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1. Background

One of the priorities identified during WECC’s Bylaws Section 4.9 Review, conducted in 2015, was a charge to take a hard look at the various stakeholder committees’ structures and roles. In December 2015, the WECC Board of Directors (“Board”) approved the Section 4.9 Work Group Report that included the following recommendation:

“The Board should require that committees, subcommittees and other member forums undertake a review of their mission, scopes and charter to assess the value they deliver to WECC and to members in pursuit of reliability assurance.

The Issue of WECC’s committee structure was identified as a high priority at the beginning of the Section 4.9 review and comments from Members and stakeholders over the course of the review acknowledge the need for a comprehensive review of the charter, mission and scope of all the member committees/subcommittees in order to align the work of the committees with WECC priorities and strategic initiatives. The review should also include opportunities to: streamline committees’/subcommittees’ research, deliberation and decision making processes, merge committees or sunset them if no longer relevant to WECC’s emerging priorities or providing value to the Members. Conducted with Board oversight and WECC management and member involvement, these reviews will improve the efficiency and effectiveness of the entire committee structure and increase the value of participation to Members.”

In July 2015, the Planning Coordination Committee (PCC), Operating Committee and Market Interface Committee each established review task forces. In December 2015, the Board established the Transmission Expansion Planning Policy Committee (TEPPC) Review Task Force (TRTF) and directed the TRTF to address several questions and issues. (Details of the Board direction to the TRTF are included in a report to the Board). The PCC Review Task Force received PCC approval of its charter during the March 2016 meeting. The charter included the identification of opportunities for alignment and integration of PCC or PCC Committees with TEPPC.

Based on evaluation of similar issues and processes by the TEPPC and PCC reviews, the two review task forces combined efforts in April, 2016 and became the Joint PCC-TEPPC Review Task Force (JPTRTF). During the last several months the JPTRTF has examined opportunities to improve efficiency and effectiveness of the two committees as well as to improve coordination and alignment with WECC’s strategic priorities.
2. JPTRTF Membership

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angell, Dave</td>
<td>Idaho Power Company</td>
<td>Co-Chair</td>
</tr>
<tr>
<td>Augustin, Philip</td>
<td>Portland General Electric Company</td>
<td>Member</td>
</tr>
<tr>
<td>Easton, Robert</td>
<td>Western Area Power Administration</td>
<td>Member</td>
</tr>
<tr>
<td>Franklin, David</td>
<td>Southern California Edison Company</td>
<td>Member</td>
</tr>
<tr>
<td>Freeman, Bryce</td>
<td>Wyoming Office of Consumer Advocate</td>
<td>Member</td>
</tr>
<tr>
<td>Galbraith, Maury</td>
<td>Western Interstate Energy Board</td>
<td>Member</td>
</tr>
<tr>
<td>Leland, John</td>
<td>Northern Tier Transmission Group</td>
<td>Member</td>
</tr>
<tr>
<td>Lemler, Gregg</td>
<td>Pacific Gas and Electric Company</td>
<td>Member</td>
</tr>
<tr>
<td>McKay, Ian</td>
<td>WECC Board of Directors</td>
<td>Co-Chair</td>
</tr>
<tr>
<td>Patel, Vishal</td>
<td>Southern California Edison Company</td>
<td>Member</td>
</tr>
<tr>
<td>Strack, Jan</td>
<td>San Diego Gas &amp; Electric Company</td>
<td>Member</td>
</tr>
<tr>
<td>Sudduth, Branden</td>
<td>Western Electricity Coordinating Council</td>
<td>Member</td>
</tr>
<tr>
<td>Zichella, Carl</td>
<td>Natural Resources Defense Council</td>
<td>Member</td>
</tr>
</tbody>
</table>

3. Recommendations

The JPTRTF has developed the following recommendations:

1. **Create a Reliability Assessment Committee (RAC).** The RAC would replace the current TEPPC and PCC and assume responsibility for all products currently under the purview of both committees. The RAC would be a single reliability assessment organization within WECC that would facilitate a unified approach to evaluating potential reliability risks and efficiently use stakeholders’ expertise. Benefits of creating the RAC would include reducing duplication in data collection; facilitating accurate, complete and consistent data; increasing coordination between near- and long-term reliability assessments; and increasing stakeholder engagement.

