Status of Eastern Interconnection Planning Collaborative (EIPC) Department of Energy (DOE) Project Work

Planning Advisory Committee Meeting
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ISO New England
EIPC/EISPC Background

- In June 2009, DOE issued an FOA to fund an analysis of transmission requirements under a broad range of alternative futures. The FOA covered two topics. Topic A was to fund Interconnection-level analysis and planning work while Topic B was to fund cooperation among states on electric resource planning and priorities.

- In 2009, the Planning Authorities (PAs) in the Eastern Interconnection (26) formed the Eastern Interconnection Planning Collaborative (EIPC) and submitted a proposal. There are eight Principal Investigators who bear project management and reporting responsibilities. PJM serves as the lead Principal Investigator under the proposal.
  - Principal Investigators for the project include Entergy, ISO-NE, MAPPCOR, MISO, NYISO, PJM, Southern Company, and TVA.

- The PAs intended to “roll-up” their respective regional expansion to form a model of the Eastern Interconnection which would provide a basis to identify opportunities for potential transmission enhancements to increase the ability to move power or reduce costs.
EIPC/EISPC Background, cont.

• The 39 states (plus the District of Columbia and the City of New Orleans) in the Eastern Interconnection formed the Eastern Interconnection States Planning Council (EISPC) and submitted a proposal for the Topic B work under the DOE FOA.

• On December 18, 2009, the DOE announced that EIPC and EISPC had been selected to perform the Eastern Interconnection work under Topic A and Topic B respectively, with a total of $16 million in funds made available to EIPC and a total of $14 million in funds made available to EISPC.

• Links
  – EIPC:
  – Phase 1 Report:
Highlights

- Stakeholder Steering Committee (SSC) successful in selecting three scenarios for study under Phase 2 of the project
- EIPC issued Phase 1 Report on schedule on 12/19/11
- With these two critical milestones achieved, DOE released funding for Phase 2 of the project
- Phase 2 work has started and EIPC has established a Transmission Options Task Force (TOTF) that includes Planning Authority representation as well as stakeholder representation as a means of increasing transparency in the Phase 2 work effort
Scenarios Selected for Phase 2 Study

• Nationally Implemented Federal Carbon Constraint with Increased Energy Efficiency/Demand Resources (EE/DR)
  – Driven by a nationally-implemented CO₂ price and considers significant penetration of EE and DR
  – Costs of EE and DR are assumed to be partially offset by the CO₂ revenues

• Regionally-Implemented National Renewable Portfolio Standards (RPS)
  – The main defining characteristic of this scenario is the deployment of significant amounts of local renewable energy
  – Qualified renewable facilities includes wind, solar, geothermal, biomass, landfill gas, fuel cells using renewable fuels, marine hydrokinetic, and hydropower

• Business as Usual
  – Characterized by no new federal, state, or regional energy or environmental policies or programs
Phase 1 Report Issued 12/19/11

- EIPC issued its first draft of the report in late July and began working with the stakeholders to consider their comments
- Four drafts of the report were crafted before issuing the final report on 12/19/11
- With this last major milestone complete, DOE released the funding for the Phase 2 work
EIPC Project Tasks

**Phase 1 – Complete**

**Task 1 – Initiate Project**
- Establish SSC
- Establish Study teams/processes

**Task 2 – Integrate Regional Plans**
- Aggregate Modeling
- Interregional Plans
- Expansion Options

**Task 3 – Production Cost Analysis**
- Eliminated

**Task 4 – Macroeconomic Scenario Definition**
- Stakeholder Consensus
- 8 Futures and 72 Sensitivities

**Task 5 – Macroeconomic Analysis**
- Informs policy/stakeholders
- Includes high level transmission costing

**Task 6a – Expansion Scenario Concurrence**
- SSC selects 3 scenarios from the 80 performed in Task 5

**Task 6b – Report on Phase 1**

**Phase 2**

**Task 7 – Interregional Transmission Options Development**
- Build-out on 3 selected scenarios
- 230 kV and up

**Task 8 – Reliability Review**
- Consistent with NERC reliability criteria

**Task 9 – Production Cost Analysis**

**Task 10 – Generation and Transmission Costing**
- High level cost estimates for both generation and transmission

**Task 11 – Review of Results with Stakeholders**

**Task 12 – Final Report**
Task 7 – Interregional Transmission Options

• EIPC will modify the Eastern Interconnection modeling developed in Task 2 to build interregional expansion models
  – Stakeholder specified baseline infrastructure model will be utilized as the starting point
  – PAs will develop a data set for each scenario prior to load flow solution
    • Loads and losses for each scenario (peak and less than peak) will be input
    • Generation will be de-committed and dispatched as determined in the Multi-Region National-North American Electricity and Environment Model (MRN-NEEM) runs. Locations determined
    • Identify transfer levels to be studied
    • PAs set-up initial load flows for each scenario
  – PAs perform gap analysis, develop initial concepts for transmission additions, and possibly solve load flow for each scenario
Task 7 – Interregional Transmission Options, cont.

