December 6, 2011

Phase II Schedule and Outline of Work

Before January, 2012

1. SSC defines the 3 Scenarios and provides the information requested by PAs ***[Stakeholder Input]***
    a. Study Year: 2030
    b. Generation resources by NEEM region or on a more granular basis if they have a reason (specific locations determined by PAs – see #9)
        i. Starting point is the "Stakeholder Specified Infrastructure" case (not Roll-Up case)
        ii. Resource additions
        iii. Resource retirements
    c. Peak load level (including itemized quantification of assumed EE, DR, DG, & PHEVs)
    d. Transfer level targets between NEEM regions
        i. Specified as MW with corresponding MWH from NEEM
        ii. If different transfer levels are expected at different load levels, those should be specified as well
    e. Economic factors for production cost runs
        i. Based on SSC-approved inputs for NEEM analysis
    f. Establish scenario naming convention– e.g. - "Scenario 1", "Scenario 2", "Scenario 3"
2. Establish **Transmission Options Task Force (TOTF)** comprised of EIPC and SSC technical representatives ***[Stakeholder Input]***
    a. Individuals who are experienced in transmission planning (limited time is available)
    b. Individuals will require CEII clearance – discussions will be detailed
    c. Individuals who can contribute to the process of transmission alternatives development and discuss the technical characteristics and relative technical merits of alternate solutions
    d. The TOTF is expected to have no more than 2 representatives from each sector and Planning Authority representatives from various regions of the Eastern Interconnection
    e. The TOTF's purpose is to provide information to the SSC
3. PAs establish an initial scope and process for obtaining TOTF comment
    a. Ground rules for discussion
    b. TOTF/PAs to discuss objectives and process
    c. PAs review existing regional process requirements
    d. TOTF/PAs discuss PA processes, Q&A with PA engineers
    e. TOTF provide comments and transmission alternatives for consideration
    f. Participants will need to bring supporting evidence of feasibility and applicability of the alternatives suggested
    g. TOTF/PAs to discuss alternatives and TOTF to provide feedback on resulting performance of the alternatives
    h. Final decisions on transmission build-out alternatives remain with the PAs

   i. Phase II is not an optimization process, although a collaborative effort should facilitate the recognition and development of more efficient coordinated inter-regional solutions
   j. Much of the work is done in a distributed "dispersed matrix" manner (individuals working alone) with results brought back to the group during calls/meetings for discussion, recognition of opportunities for inter-regional coordination, and next steps
4. Possible TOTF Webinar ***[Stakeholder Input]***
   a. Review and discuss the initial scope and process prepared by the PAs (from #3)
5. PAs to create a consistent process for choosing generating units that would not be represented ["retirements" indicated by the NEEM analysis] in the load flow for transmission modeling purposes to avoid conflicts due to enumerating the choice of specific units – e.g. rank units by size and age, then cut from the bottom. Provide a description of the process along with appropriate disclaimers and caveats. (See #9.a)
6. PAs to define how "less than peak" is defined and when such a case is needed for use case analysis – See #1.d, #10.b, and #13.d
7. PAs to define the set of reliability tests that will be used in Statement of Project Objectives (SOPO) Task 8 (See #23)

January – February, 2012

8. Hold initial meeting of TOTF ***[Stakeholder Input]***
   a. Review scenarios and associated input data provided by the SSC
   b. Present schedule and work product required by DOE
   c. Discussion of possible transmission alternatives, broad transmission facility types and locations – See #11.d
9. PAs develop a data set for each Scenario prior to load flow solution in #10 (SOPO Task 7)
   a. Start from Stakeholder Specified Infrastructure (SSI) [Case name: EIPC 20S-CI.sav]
      i. Changes to this case as the starting point will be on a case-by-case basis
      ii. Additions only if under construction
      iii. Removals if supported by the regional PA
   b. Determine locations for generation resources that are not producing ("idled" instead of "retired") based on NEEM run results
      i. NEEM generation reduction is by technology (incrementally)
      ii. PAs apply process developed to choose units that would not be represented in the load flow for transmission modeling purposes (See #5)
         1. NEEM results used to identify individual coal units above 200MW (from CRA)
         2. Scale coal units less than 200MW and other unit types by technology type
         3. Set Pmax, Pmin, Qmax, and Qmin of idled units to zero, set status code to 0