   Rather than reporting to the Board as the PCC and TEPPC currently do, the RAC would report to the Chief Executive officer. This proposed reporting relationship would provide improved coordination
and alignment with WECC’s priorities. Directors would no longer participate in the RAC or any of the subcommittees.

The complete RAC proposal is attached to this report as Appendix A.

2. **Create the Anchor Data Set (ADS) Development Process.** The ADS process would establish consistent processes and protocols for gathering planning data, including reviews for consistency and completeness, to generate production cost, power flow, and dynamic models with a common representation of the loads, resources and transmission across the Western Interconnection 10 years in the future. The ADS would include data used by the Western Planning Regions to create regional plans to establish a common modeling starting point to be used by WECC, the Western Planning Regions and other stakeholders to analyze the bulk electric transmission system for planning and reliability assessments.

The complete ADS proposal is attached to this report as Appendix B.

3. **Committee Products Recommendation.** The two task forces each reviewed the existing products and found that all products are beneficial for assessing reliability of the Western Interconnected system. The JPTRTF recommends consolidating the products under one committee to achieve efficiently produce those products that are presently developed or used by each of the two exiting committees. Appendices A.1, A.2 and A.3 contained in the RAC proposal describe committee products in detail:

   - Appendix A.1 describes how current and proposed Committee products would be developed under the proposed Reliability Assessment Committee;
   - Appendix A.2 shows the products currently developed by TEPPC; and
   - Appendix A.3 shows the products currently developed by the PCC.

4. **State/Provincial Representative and Non-Governmental Organization (NGO) Representative Funding Recommendation.** The task force sought a WECC management recommendation regarding the continued funding of State/Provincial Representatives’ travel expenses and NGO Representatives’ travel expenses and stipends while participating in TEPPC-related planning activities. The JPTRTF supports the management recommendation to fund State/Provincial Representatives’ and NGO Representatives’ travel expenses. The WECC management proposal on funding NGO and State/Provincial Representatives’ expenses for participating in reliability assessment activities is included as Appendix C.

5. **Other Items Included in the Scope of the TEPPC Review Task Force (TRTF).** When the Board created the TRTF in December 2015, it directed the task force to address several issues. The following table lists these issues and how they are addressed:
<table>
<thead>
<tr>
<th>Issue</th>
<th>How Addressed In This Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scope: Given WECC’s reliability mission, what long-term reliability assessments should be performed through TEPPC?</td>
<td>The work currently performed by TEPPC would be performed by the proposed RAC. Details are included in the RAC proposal, Appendix 1.</td>
</tr>
<tr>
<td>2. Study Program: How can (TEPPC) reflect the changing needs of the Western Interconnection and emergent work?</td>
<td>The proposed RAC Studies Subcommittee would develop an annual study program including the products currently developed by TEPPC.</td>
</tr>
<tr>
<td>3. Transmission Report: What is the appropriate frequency and scope for such a TEPPC deliverable?</td>
<td>The proposed RAC Studies Subcommittee would develop an annual report of reliability assessment activities.</td>
</tr>
<tr>
<td>4. Planning protocol: What is the appropriate scope and level of detail needed in a planning protocol to adequately describe the work of TEPPC?</td>
<td>Development of charters and protocols would be part of the transition plan for moving from the current PCC and TEPPC to the RAC.</td>
</tr>
<tr>
<td>5. Potential Opportunities for TEPPC/PCC Efficiencies: Are there similarities or overlaps between the work of TEPPC and the PCC?</td>
<td>This issue is addressed by the creation of the proposed RAC.</td>
</tr>
<tr>
<td>6. Membership: Is the predefined membership structure still the most effective?</td>
<td>This issue is addressed by the proposed RAC membership included in the proposal.</td>
</tr>
<tr>
<td>7. Leadership: Does the requirement to have a Board member serve as the chair of TEPPC still make sense?</td>
<td>Directors will not participate in any manner in the proposed RAC.</td>
</tr>
<tr>
<td>8. Committee Name: is there a more appropriate name that better reflects the committee's activities?</td>
<td>The proposed name of the new committee is the Reliability Assessment Committee.</td>
</tr>
<tr>
<td>9. Alignment of TEPPC work with WECC priorities: What is the process used to ensure alignment of TEPPC work priorities with WECC’s priorities and to advise WECC management of recommended resource requirements?</td>
<td>The RAC would be responsible for all current TEPPC activities. The RAC would report to the Chief Executive Officer to ensure alignment of RAC work priorities with WECC’s priorities and ensure resources are allocated to the highest priorities.</td>
</tr>
<tr>
<td>10. NGO and state representative funding: Should expense reimbursement for NGO and state participation continue to be funded by WECC?</td>
<td>The JPTRTF supports the WECC Management recommendation to fund NGO and State/Provincial travel expenses in accordance</td>
</tr>
</tbody>
</table>
### Issue 11. Data Sharing: What is the benefit of relying only on publicly available data sources?

