



Eastern Interconnection Planning Collaborative



## TOTF Meeting January 10-11, 2012 Summary

### **TOTF Members in Attendance (by sector)**

**TO/TDs:** Randell Johnson, Evan Wilcox

**End Users:** Fred Plett, Erin Hogan

**Public Power/TDUs:** Dustin Betz

**NGOs:** Matt Schuerger, Ed Pfeiffer

**States:** Marya White (alt. for Michael Wegner), Hisham Choueiki, Diane Barney, Craig Taborsky, Stuart Hansen, John Stovall

**Canada:** Rob Sinclair

**SSC Chairs:** Roy Thilly

**EIPC:** Dan Fredrickson (MAPP COR & co-chair), David Till (TVA & co-chair), Dave Whiteley (Exec. Director)

**Presenters:** Doug Bowman (SPP), Stan Doe (ISO-NE), Jeremy Bennett (Southern Co.), Chuck Liebold (PJM), David Duebner (MISO), Zach Smith (NY-ISO), Joe Payne (Entergy)

**The Keystone Center:** Catherine Morris, Margaret Pinard, Rusty Sticha

### **Day 1, January 10**

- 1. Role of TOTF and expectations working with EIPC (See David Till's [presentation](#) for details)**
  - TOTF is not a decision-making body, but will discuss approach and results of Phase II analysis and provide input
  - TOTF should keep SSC and Sector Caucus members informed of the progress of the group and bring any issues to the TOTF and EIPC as outlined in the TOTF Scope document.
  - EIPC will make every effort to track TOTF and SSC input and create a record of how the input was handled.
  - Modeling WG will stay in place to review results of the production cost modeling in Task 9 as charged by the SSC, but is inactive at the present time.
  - Scenarios as chosen by the SSC and defined by the inputs and characterized by the MRN-NEEM results will not be modified.
  - Load flow results will be provided to all participants with Critical Energy Infrastructure Information (CEII) clearance. State officials who are obligated to share all information with the public will not be able to receive CEII information.
- 2. Phase II Schedule See Dave Whiteley's [presentation](#) and [detailed weekly schedule](#)**
  - No work has been done by the PAs other than the Phase II pre-work. This meeting is designed to review the detailed approach and take TOTF input before work begins.
  - In the next 3 months, the lion's share of the work will be completed.

- Procedures for handling CEII data will be developed for both meetings and webinars and posting information on the website.
- Calls will be scheduled for bi-weekly TOTF webinars between face-to-face meetings
- TOTF will have the opportunity to review data sets
- In addition, an SSC webinar will be scheduled in early March to share the results of the EIPC and TOTF Phase II work

### 3. Phase II Process Documents

#### a. HVDC (Stan Doe, "[Phase II HVDC Consideration Process](#)")

- Guidelines for consideration of HVDC include long distances (e.g. > 500 miles), as a connection between asynchronous systems, and where a cable greater than 50 km is required
- EIPC will consider AC solutions first, since they integrate most easily with the existing system. Selection of HVDC over AC will consider costs at a high level but will not be based on least-cost analysis. Every effort will be made to select the "lower cost" alternative.
- EIPC agreed to revise the Phase II HVDC Consideration Process document to explain how costs will be taken into account.
- Both HDVC "classic" configurations (e.g. Hydro Quebec line in Canada & New England) and HDVC "lite" solutions (e.g. Long Island Sound cable) will be considered.
- EIPC clarified that dividing the Eastern Interconnect into 2 or more systems is not within the scope of the study.
- HVDC projects currently under consideration by the PAs may be evaluated as solutions to a scenario transmission need such as the transfer of high amounts of wind power.
- EIPC noted that new DC lines may change the requirements for the underlying AC system.
- EIPC confirmed that regional loss of source requirements will be considered in HVDC design.
- One topic open for future discussion is the option for including more than sink and source converter stations so that the benefits of DC can be shared along the length of the line.

#### b. Less-than-peak case (Doug Bowman, See "[Definition of Less-Than-Peak Case \(LTP\)](#)")

- After reviewing the scenarios, the PAs believe off-peak cases may likely be necessary to ensure that the transmission system can support periods of lower demand but potentially high wind generation.
- The initial proposal was to use an hour in Block 13 of the load duration curve as the basis for the less-than-peak case because it most closely approximates the average load levels in the summer shoulder period (approximately 62%) and has the highest regional wind generation (GWh).
- An alternative proposal by a TOTF member was to use the hours with the largest ratio of wind generation to load. This approach is used in PJM, but the PAs explained that the project scope does not envision analysis of multiple light load cases.
- Another TOTF member noted that the EIPC approach of using a single hour was appropriate since we are not doing operational studies, but rather testing reliability at a high level.
- The TOTF discussed the question of how curtailment of wind generation might impact the transmission system design. Typically the PAs would not design the system for 100% capacity factor nor optimize the system to accept 100% of the generation. MISO uses 90%

CF and PJM may use another value which implies a certain level of curtailment of wind generation.