4. For units under 200MW, scale Pgen to level consistent with NEEM output and consistent with pre-work document "Method to Select Coal Unit Deactivations"

c. Determine locations for new generation using PA internal processes
   i. All generation specified by NEEM will be shown in the data set/case
      1. Naming convention – use owner ID and bus name that indicates technology type. Specifics TBD
   ii. Adjacent to existing transmission facilities and/or at existing generation sites where feasible, locate remote generation and create collector system, provide connection to the EHV system
      1. For wind, solar, and other renewables use results from existing regional studies as primary driver for location
      2. For CC and CT, locate them at unit sites where there are deactivated units (to maximum extent possible)
      3. For Nuclear and hydro use known potential sites
      4. Final locations chosen by PAs, explanation provided
      5. New generation chosen in common technology "blocks" from data source used by NEEM for cost inputs (AEO 2010). Unit additions to be "rounded up" to nearest technology block size
   iii. Data on resource amounts and location by NEEM region come from the SSC scenario description (based upon NEEM results)
      1. Installed capacity from the NEEM result
      2. Dispatched MW by technology type, by NEEM region, from NEEM load block chosen (data from CRA)
      3. Specific units to be dispatched chosen by PAs, explanation provided
   iv. Consider "high value" locations – e.g. locations where units were retired, must run locations, etc.
   v. Generation that was chosen by NEEM (for reserve margin purposes) but is not providing energy set to status code 0

d. Incorporate peak load level defined by each scenario
   i. From the scenario description
      1. NEEM provides a load level that includes all of the load and modifiers for DR, DG, EE and PHEVs [Peak Block #1 – 10 hours]
      2. Each region's load is defined as the energy in Peak Block #1 divided by 10
      3. Losses will be accommodated in determining the loads inserted into the load flow
      4. Generation dispatch (by type, by region) supplied from NEEM for the load block chosen
   ii. Modified to represent EE, DR, DG and PHEV's as appropriate (incorporated in 9.d.i.1.)

e. Identify transfer levels to be studied

i. Comes from the scenario description. See #1.d
ii. Interchange for final case set by NEEM output for that load block (from CRA). For clarification purposes, it is expected that the actual transfer limits (what comes from NEEM) will equal the hard limits. If the NEEM output is less for a given transfer direction, the TOTF will engage in a discussion to determine the appropriate level to study.

f. Determine the if "less than peak" case(s) need to be developed for each scenario
   i. Likely based on amount of intermittent resources
   ii. See #10.b
g. Provide a, b, c, d, e and f to TOTF for comment ***[Stakeholder Input]***
h. PAs incorporate TOTF feedback as appropriate

10. PAs set-up initial load flow for each Scenario (Initial Case Development)
    a. Start with a peak case (as defined by the scenario) with no additional transfers or transmission from starting point. Each NEEM region meets its own dispatch requirement based on new generation added and units that are not producing (see #5). New generation interconnected into each NEEM region using each PA's respective internal processes. See 9.c.
       i. Start with SSI case
       ii. Incorporate load forecast, unit deactivations, new units, etc.
       iii. PA's may also identify new transmission required to interconnect new generation
    b. Develop "less than peak" case from "a" if a "less than peak" case is required based on the scenario description.
       i. New load profile
       ii. New generation dispatch
    c. Combine PA's work into a single case for each load level chosen
       i. Will result in a solved peak case (Case "a") and off-peak case (Case "b")
11. PAs perform gap analysis, develop initial concepts for transmission additions, and possibly solve load flow for each Scenario
    a. Perform screening power flow analysis (linear transfer analysis, dc power flow anticipated)
    b. Compare regional and interregional transfer limits with transfer requirements
    c. Identify limiting facilities from regional and interregional transfer requirements
    d. Based on gap analysis, PAs identify initial transmission upgrades that may be needed to solve the load flow case for each of the three stakeholder scenarios
12. Hold Second meeting of TOTF ***[Stakeholder Input]***
    a. Review and provide feedback on starting point data sets and generation information from PAs (See #9)
    b. Joint working session on generation modeling to review work from #9 and #10.
    c. Discuss transmission alternatives with PA engineers
       i. PAs to provide results of screening gap analysis (#11) intended to compare transfer limits with transfer requirements (#9.e.) and limiting facilities

ii. PAs to derive initial alternative concepts for each scenario
iii. Stakeholders provide feedback on initial concept for transmission facilities to be studied for each scenario. Consideration of alternative concepts will be based on incremental capacity needs identified, and applicability of available technologies (including HVDC) to meet such incremental needs
iv. The PAs will select a concept for detailed study for each scenario
v. Alternative concepts are broad facility types and delivery mechanisms, large scale concepts, overall approaches to the development of the transmission system, rather than refinements on particular alternatives *or individual transmission projects*
vi. The alternative concepts must be capable of satisfying reliability performance tests
vii. PAs incorporate TOTF feedback as appropriate

