Background

Study Scope

- Scope is broad and includes many assumptions
  - Envisioned a single future snap-shot year
    - Far enough into the future to avoid the question “how did we get here?”
    - Hypothetically, considered to be well beyond the year 2020
    - Specific load level considered
      - Many scenarios have various amounts of Energy Efficiency and Demand Response
      - Energy Efficiency and Demand Response are viewed as resources
  - Scenario Analysis is explicitly not a least-cost plan
  - Scenario Analysis is explicitly not a multi-year present worth analysis
- Open process allowed various stakeholders the opportunity to advocate for metrics of importance to them

Seven Scenarios and Sensitivity Analyses

		A	B	C	D	E	F	G	H	I	J	K
	Scenarios — incremental 8,000 MW All cases have the same 2,600 MW of resources reflecting proposals in the ISO queue as of 9/30/06.	**Common Assumptions**	**Low Gas/Oil Fuel Prices**	**High Gas/Oil Fuel Prices**	**Replace 3,500 MW of the Scenario Technology with 1,750 MW of Energy Efficiency (EE) and 1,750 MW of Demand Response (DR)**	**Replace 2,700 MW of DR with 2,700 MW of EE**	**Replace 2,700 MW of EE with 2,700 MW of DR**	**Retire 3,500 MW and Replace with Scenario Technology**	**Low Carbon−Allowance Prices**	**High Carbon−Allowance Prices**	**For Coal with Carbon Sequestration**	**Decreased Imports of Low−Emission Resources (−7 TWh)**
1	**Queue Mix —** combination of currently proposed resources; 5,400 MW blend reflecting the fuel mix exhibited recently by the market	X	X	X	X			X	X	X		
2	**Demand-side resources —** an additional 2,700 MW of DR and 2,700 MW of EE	X	X	X		X	X	X	X	X		
3	**Nuclear —** 5,400 MW	X	X	X	X			X	X	X		
4	**Advanced technology coal (IGCC) —** 5,400 MW without carbon sequestration	X	X	X	X			X	X	X	X	
5	**Natural gas (combined cycle) —** 5,400 MW	X	X	X	X			X	X	X		
6	**Renewables —** 5,400 MW, including a combo of on− and offshore wind, hydro, biomass, landfill gas, combined heat and power, fuel cells, photovoltaics; 1/8 each	X	X	X	X			X	X	X		
7	**Increased imports of hydro and other low−emission resources —** 30 TWh of imports	X	X	X	X			X	X	X		X

Stakeholder Input

- Technical experts provided comments/information
  - Fuel forecasts
  - Need for additional natural gas infrastructure
  - Profiles of wind, photo-voltaic (PV), and energy efficiency resources
- Open Stakeholder Meetings held to discuss detailed technical issues
  - Power Supply Planning Committee
    - Assumptions and data inputs
    - Modeling characteristics, capital and dispatch costs
  - Demand Response Working Group
    - Energy efficiency and demand response costs and characteristics
  - Environmental Advisory Group
    - Emission modeling and rates, environmental metrics
  - Transmission Owners Working Group
    - Transmission and distribution conceptual costs
  - Metrics Working Group
    - Type and format of Scenario Analysis information to be provided
- Plenary meetings
  - Review scope of work, assumptions, and results

Recent Stakeholder Input

- Comments received and reflected
  - Energy Efficiency Profiles
  - Wind Energy Profiles
  - Land Use
  - Water Use
- All assumptions have been posted

Types of Analyses Performed

- Production Simulations
  - Provide individual and total production costs for resources
  - Calculate wholesale energy costs to consumers
  - Determine gross energy revenues to resources
  - Show air emissions
- Operable Capacity Analysis
  - Evaluate need for fuel diversity
  - Use methodology similar to RSP06
- Conceptual Electrical Transmission Needs
  - Develop cost for generic transmission expansion
  - Determine representative $/MW-mile for transmission expansion
- Conceptual Electrical Distribution Needs
  - Develop cost for generic distribution system expansion
- Conceptual Expansion of Wholesale and Local Distribution Natural Gas Delivery Systems
  - Develop cost for generic expansion of natural gas delivery system
- Physical Resource Needs for Land and Water Use
- Economic Analysis

Metrics Overview Summary

Economic	Reliability	Environmental
Systemwide production costs[a] (billion $)	Systemwide energy mix (MWh; % MWh by fuel)	Systemwide emissions of SO_X and NO_X (1000 tons)
Energy supply duration curve for marginal clearing price	Systemwide capacity mix (MW by fuel)	Total systemwide NO_X emissions for the 10 highest peak-load summer days (tons)
Annual revenue requirement for expansion resources[b] (billion $; $/kW-year)	Total units of fossil fuel burned (Quadrillion Btus consumed; MWh of production)	Total systemwide emissions of CO_2 (million tons)
Net electric energy revenues for expansion resources (million $; $/kW-year)	Exposure to fuel-supply disruption (MW) (operable capacity analysis)	Mercury emissions—(lbs)
Load-serving entity (LSE) expense for wholesale electric energy based on hourly New England marginal clearing price (billion $; $/MWh)		Cooling water use (gal/minute)
Generic capital cost for expansion ($/kW)		Amount of incremental land used (acres)
Generic transmission expansion cost ($/scenario; $/MW-hour)		Renewable energy contribution (MWh;% MWh)
Generic distribution expansion cost ($/MW-hour)		
Cost for generic expansion of gas-delivery system ($)		

(a)The systemwide production cost is the sum of the annual production costs (i.e., the fuel and emissions-related operating costs) for every resource to produce power in each hour of the simulated year.
(b) The annual revenue requirement (capital cost X the annual revenue requirement rate) captures all non-fuel-related costs including the recovery of capital costs, other operating costs, taxes, and other expenses.

Overview of Results

- Approximately 75 Metrics for over 50 Scenarios
  - Economics
  - Reliability
  - Environmental
- Study results derived from:
  - Production Simulations
  - Operable Capacity Analysis
  - Research of various quantities
  - Calculations
- Detailed results have been posted and will be discussed later today
- Several main themes will also be discussed