The JPTRTF recommends no changes to the WECC Information Sharing Policy.

### 4. Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 24 - September 13</td>
<td>Draft Proposal - Stakeholder Comment Period (closes at 5:00 pm MDT)</td>
</tr>
<tr>
<td>September 13 – 30</td>
<td>JPTRTF considers stakeholder feedback and may revise Proposal</td>
</tr>
<tr>
<td>September 30</td>
<td>Revised Proposal posted</td>
</tr>
<tr>
<td>November 4</td>
<td>Revised Proposal considered by PCC</td>
</tr>
<tr>
<td>November 4</td>
<td>Revised Proposal presented to TEPPC</td>
</tr>
<tr>
<td>November 4 - 14</td>
<td>JPTRTF considers PCC input and decisions</td>
</tr>
<tr>
<td>November 14</td>
<td>Final Proposal posted for Board consideration</td>
</tr>
<tr>
<td>December 7</td>
<td>Final Proposal considered by Board</td>
</tr>
</tbody>
</table>
Appendix A: Reliability Assessment Committee Proposal

1. Executive Summary

The JPTRTF developed a recommendation to create the Reliability Assessment Committee (RAC) which would replace the PCC and TEPPC while continuing to produce all of the work products currently produced by the PCC and TEPPC. The JPTRTF recommends that the WECC Board of Directors approve creation of the Reliability Assessment Committee to replace the PCC and TEPPC. The following are key elements of the proposal to create the RAC:

- The RAC would be governed by a five-member RAC Governing Body consisting of the RAC Chair and the chairs of each of four Subcommittees: the Scenario Development Subcommittee, the Studies Subcommittee, the Modeling Subcommittee and the Data Subcommittee.
- Subcommittees would be open to membership for any stakeholder who wants to participate and notifies the subcommittee chair accordingly.
- Each subcommittee would include a Governing Body consisting of 13-15 members.
- Initial members for the RAC and Subcommittee Governing Bodies would be recommended by JPTRTF members not seeking a position on the RAC and approved by the WECC Board.
- Nominees for subsequent vacancies in the RAC and Subcommittee Governing Bodies would be recommended by a nominating committee appointed by the RAC Governing Body.
- The RAC Governing Body would report to the WECC CEO, rather than to the WECC Board.
- All work products currently produced by the PCC and TEPPC would continue to be produced by the RAC and its subcommittees.
- In addition, WECC would compile and post a new product, the Anchor Data Set, designed to promote consistency among the data used in reliability assessment models (production cost model and power flow/stability models) used by WECC and its stakeholders.

2. Background

The Joint PCC-TEPPC Review Task Force (JPTRTF) developed this proposal for a Reliability Assessment Committee (RAC) that would replace the current Planning Coordination Committee (PCC) and Transmission Expansion Planning Policy Committee (TEPPC). Although TEPPC and the PCC have operated separately for many years, a single committee responsible for all reliability assessment functions, including both existing functions and new functions such as the Anchor Data Set (ADS), offers significant potential efficiencies.
The task force believes it is essential that the RAC retain the current products and responsibilities currently represented by TEPPC and PCC and, additionally, collaborate with the Regional Planning Groups (RPG) in completing WECC’s work. The RAC’s responsibilities include:

- Creating and promoting a broad view of reliability, including the use of power flow, dynamic stability and short circuit analysis under reasonable “stress” conditions (e.g., real-time variations in resource output and end-use consumption, constraints on dispatchable generation); and

- Developing and evaluating plausible future scenarios involving different economic, technology and policy issues affecting reliability across the entire Western Interconnection (including western Canada and northern Baja, Mexico).