February – March, 2012

13. PAs Identify New Transmission for each Scenario
    a. For each of the Scenarios, PAs will develop potential transmission modifications for their NEEM regions. [Note: peak and "less than peak" cases will be developed depending on particular scenario needs.]
    b. Objective – identify final sets of high level (230 kV and above) transmission modifications to be considered and ultimately developed into final load flow cases
    c. Start with a peak case from #10, modified as appropriate based on TOTF feedback from #12 – each NEEM region meets its own dispatch requirement based on new generation added and units that are not producing (See #5). New generation interconnected into each NEEM region using each PA's respective internal processes. *Result is a solved case. Case "A".* **New transmission identified**
    d. Develop "less than peak" case from "A" if a "less than peak" case is required based on the scenario description. Re-dispatch and test. *Result is a solved case. Case "B".* **New transmission identified**
    e. Use linear analysis to increment in the transfers in case "A" (change load levels and/or generation dispatch) required by the scenario description to achieve the transfer specified by the scenario – **non-simultaneous**. Capture distribution factors for other regions pairs. **New transmission identified**
        i. Use maximum of actual flow from each scenario for each pair of NEEM regions
        ii. Fix problems found through transmission modifications
    f. Regions notify each other when a change is required in another region to satisfy the transfer limits in e
    g. Assemble all of the PAs' regional transmission changes into Case "A" and Case "B". Add **simultaneous transfers** to reflect the transfers from the scenario – Case "C" and Case "D". Result is s*olved AC power flow(s)*

i. Use coincident actual flows from the relevant load block represented in Case "A" and Case "B"
ii. Linear contingency screen, fix problems found through transmission modifications

h. Rationalize the additions – remove un-needed duplicate lines, "right-size" lines to appropriate voltages/locations, consider reconfiguration of existing/new facilities. **New/modified transmission identified**

i. Cases "C" and "D" - Solved power flow cases – with a single transmission topology – peak and "less than peak"

j. Provide case "A", "B", "C", and "D" for each scenario to TOTF for comment and input

March – April, 2012

14. Hold third TOTF meeting ***[Stakeholder Input]***
    a. Review and provide feedback on solved cases from #13
    b. Discuss new/modified transmission identified and alternative concepts considered
    c. Describe reasons for selecting the single set of transmission facilities to be studied for each of the three scenarios
    d. Joint working session on results
15. Hold SSC meeting to obtain feedback on case development progress
16. PAs incorporate SSC and TOTF feedback as appropriate

May – June, 2012

17. Hold fourth TOTF meeting ***[Stakeholder Input]***
    a. Final review and feedback on revised cases
18. PAs perform final non-simultaneous transfer test
    a. If modifications are required, engage TOTF
19. Seek feedback from SSC on cases developed for each scenario ***[Stakeholder Input]***
20. Final modification to build-outs giving due consideration to stakeholder input
21. PAs choose the one group of transmission of upgrades for each scenario that will be analyzed in SOPO Task 8 and used for the Production Cost run in SOPO Task 9 (subject to modifications required in SOPO Task 8)
22. Deliverable from SOPO Task 7 – one solved power flow case for each scenario along with its companion "less than peak" case if required in accordance with #13.d

June – August, 2012

23. PAs test the three final build-out transmission topologies against reliability criteria (SOPO Task 8)
    a. This step is expected to be a final check on the work done in Step 13 – including modifications as a result of stakeholder input (See Steps 14 thru 22). Reliability testing

will be performed with the understanding that the reliability criteria identified in Step 7 must be met.

b. Results provided to TOTF and SSC for comment and feedback
c. If modifications are required:
    i. PAs to develop option modifications
    ii. PAs to meet/discuss opportunities to coordinate option modifications
    iii. Engage TOTF to explain modifications

24. PAs determine flowgates for use in production cost analyses as each scenario is finished
25. Results provided to SSC and TOTF for review and input ***[Stakeholder Input]***
26. Deliverable from SOPO Task 8 – one reliability tested transmission topology for each scenario

July – September, 2012

27. Complete three production cost analyses (CRA) – one for each scenario (SOPO Task 9)
    a. Economic factors as specified by the SSC in the scenarios
    b. Transmission topology from the build-out process (SOPO Tasks 7 & 8)
    c. Flowgates from #24
28. Results provided to SSC for review and input
29. Hold SSC meeting to review scenario results ***[Stakeholder Input]***
30. Deliverable from SOPO Task 9 – one production cost analysis for each scenario **[9/28/12]**

July – October, 2012

31. PAs develop transmission cost information for each scenario (SOPO Task 10)
32. Generation costs based upon SSC-approved inputs from SOPO Task 5
33. Results provided to SSC for review and input ***[Stakeholder Input]***
34. Deliverable from SOPO Task 10 – G&T cost estimates

August – December, 2012

35. Report outline created
36. Draft report sections provided to SSC for review and comment as they are developed
37. Hold SSC meeting to provide input on initial sections of draft report (same meeting as #27) ***[Stakeholder Input]***
38. EIPC develops complete draft report
39. Deliverable from SOPO Task 11 - Draft report **[10/31/12]**
40. Stakeholder input on Draft Report ***[Stakeholder input]***
41. EIPC develops final draft for review
42. Hold SSC meeting to review final draft report and provide input ***[Stakeholder Input]***
43. Feedback from SSC incorporated as appropriate
44. Deliverable from SOPO Task 12 – Final Report **[12/28/12]**