

TO: EIPC Stakeholder Steering Committee (SSC)  
FROM: SSC Scenario Task Force  
RE: Recommended criteria for scenario selection  
DATE: July 20, 2011

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The Scenario Task Force held three conference calls in June and July 2011, and developed the following recommendations and comments regarding the objective, process and criteria for the selection of three scenarios to be studied in Phase II of the EIPC project.

**A. Main objective for scenario selection: See a range of transmission build-outs that reflect distinct policy scenarios of interest to stakeholders.**

The Scenario Task Force agrees that the main, guiding objective for the selection of scenarios to be studied in Phase II, is to end up with a set of scenarios that are defined by different policy drivers, and to determine what different transmission build-outs may be needed to support these policy drivers.

Stakeholders are interested in seeing what kind of transmission build-outs might result from various policy futures of interest to them. They are also interested in seeing different possibilities for the future transmission grid, and learning what kind of policy sets and other factors can be accommodated by those different transmission expansion possibilities. Therefore, the process and criteria for scenario selection outlined below are designed to allow stakeholders to achieve the desired range in the inputs (such as generation and load) and potential transmission build-outs to meet the range of resource futures and load growth patterns (such as DC lines, grid upgrades, and technical/operational efficiency improvements), along with the benefit and cost information related to the three scenarios.

**B. Process: “Bookends” and “Bundling/Clustering”**

The SSC and the Task Force have discussed two main approaches for defining the three scenarios.

**“Bookends” Approach**

The first is the “bookends” approach. This can be thought of as a more top-down approach, which involves the development of a very general “balanced set” of three scenario types, which would then be used to choose which of the Phase 1 results to select for the inputs to that scenario. It involves the following steps:

- 1) Selecting a key variable or variables, such as a policy driver or drivers, which would define the spectrum(s) along which the two bookends – opposite ends of the spectrum – would lie.
- 2) Naming the two bookends, and determining where the third scenario would fall (whether it would be somewhere “in-between” the bookends or would represent a third point in a “triangular” set).

- 3) Sketching out one or two other key variables that would define the scenarios and differentiate them from the others.
- 4) Determining key variables of interest to stakeholders from the Phase I inputs and output results which may heavily affect generation and thus the Phase II transmission build-outs.
- 5) Agreeing on which sensitivity runs, or combinations of different sensitivities, best represent that particular scenario, and using the inputs and outputs from that sensitivity run (after considering adjustments, such as possibly re-locating generation to make better use of the existing transmission infrastructure, or due to other qualitative considerations), for the Phase II modeling.

The resulting bookend titles and attributes would be used to select the Future(s) or sensitivity runs – or create combinations of such – that best fit the framework. Task force members support this approach because it gives priority to defining the range of drivers for the resource futures and their related transmission build-outs, and it can be developed somewhat independently of the results of the MRN-NEEM modeling in Phase 1.

### **Clustering Approach**

The second approach is the “bundling” or “clustering” approach, which represents more of a bottom-up process. This would involve the following steps:

- 1) Determine factors of interest to stakeholders (policy drivers and key variables) from the Phase I output results.
- 2) Compare the futures and sensitivity runs based on these factors identified in Step 1.
- 3) Determine which Phase 1 runs are similar, in terms of the key variables that could result in similar generation and/or transmission build-outs, and group them accordingly, into “clusters.”
- 4) Determine if a number of different policies from various futures and sensitivities modeled in Phase I could result in similar generation and/or transmission build outs, and if a number of the different policy drivers in the various futures and sensitivities appear to be calling for different transmission expansions.
- 5) Select the three preferred “clusters” and select or specify scenarios that are representative of these “clusters,” to use as the inputs for the three transmission build-out scenarios.

One benefit of this approach is that it could help ensure that the resulting transmission build-outs are resilient under more than one policy option or narrative of how the future unfolds. Additionally, some stakeholders favor this approach because it allows for the scenarios to emerge from the Phase 1 data.

Therefore, though there is some tension between these two approaches, they are not incompatible. In fact, by employing a scenario selection process that includes BOTH the top-down, more conceptual, bookends approach AND the bottom-up, data-based bundling approach, the SSC could reap the benefits of each, and stay within the project timeline.

The general process and timeline for a combined approach would be as follows.