The task force believes it is essential that RPGs continue to be engaged in WECC’s work, not only in providing data to support WECC’s economic and reliability models, but also in providing input on the studies WECC undertakes to evaluate potential reliability risks and identify possible mitigation solutions for such risks. The JPTRTF believes that bringing the perspectives of the current TEPPC, PCC and RPGs together under a single committee will create a more holistic reliability assessment approach.

In proposing a governance structure for the RAC, the task force recognizes the value of allowing all WECC members to have a say in important decisions related to the structure and conduct of reliability studies. The task force also understands the need for technical expertise, and has sought in the governance proposal to find a balance between stakeholder participation and modeling experience. The remainder of this section provides additional details about the RAC’s proposed responsibilities, structure and governance.

3. **WECC Reliability Assessment Context**

WECC’s Delegation Agreement states that:

“WECC shall develop assessments of the reliability of the Bulk-Power System, or ensure that data and information are collected, analyzed and provided to NERC in support of the development of reliability assessments. WECC shall also develop and maintain, and collect data in support of the development and maintenance of, reliability performance metrics and assessments of risks to the Reliable Operation of the Bulk-Power System.”

To fulfill that responsibility, WECC seeks to identify potential reliability risks based on a variety of alternative load, resource and transmission futures that could arise within the planning horizon to enable its staff and stakeholders to consider actions that could mitigate potential reliability risks. Stakeholders throughout the Western Interconnection may have differing perceptions of the meaning of “reliability,” so it is important to establish a common understanding of the term. Many different
types of studies provide insight into the ability of WECC and other entities to maintain reliable electric service to customers in the Western Interconnection including:

- Power flow studies;
- Stability analyses;
- Short-circuit duty studies;
- Economic (production cost) studies;
- Resource adequacy assessments;
- Impacts of energy policies; and
- Development of performance standards and metrics.

In this recommendation, “reliability assessment” is understood to mean any technical, economic or policy-related assessment that provides insight into potential future reliability risks and the ability to maintain uninterrupted electric service to customers in the Western Interconnection.

WECC has used various combinations of these analyses, and has collaborated with the Western Planning Regions, International Planning Regions, other western planning organizations, utility planners (both transmission and resource) and the broad community of stakeholders to better understand potential reliability risks.

For many years, WECC’s efforts to understand potential reliability risks have been implemented primarily through two committees, each of which has a unique perspective on and approach to understanding potential reliability risks:

- **The Planning Coordination Committee (PCC)** The purpose of the PCC is to advise and make recommendations to the WECC Board of Directors on all matters within the jurisdiction of WECC that pertain to maintaining the reliability of the Western Interconnection through evaluating:
  1. Potential future generation and load balance (one year or greater time frame); and
  2. The adequacy of the physical infrastructure of the interconnected Bulk Electric System.

- **The Transmission Expansion Planning Policy Committee (TEPPC)** As stated in the TEPPC Charter, the purpose of TEPPC is to conduct and facilitate economic transmission planning in the Western Interconnection. TEPPC has four main functions:
  1. Oversee and maintain a public data base for production cost and related analysis;
2. Develop and implement interconnection-wide expansion planning processes in coordination with the Planning Coordination Committee (PCC), other WECC committees, Regional Planning Groups (RPGs) and other stakeholders;

3. Guide and improve the economic analysis and modeling of the Western Interconnection and conduct transmission studies; and