- EIPC stated that they will be able to evaluate the level of curtailment after running the production cost model by comparing the wind generation in all hours to the expected capacity factor. (NEEM utilizes 20 load blocks, not hourly data.) At a minimum, wind and other renewable resources will need to meet the RPS requirements in the scenario assumptions.
  - It is not yet clear whether a less-than-peak case will be needed for all three scenarios, but it is more likely that Scenario 1 – the Federal Combined Climate and Energy Policy case – will require analysis of a less-than-peak case.
  - A TOTF member emphasized the importance of focusing on wind energy rather than wind power in evaluating the need and appropriate block for the case, so the system is not over-built.
  - Any less-than-peak case developed is for the purpose of evaluating the reliability of the transmission build-out in step eight. Only one transmission topology will be subjected to the production cost analysis.
  - **EIPC and the TOTF agreed to discuss this further (See Day 2).**
- c. Fossil unit deactivations (See Chuck Liebold’s [presentation](#) and “Method to Prioritize Fossil Unit Dispatch”)
- Units 200 MW and greater will be specifically identified; smaller aggregated units will be deactivated by applying a ratio to total generation by NEEM region.
  - NEEM output will be the source of the large unit (>200 MW) deactivations. Other information sources will be used if additional specification is needed. The impact of EPA regulations on units has already been factored in by NEEM based on the SSC assumptions.
  - No changes are proposed to the original approach for coal plant deactivations, except to clarify that the approach will be used for all fossil units.
  - TOTF members asked whether PAs will locate new generation on the site of units only partially deactivated in the aggregated smaller units. EIPC agreed to think about how to handle this if there are not adequate sites for new generation.
- d. Reliability tests (Jeremy Bennett, “[Reliability tests for Phase II](#)”)
- EIPC intends to conduct four tests to determine reliability:
    - Test 1:** System Performance with all Elements in Service
    - Test 2:** System Performance Following the Loss of a Single Element
    - Test 3:** System Performance Following Loss of a Single Element under Generator-Out Scenarios
    - Test 4:** System Performance Following the Loss of Multiple Transmission Lines Sharing Common Towers/Structures
  - No comments were received; therefore no changes have been made to proposed approach.
  - EIPC confirmed that these tests will be applied as the minimum reliability tests by all PAs. Some PAs may choose to add other tests specific to their regions. It is beyond the scope of the study to consider criteria that are not currently in use.

- EIPC explained that breaker failures can be addressed with redundant breakers and that bi-pole losses of high voltage will be covered under the single element test.

#### 4. Load Flow Model Data Needs for 3 Scenarios (Jeremy Bennett's [presentation](#))

- Transmission topology – EIPC will start with the Stakeholder Specified Infrastructure (SSI), adding transmission fixes if deficiencies are detected.
- Generation – NEEM region generation will be distributed within the states and utilities contained in each region based on current generation patterns. This process requires PA judgment calls and can be reviewed by TOTF.
- Load – load will be based on NEEM scenario results.
- Losses – this will be a one-time calculation, not involving iteration to determine losses.
- Interchange – transfer between regions will be specified by NEEM; Purchased Power Agreements (PPAs) will not be considered.

#### 5. Broad facility types (See Dave Whiteley's [presentation](#))

- Each PA will look at transmission solutions for their region first. Gap analysis will identify shortcomings, including transmission needs between regions. PAs will work together throughout the process.
- Facilities considered “out-of-bounds” include technology that is far from proven, e.g. long distance superconductors.
- No siting considerations will be considered.
- Should new parallel transmission with voltages matching the existing system be considered?
  - Need local transmission planners’ experience to determine
  - PAs will consider local regulations and restrictions; TOTF can provide further advice.
  - Makes sense and should rely on PAs’ judgment
  - May replace existing lower voltage
  - Deactivation of existing transmission may be considered but expect to need all existing transmission. EIPC will not evaluate the economics of deactivating lines compared to continued maintenance.
- Should EHV (extra high voltage) overlays be considered?
  - TOTF agreed that EHV overlays in both grid and skeleton configuration should be considered.
  - Only consider EHV when existing voltages do not work
  - Consider what neighboring regions have that can be built off of
  - Should not push existing voltages to their extremes
  - Take care to loop facilities in grid-like system
  - Skeleton overlay should be considered (e.g. 765kV system)
- EIPC confirmed that the reliability implications of loss of an EHV line will be considered in the transmission solutions; it may be that two EHV lines are needed to meet reliability standards.
- Should point-to-point HVDC with limited drop points be considered?
  - EIPC is open to TOTF input on where HVDC is most appropriate, but it should not be constrained by siting considerations. HVDC will be considered only when AC does not work at inter-regional level.