<p><b>Step 1: Develop consensus on a list of the most important variables driving transmission build-out that are of interest to stakeholders.</b> These key variables should include those drivers across which stakeholders hope to see some measure of variation or range among the three final scenarios. A list of other criteria should include other important considerations the SSC should use to evaluate the scenarios (e.g. plausibility, “pushing the envelope,” etc.)</p> <p><i>PRELIMINARY APPROVAL BY END OF July SSC MEETING, WITH SUBSEQUENT REFINEMENTS, AS NEEDED.</i></p> <p><i>Recommendations under Sections C and D of this memo.</i></p>
<p><b>Step 2: In preparation for the Clustering analysis, create a chart or other mechanism to analyze the Futures and sensitivities of primary interest based on the criteria.</b> This could simply be a chart listing all of the output variables that stakeholders agree to be important, and showing how each future/sensitivity run behaves, relative to the others, on each of those variables.</p> <p><i>PRELIMINARY APPROVAL BY END OF JULY SSC MEETING, WITH SUBSEQUENT REFINEMENTS, AS NEEDED.</i></p> <p><i>Options to be presented at July SSC meeting.</i></p>

TOP-DOWN/BOOKENDS	BOTTOM-UP/CLUSTERS
<p><b>Step 3A: From the list of key variables described above, identify the <i>primary</i> characteristics that will define the spectrum(s) along which the three scenarios (the two bookends and the third scenario) will lie.</b></p> <p><i>PRELIMINARY APPROVAL BY END OF JULY SSC MEETING, WITH SUBSEQUENT REFINEMENTS, AS NEEDED.</i></p> <p><i>Recommendations under Section E of this memo.</i></p>	<p><b>Step 3B: Begin analyzing the data and filling in the comparison chart.</b></p> <p><i>JULY -SEPTEMBER</i></p>
<p><b>Step 4A: Generally define the two bookends and the third scenario. (If can't fully agree on</b></p>	<p><b>4B. Determine which future/sensitivity results are similar on particular factors that</b></p>

<p>three, get as much agreement as possible, with proposals/options for remaining issues.)</p> <p><b>PRELIMINARY APPROVAL BY END OF JULY SSC MEETING, WITH SUBSEQUENT REFINEMENTS, AS NEEDED.</b></p> <p><b>Recommendations under Section E of this memo.</b></p>	<p><b>are likely to lead to similar transmission build-outs and begin to group them accordingly.</b> (If can't fully agree, get as much agreement as possible, with proposals/options for remaining issues.)</p> <p><b>JULY - SEPTEMBER</b></p>
<p><b>Step 5A: Roughly sketch out how one or two other key factors may appear or behave in each of the three scenarios.</b> (If can't fully agree, get as much agreement as possible, with proposals/options for remaining issues.)</p> <p><b>PRELIMINARY APPROVAL BY END OF JULY SSC MEETING, WITH SUBSEQUENT REFINEMENTS, AS NEEDED.</b></p> <p><b>Recommendations under Section E of this memo.</b></p>	<p><b>Step 5B: Identify the three preferred bundles/clusters and corresponding scenarios.</b> (If can't fully agree, get as much agreement as possible, with proposals/options for remaining issues.)</p> <p><b>APPROVAL BEFORE SEPTEMBER SSC MEETING.</b></p>
<p><b>Step 6: Review results of bookends and clustering approaches and determine how the results should be utilized for the selection of the three scenarios.</b></p> <p><b>COMPLETE BY END OF SEPTEMBER SSC MEETING.</b></p>	
<p><b>Step 7: Reach general agreement on the three scenarios.</b> Stakeholders propose and evaluate scenario options based on the extent to which the selection of the scenario would achieve the Phase II objectives, contribute to the range/diversity desired, and meet other concerns or criteria, until general agreement is reached on the three scenarios.</p> <p><b>APPROVE BY END OF SEPTEMBER SSC MEETING, WITH SUBSEQUENT REFINEMENTS, AS NEEDED.</b></p>	
<p><b>Step 8: After SSC approval of 3 Scenarios, identify specific inputs for the Phase II analysis: generation (amount/type/location) and load (amount/location), etc.</b> If necessary, run additional NEEM runs in order to get information needed to specify the three scenarios. [Note: the full range of inputs that must be specified will be explained to the SSC by EIPC at the July 28 and 29 SSC meeting].</p> <p><b>APPROVE BY END OF SSC MEETING IN NOVEMBER (not yet scheduled, likely early Nov.).</b></p>	

In sum, the process recommended by this group involves defining, in general terms, policy-driven bookends, with consideration of the Phase I results, to try and determine if different policy choices result in “clusters” of similar resource mixes and/or expected transmission expansions.