4. Prepare interconnection-wide transmission plans consistent with applicable NERC and WECC reliability standards.

In fulfilling its reliability assurance responsibility, WECC must address two straightforward questions: “What potential reliability risks might WECC face in the next 1-20 years;” and “How can WECC best understand those potential risks?” Both PCC and TEPPC have responsibilities within the overall purview of identifying potential reliability risks, although each has focused on different aspects of reliability. The PCC and its subcommittees and work groups have focused on power flow studies, steady-state and dynamic stability analyses. PCC’s work has also included resource adequacy evaluations and assessing the impacts of its various studies on WECC’s reliability standards. TEPPC and its subcommittees and work groups have focused on developing public data bases of planning data, completing economic (production cost modeling) and capital expansion studies based on plausible futures for the Western Interconnection. TEPPC’s work also has included evaluating the impacts of broad reliability-related trends, such as the impacts of the changing resource mix on the need for operational flexibility; and policy issues potentially affecting reliability such as the 2014 Clean Power Plan.

While each committee’s activities address specific aspects of reliability, all of their activities provide insights on potential future reliability risks and provide guidance for utility planners, regulatory bodies, project developers and other stakeholders as they consider the need for future generating resources and transmission infrastructure to deliver resources to loads.

In addition to WECC staff and committees, a number of other entities including Western Planning Regions (WPR), International Planning Regions (IPR), Transmission Planners (TP), Planning Coordinators (PC), Balancing Authorities (BA) and other regional planning organizations play a significant role in identifying and managing potential reliability risks and implementing mitigation measures to maintain reliability in the Western Interconnection. Within the United States, four planning regions exist to comply with the requirements of FERC Order 1000. In Canada, similar planning regions exist, but they are not within the jurisdiction of FERC. The portion of WECC within Mexico is currently represented by El Centro Nacional de Control de Energía (CANACE). CANACE establishes policies to ensure reliable operation of the transmission system in Mexico. In addition to completing technical analyses, planning

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1 California Independent System Operator (CAISO), ColumbiaGrid, Northern Tier Transmission Group and WestConnect.
2 Alberta Electric System Operator and British Columbia Coordinated Planning Group
regions in the Western Interconnection prepare transmission plans, either annually or biennially, to describe planned infrastructure additions to address identified reliability concerns.

The goal of the proposed RAC is to create a single reliability assessment organization within WECC that will facilitate a unified approach to evaluating potential reliability risks, efficiently use the expertise of external stakeholders and ensure consistent collection, application and management of data used for reliability analyses. Considering the potential reliability impacts of changes to the resource mix, transmission infrastructure and loads, it is essential that WECC evaluate potential risks in all planning horizons, from the next year through 20 years in the future; using all available tools, including power flow, production cost, capital expansion and other models; and by applying accurate, consistent data for all analyses. It is important to evaluate potential reliability risks with a holistic approach that looks across the entire Western Interconnection. It will also be critical to continue collaboration among WECC staff, WECC committees, utility planners and Western planning regions, as well as other reliability planning stakeholders. This broad approach will neither replace nor obviate the need for regional analyses. Rather, the Interconnection-wide perspective will complement the insights gained from regional analyses. Further, bringing all reliability assessment functions under a single organization will facilitate consistent and regular communication, coordination of planning resources and creation of a unified framework for evaluating potential future reliability risks.

4. Benefits of Creating the RAC

Creating the RAC will provide significant benefits compared to maintaining the current committee and subcommittee structure. The JPTRTF has identified the following potential benefits of creating the RAC:

1. Reliability assessment expertise focused within a single committee. The current PCC and TEPPC committee structure places expertise for technical analyses in one committee structure and expertise for economic assessments in another committee structure. The proposed RAC would bring both sets of expertise into a single committee organization to better align all analyses for identifying potential future reliability risks and identifying potential mitigations of those risks.

2. Unification of all reliability assessment activities under a single organization. As noted previously, bringing all reliability assessment functions under a single organization will facilitate consistent and regular communication, coordination of planning resources and creation of a unified framework for evaluating potential future reliability risks.

3. Reduced duplication in data collection. TEPPC’s and the PCC’s modeling activities currently use different sets of data to describe the same loads, resources and transmission facilities. These data are gathered from different sources, sometimes from different business units of the same organization. While there are valid reasons for these differences, creating the RAC with a single
subcommittee responsible for data creation and validation would reduce duplication and, thus, enable more efficient data collection and validation.