• Task 7 will focus on transmission reinforcements to support the resources identified and interregional energy exchanges for each of the three expansion scenarios from Task 6
  – TOTF will engage in discussion and provide input on results. Bi-weekly conference calls and monthly face-to-face meetings are scheduled
  – Next TOTF meeting scheduled for 2/22-2/23/2012

• Task 7 deliverables
  – Develop and/or adjust transmission reinforcements needed to support the expansion scenarios
  – Develop Eastern Interconnection power flow model for each scenario
Task 7 – Interregional Transmission Options, *cont.*

- EIPC will develop transmission expansion options focused on the extra high voltage transmission network (230 kV and above)
- EIPC will consider the transmission facilities required to integrate new resources within a region using a similar high voltage focus
- EIPC will leverage the expertise of EIPC’s membership in considering HVDC and advanced technologies in developing expansion options
Task 7 – Out-of-Bounds for the Study

- Specific siting issues – transmission routes or new substation locations
- Technology that is inconsistent with the NEEM run that specified the resources (e.g., long distance superconductors)
Task 8 – Reliability Review

• EIPC will perform reliability analyses consistent with NERC reliability criteria for transmission planning
  – Assess each of the three final Eastern Interconnection transmission build-outs developed in Task 7 that support the three selected scenarios
  – Make adjustments to the transmission build-outs to satisfy reliability tests

• Key inputs for Task 8 are the Eastern Interconnection models from Task 7

• Key deliverables
  – Review detailed transmission analysis results with the SSC and stakeholders
  – EIPC will identify flowgates for use in the production cost analysis of Task 9
Task 8 – Reliability Review, cont.

• System Performance Tests

<table>
<thead>
<tr>
<th>TEST</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>No Contingency</td>
</tr>
<tr>
<td>T2</td>
<td>Loss of Single Element</td>
</tr>
<tr>
<td>T3</td>
<td>Loss of Single Element with Generator Outage</td>
</tr>
<tr>
<td>T4</td>
<td>Loss of Multiple Transmission Circuits that Share Common Structures</td>
</tr>
<tr>
<td>T5</td>
<td>Loss of Multiple Elements that result from a Bus Fault on Buses &gt; 300 kV</td>
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</tbody>
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• Minimum Criteria to Mitigate
  – Thermal: >100% of rating
  – Voltage: < 0.95 p.u.; > 1.1 p.u.
Task 9 – Production Cost Analysis of Expansion Options

• Economic analysis will be performed using production cost modeling for each scenario based upon the power flow modeling and transmission expansion options developed in Task 7 and 8
• Task 9 deliverable – One production cost analysis for each scenario
Task 10 – Generation and Transmission Cost Estimates

• EIPC will provide high-level estimates of the capital costs of the three interregional generation resource and transmission systems finalized in Task 8

• Transmission costs will be developed by EIPC using generic planning-type estimates referenced to the study year and will represent “overnight” costs

• Costs associated with resource additions and retirements will be developed by EIPC and will be informed by SSC assumptions regarding technology characteristics and costs

• Generation costs based upon SSC-approved inputs from Task 5

• Key inputs for Task 10 include the Interregional Expansion Options (generation and transmission) from Tasks 6, 7, and 8, and high-level, generic transmission cost information
Task 11 and Task 12

• Task 11 – Review Results
  – Draft results reviewed with stakeholders
  – Stakeholder input incorporated

• Task 12 – Phase 2 Report
  – Report outline available – August
  – Monthly stakeholder input
Phase 2 Schedule

- Task 7 – January-June 2012
- Task 8 – May-August 2012
  Milestone: Scenario Transmission Analysis Results – 8/10/12
- Task 9 – July-September 2012
- Task 10 – July-October 2012
  Milestone: Scenario Cost Results – 10/5/12
- Task 11 – July-December 2012
- Task 12 – September-December 2012
  Milestone: Study Report Complete – 12/31/12