- The 890 process may provide guidance on which HVDC lines should be considered. e.g. NYISO would probably not limit options to HVDC projects in the queue but would give those serious consideration.
  - DC is proven technology and used worldwide; multi-terminal DC is less common.
  - HVDC may be considered to optimize power flows within regions (reduce or eliminate loop flows).
- Should EHV collector systems be considered?
  - The decision to include collector systems at EHV will be influenced by the size of the power being collected; 345 kV is the most likely collector system voltage level.
  - SPP and MISO have considered collector systems in their regions (collecting power independent of existing system).
  - Collecting through a 345 kV system and then having an overlay of 765 kV to move the power east is a possible alternative.
  - EHV includes 345 kV and above; there may be circumstances where collector systems below 345 kV would be appropriate as well.
- Should incremental upgrades such as reconductoring and rebuilding single to double circuits be considered?
  - There may be a situation when it makes sense to replace lower voltage lines with higher voltage, e.g. in corridor-restricted areas or those with limited ROW (right-of-way).
- What other types of transmission facilities should the study consider and when would they be applicable?
  - Building 4-double circuits, but probably will not get to that level of detail
  - Flow controllers (universal power flow controllers)
  - Phase shifters at any voltage level; typically 345 kV and lower
  - Synchronous condensers and other existing technologies
  - Would it be simpler to adopt a distance threshold to determine when DC becomes viable? EIPC suggested it is better to keep more flexibility for making the decision.
  - Could storage be included to even out the delivery of power to the transmission system?
    - EIPC responded that since storage could not be considered on the resource side of the NEEM analysis, it is difficult to consider now after the resource base is set, but the topic is open to further discussion.
- Clean Line Energy described the merchant HVDC projects they are developing with utility status in SPP and elsewhere; noted that these projects are not likely to be included in the 890 plans since they are participant-funded and do not require PA approval. There may have to be a process for considering these solutions since they are not in any PA or regional transmission expansion plan.
- Some of the NEEM-specified inter-regional pipes may be larger than energy flows require; EIPC will maintain the transmission specified by NEEM if it is used at all, but will not add transmission that was not carrying energy in the NEEM model.

## 6. Approach to Locating Generation (See Chuck Liebold's [presentation](#))

- EIPC will map NEEM region generation to load flow model.

- Nuclear generation will be sited based on regional practices.
- Other non-renewable generation will be located on deactivation sites where available and according to other information and regional practices as needed, including current generation queue data.
- Renewable generation will be located based on best renewable resource data and other data sources within regions.
- TOTF discussed the best approach for sizing wind farms, for instance, should the PAs locate wind in blocks of 200 MW similar to AEO's approach?
- Data sets will be shared with the TOTF in the form needed for the load flow models.

## **Day 2 – January 11**

### **1. Work to be accomplished in next 5 weeks (See Dave Whiteley's [presentation](#))**

- EIPC will share data with TOTF as they become available, consistent with CEII procedures

### **2. Approach for evaluating transmission alternatives (See Jeremy Bennett's [presentation](#))**

- Gather all input data for peak case - Load Block 1. This is almost complete.
- 26 PAs will enter data into their portions of the model using the SSI and develop proposed transmission solutions; transmission will be designed to meet the dispatch specified by NEEM and will meet native load first.
  - After some discussion, the TOTF agreed that generation and transfer limits should be specified by NEEM and not modified by current planning guidelines for dispatching wind.
- PAs will jointly review inter-regional transfers to determine additional transmission needs.
- Conduct linear transfer analysis of EI-wide NEEM transfers and identify EHV overloads
- Identify bulk of transmission enhancements needed and run load flow; iterative process will ultimately produce a solved peak case satisfying appropriate loading and voltage requirements
- Off-peak case topology will be defined first by solved peak case. PJM noted that they may be looking for possible off-peak solutions earlier in the process.
  - After further discussion, EIPC finalized that the less-than-peak case should be based on an hour in Block 13 that represents the average load in that shoulder period or 62.5%
  - Regional dispatch sensitivities to the Block 13 less-than-peak model will be used to test renewable generation at greater output than shown in Block 13.
- TOTF can review results and provide input, but the EIPC does not plan to document the rationale behind all transmission choices. EIPC will note if transmission projects were selected from the existing 890 plans.
- Focus on solutions to high level transmission system not the local problems
- NEEM transfer levels will be relied upon when developing the transmission topology but the AC power-flow modeling will calculate simulated flows per the physics of AC systems.

