning* on the grid: reciprocity provision may not be adequate.
- Comprehensiveness/completeness of the market structure is necessary: SMD provides for short-term energy market, but no capacity market and no appropriate economic signals for transmission investment; significant increase in uncertainty.
- The need for flexibility in corporate structures should allow *for-profit* models such as ITCs.
SOME KEY ISSUES

- The process for transmission expansion and investment is unclear and inequitable by not giving the current transmission owner the first right of refusal to build.
- The move from the current state/local planning to ITP regional planning is a significant shift:
  - Transition needs to be clearly specified.
  - Breaks the historical regulatory compact between the state and the utility on generation and transmission service and the state-based cost recovery is jeopardized.
  - State support and involvement not specified.
MAJOR RESEARCH NEEDS

- Data issues
- ITP organizational structures
- Market design and implementations
- Validation of market design
- Congestion revenue rights
- Market monitoring
- Transmission planning
- Resource adequacy
- Inter-ITP seams issues
THREE CLEAR THEMATIC NEEDS

- Integration of economics and power engineering to develop efficient competitive electricity markets
- Collection and deployment of data to ensure adequate information in competitive markets
- Development of incentives in all relevant aspects of electricity market operations and planning
DATA ISSUES

- The gathering, dissemination and wide availability of data for smoothly functioning markets is a well-recognized need.
- Guidelines are required for data acquisition, release and dissemination, and availability for all participants and various stakeholders.
- Development of incentives/penalties is required to ensure data availability, timeliness, and accuracy.
- Implementation of secure computing systems and tools to protect data sensitivity and integrity are a must for markets.
ITP STRUCTURES

- Formulation of effective incentive schemes for the efficient operation of the system by an ITP
  - overcoming the constraint of a not-for-profit organization
  - investigation of the feasibility of a for-profit independent transmission company (ITC) to transition to an ITC
- The integration of additional interdependent markets under the ITP structure
MARGET DESIGN

- Development of transparent rules and procedures that effectively integrate and coordinate system operations with market administrative functions.

- Development of:
  - day-ahead and real-time energy markets
  - financial transmission rights markets

  to operate side-by-side with bilateral contracts.
The validation of different market designs is a critically important missing part of SMD. Verification necessary to ensure the proper behavior of proposed design under various conditions. Major areas of need encompass development of tools and metrics to perform market validation, test systems to validate a market design, and experimental economic testing.
CONGESTION REVENUE RIGHTS

- **Liquidity of CRR**: in principle, CRR are *point-to-point* rights so secondary markets for them may be limited.

- **Revenue adequacy**: it is necessary to develop mechanisms to deal with the differences between the *congestion charges* collected and the targeted value of the CRR.
The smooth functioning of markets and the need for continuous improvements create a clear necessity to monitor the structure, performance, and behavior of markets, as well as, of each market player, including the demand response participants.
A primary need is the development of effective metrics to monitor market performance:
- formulation of appropriate measures
- computational aspects
- tool implementation
- sanity checks to detect fraud or manipulation
- measures for the assessment of market power
- load pockets
- robustness of demand response
- metrics for inter- and intra- ITP performance assessment
- tools to perform inter-market assessments
MARKET MONITORING

- Long-term competitive benchmark analysis
  - trend identification and reference price determination
  - development of mitigation measures
  - formulation of criteria for market access
  - development of guidelines for the implementation of maintenance schedules to ensure that market power is not exercised

- Short-term competitive benchmark analysis
  - hourly and daily activity monitoring
  - transaction monitoring
  - identification of players causing anomalies
TRANSMISSION PLANNING

- Development of long-term economic signals that can serve as effective incentives for transmission investments
- Development of methodology to identify the beneficiaries of a given expansion and an equitable criterion to decide how project costs should be allocated to them
- Investigation of the viability of the participant funding for new transmission expansion projects concept through analytical studies and tool and software development
The reliability evaluation needs to establish a strong linkage between reliability and economics:
- Outage costs
- Reliability criteria
- Willingness to pay by customers

Definition of the allocation of the reserve margin requirements among all the LSEs

Formulation of incentives to provide new capacity

Definition of penalties in cases of failure to provide the required level of reliability

Definition of the curtailments process in case of system outages
The creation of the geographically extensive ITPs requires the careful study and management of the *seams* problems between the ITPs. These problems encompass all aspects of market and system operations and planning:

- interchange metering
- data availability
- impacts on \( LMP \) calculations
- coordinated reliability/planning among ITPs

Schemes and tools for the management of *seams* issues are needed.
The Federal Energy Regulatory Commission (FERC) is pushing a scheme to take electricity management out of the hands of local and state authorities. Can you guess why?...

HAVE YOU BROUGHT ME ALL THEIR TRANSMISSION LINES?

YES, MASTER!

The White Paper
- identifies revisions to the SMD proposal
- compares the RTO requirements set out in Order No. 2000 with those proposed in the White Paper
- sharply alters the course set forth in the SMD proposal
The major thrust is to revert to the regional approach of the Order No. 2000 and away from the uniform nation-wide approach of the SMD proposal:

- Reduced scope and configuration of existing and new ISOs/RTOs
- Mandatory participation in an RTO to replace the voluntary approach of Order No. 2000
- Flexibility for and accommodation of, regional differences
- Deference to and larger roles for, state authorities in the development of RTOs
The platform is a conceptual framework for fair, competitive bulk electricity markets

- no nation-wide standardization
- primary reliance on bilateral contracts with markets operated by the RTO designed to supplement these contracts
- regional approach and increased roles for the yet to be set up “Regional State Committees”
Principal shifts in several areas

- *LMP* is not the only congestion management scheme
- Uniform approach to resource adequacy is abandoned
- FERC’s jurisdiction over bundled transmission rates is not asserted
WHOLESALE POWER MARKET PLATFORM COMPONENTS

- Regional independent grid operation
- Regional transmission planning process
- Fair cost allocation for existing power mitigation
- Spot markets for real-time energy balancing
- Transparency and efficiency in congestion management
- Firm transmission rights
- Resource adequacy approaches
CONCLUDING REMARKS

- The FERC vision gives rise to a wide range of challenges and exciting new opportunities for power system engineers.
- The solution of the various problems will require the effective marriage of economics and power system engineering.
- The SMD area provides an unparalleled opportunity to contribute to the effective design of the future electricity industry.