Given the steps outlined above, there are several additional items **the SSC** should work on and/or approve at the July meeting:

- Key variables for comparing Future/sensitivity runs and describing the three scenarios
- Other criteria to consider
- Bookends approach – Factor(s) that will define the spectrum for the bookends and a very general description of the two bookends and the third scenario

The task force's comments and/or recommendations on those items are as follows.

### **C. Key variables (for achieving objective)**

The attributes that Task Force members believe are most important for the purposes of achieving variation across the three scenarios, and for comparing the Future and sensitivity runs for the clustering analysis, include the following:

- Policy drivers/goals (national carbon reduction, high EE/DR, etc.)(This is the most important consideration.)
- Whether different policies result in “clusters” of similar generation and/or expected transmission
- Policy Implementation approach (state-focused/regional/super-regional/EI-wide)

The Task Force members also believe that the following are important factors that should be considered for the purposes of achieving variation across the three scenarios:

- Load growth patterns (high, low, etc.)
- Gas prices
- Emission reductions in the Phase I modeling outputs
- Generation type (high natural gas, high wind, etc.)
- Generation location
- Generation costs (high, low, etc.) (acknowledging that a more detailed generation cost estimate will be performed in Phase II)
- Possible transmission built-out type (acknowledging that the specific type of transmission build out will be determined in Phase II, and the MRN-NEEM model does not predict how much transmission will be needed within NEEM regions)
- Transfer limits/transfer limit increases
- Total energy transfers
- High-Level transmission cost estimates (high, low, etc.) (acknowledging that the specific type of transmission build out will be determined in Phase II, the MRN-NEEM model does not predict how much transmission will be needed within NEEM regions, and a more detailed transmission cost estimate is expected in Phase II)

## D. Other criteria to consider

As the SSC works to define the scenarios, there are several other criteria, in addition to achieving the desired amount of variation across the key scenario variables, which the SSC may want to consider. These criteria include:

- Balance between plausibility and pushing the envelope** – The task force has been asked to select a set of scenarios that collectively “push the envelope” and most task force members agree with this concept, in principle. However some task force members are wary of selecting scenarios that result in transmission build-outs that are impossible to achieve. The Task Force has not reached consensus on how to define “plausibility” or “impossibility”. The task force and/or the SSC should work to develop more specific parameters related to how “plausibility” or “impossibility” would be defined in this context.
- Some task force members believe that plausibility should be considered in terms of the following:
  - The *amount of transmission* that can reasonably be constructed in the time period of the study
  - The *amount of DR/EE* that can reasonably be implemented in the time period of the study
  - The *amount of generation* that can reasonably be implemented in the time period of the study
- **Reliability in resulting transmission build- out** – Task force members understand that the transmission build-outs developed for the three scenarios will undergo reliability testing. However the task force recommends that as the SSC selects the three scenarios, members should consider how easy or how likely it will be that the resulting transmission build-out will meet reliability standards. The task force views this criterion as a “sanity check,” to prevent the group from having to go back and reconfigure a particular scenario because it turns out to be unduly difficult to create a transmission build-out that meets the reliability standards.
- **Resilience** – Task force members believe the SSC should also strive to select scenarios that will result in transmission build-outs that can reliably support multiple policy futures.
- **Realistic location/clustering of generation** –Task force members acknowledge that the Phase I modeling may have located or clustered generation in patterns that aren’t entirely reflective of the real world. Therefore they encourage the SSC to take into account some qualitative considerations when developing the generation inputs for the three scenarios, so they are more reflective of the way generation may actually develop over the next 20 years.

## E. Bookend Approach

An initial step in the bookends approach is to identify the key variable(s) that will differentiate the three scenarios, and define the spectrum(s) along which the two bookend scenarios and the third scenario will be located.

The Task Force has conceptually agreed that the types of scenarios of greatest interest are those that achieve the desired range of policy drivers and the transmission build-outs that may be

necessary to achieve the policy objectives. That said, the Task Force has not reached a consensus recommendation on what, exactly, the spectrum for these bookends should be, or what the two bookends and the third scenario should look like. The group discussed the example shown below, and offers it to the SSC as an illustrative example; this is **not** a consensus recommendation of the group.