### **Topics Open for Further Discussion as Needed:**

1. Options for including more than sink and source converter stations so that the benefits of DC can be shared along the length of the line
2. Whether PAs will locate new generation on the site of units only partially deactivated in the aggregated smaller units

3. Whether/ how storage might be included to even out the delivery of power to the transmission system

**NEXT STEPS:**

- Upcoming TOTF Webinars – Thurs., Jan. 26, 10-11:30 ET/ Thurs., Feb. 9, 10-11:30 ET
- Goal is to provide webinar information 3-5 days in advance
- Next TOTF Meeting – Feb. 22-23, Crystal City Crowne Plaza, beginning at 10AM
- Today's meeting recording and summary will be posted to EIPOnline.org
- Data input files will be posted
- Develop and distribute guidelines for sharing CEII materials at meetings, webinars and in advance

### Attendance Report January 10-11, 2012

Name		Company	Sector	Role
Kerry	Marinan	American Transmission Company	EIPC	Official Task Force Member
David	Whiteley	EIPC	EIPC	Official Task Force Member
Joseph	Payne	Entergy	EIPC	Official Task Force Member
Stan	Doe	ISO New England	EIPC	Official Task Force Member
Dan	Fredrickson	MAPP	EIPC	Official Task Force Member
David	Duebner	MISO	EIPC	Official Task Force Member
Adam	Solomon	MISO	EIPC	Official Task Force Member
John	Buechler	NYISO	EIPC	Official Task Force Member
Zach	Smith	NYISO	EIPC	Official Task Force Member
Jerrold	Moll	Southern Company	EIPC	Official Task Force Member
Doug	Bowman	SPP	EIPC	Official Task Force Member
Frederick	Plett	Massachusetts AGO	End Users	Official Task Force Member
Matt	Schuerger	ESCS	NGOs	Official Task Force Member
Ed	Pfeiffer	NGO	NGOs	Official Task Force Member
Dustin	Betz	Nebraska Public Power District	PP/TDU	Official Task Force Member
Marya	White	EISPC	States	Official Task Force Member
John	Stovall	EISPC / Oak Ridge National Laboratory	States	Official Task Force Member
Craig	Taborsky	MD PSC	States	Official Task Force Member
Stuart	Hansen	Minnesota PUC	States	Official Task Force Member
Diane	Barney	New York State Dept of Public Svc	States	Official Task Force Member
Hisham	Choueiki	Ohio PUC	States	Official Task Force Member

Evan	Wilcox	American Electric Power	Transmission Owners/ Developers	Official Task Force Member
Randell	Johnson	Northeast Utilities	Transmission Owners/ Developers	Official Task Force Member
Jeremy	Bennett	Southern Company	EIPC	Other Participant/Expert
Flora	Flygt	American Transmission Company	EIPC	Other Participant/Expert
Don	Gates	ISO New England	EIPC	Other Participant/Expert
Yonas	Habtemichael	PJM	EIPC	Other Participant/Expert
Fred	Von Pinho	PJM	EIPC	Other Participant/Expert
Samir	Succar	NRDC	NGOs	Other Participant/Expert
Ellen	Vancko	Union of Concerned Scientists	NGOs	Other Participant/Expert
Thomas	Schnieder	NREL	Other	Other Participant/Expert
Stanton	Hadley	Oak Ridge National Lab	Other	Other Participant/Expert
Roy	Thilly	SSC Co-Chair	Other	Other Participant/Expert
Bob	Pauley	EISPC	States	Other Participant/Expert
Deidre	Altobell	CON ED	Transmission Owners/ Developers	Other Participant/Expert
Tyler	Ruthven	National Grid	Transmission Owners/ Developers	Other Participant/Expert
Samrat	Datta	Entergy	EIPC	Observer
Keith	Daniel	Georgia Transmission Corp.	EIPC	Observer
Chuck	Liebold	PJM Interconnection	EIPC	Observer
Craig	Glazer	PJM Interconnection, L.L.C.	EIPC	Observer
Andy	Oliver	Land Trust Alliance	NGOs	Observer
Barry	Huddleston	Clean Line Energy Partners	Transmission Owners/ Developers	Observer

Attendance Report- Webinar, January 10-11, 2012

<i>First Name</i>	<i>Last Name</i>
Lucyna	Khazanovich
Beth	Soholt
Jonathan	Forward
Robert	Eisenhuth
Thomas	Gentile
Terry	Black
Jinxiang	Zhu
Samuel	Zewdie
Alicia	Dalton-Tingler
John	Zarzycki
Garrett	Bissell
Syed	Ahmad
George	Smith
Akarsh	Sheilendranath
Wayne	Galli