4. **Facilitate an accurate, consistent and complete data set for Western Interconnection reliability assessment.** By focusing all data collection and validation into a single committee and subcommittee, the proposed RAC and Data Subcommittee would provide better alignment of WECC’s reliability assessment data among models. This would facilitate progress toward WECC’s goal of a single data set that could be used in any reliability assessment model and development of the ADS.

5. **Increased stakeholder buy-in.** While the proposed RAC structure would be a major change from the current WECC committee and subcommittee structure, in the long run, it offers an opportunity to increase stakeholder buy-in for the data, models and analyses completed by WECC because it brings their development and review into a single committee organization.

6. **Improved coordination between WECC’s near- and long-term reliability assessment activities.** The committee structure proposed below would bring WECC reliability assessment activities in all planning horizons into a single committee organization. This would facilitate alignment of the assumptions used in reliability assessment within all horizons, as well as alignment of the trends and potential risks associated with near-term and long-term reliability assessment activities.

7. **Enhanced verification of data sources and modeling assumptions.** By bringing review of data and modeling assumptions into a single committee organization, rather than under multiple organizations as in the current structure, the proposed RAC would enhance WECC’s ability to verify the data and models used in reliability analyses.

8. **More focused stakeholder engagement and participation.** WECC’s current committee, subcommittee and work group organization in the PCC and TEPPC includes 22 established committees, subcommittees, work groups and task forces made up of hundreds of individual members. The proposed RAC structure would focus stakeholders’ efforts on specific products and reliability assessment activities. All stakeholders would be welcome to participate in whichever subcommittee and work group activities they wished. The proposed RAC offers both an efficient decision-making structure for resolving non-consensus decisions and an operational structure that allows any interested stakeholder to participate in and offer expertise to the reliability assessment process.

9. **Improved efficiency and cost effectiveness.** The current proposal for the RAC is intended to have fewer committees, than the 22 committees, subcommittees and work groups in the current committee structure. If the RAC is approved, ongoing work may require creating additional work groups and task forces. However, the JPTRTF members believe it is likely that
all of the work can be completed with far fewer specific committees than in the current structure, thus reducing WECC and stakeholder time commitments and costs for meeting participation and travel.

10. **Improved Alignment with WECC’s Three-Year Strategic Plans.** Compared to separate, independently-managed, TEPPC and PCC committees, a single committee will facilitate greater consistency between the production cost modeling and power flow/stability modeling necessary to implement WECC’s three-year strategic plan.

11. **Better Coordination between Committees.** Because the RAC governing body will include the four RAC subcommittee chairs in addition to the RAC chair, the various functions of the RAC will be carried out with a higher level of coordination than currently exists between TEPPC and PCC.

5. **PCC and TEPPC Work Product Mapping to RAC and Subcommittees**

The JPTRTF reviewed all of the products currently being produced by the PCC, TEPPC and their subcommittees and work groups. The JPTRTF concluded that all current products are valuable to WECC and its stakeholders and should continue to be produced. To ensure that no work products would be lost in the transition to the RAC and its subcommittees, the JPTRTF developed the following appendices:

- Appendix A.1 shows the specific committees and subcommittees that would be responsible for each of the work products under the proposed RAC structure;
- Appendix A.2 shows the current TEPPC products and the work groups that currently prepare them; and
- Appendix A.3 shows the current PCC products and the work groups that currently prepare them.

6. **Guiding Principles**

The RAC will adhere to the following guiding principles:

1. **Consistency with FERC Order 890:** The RAC will be consistent with the Commission’s planning principles, which are coordination, openness, transparency, information exchange, comparability, dispute resolution, regional coordination and economic planning studies.

2. **Diversity.** The RAC will seek diversity in its subcommittees and work groups, including a diversity of member classes, interest groups and geographic representation.

3. **Consensus:** The RAC is expected to make most of its decisions by consensus. For this document, “consensus” is defined as is reaching a decision that all members can agree to support, even if their preference would be for a different decision.
4. **Process Driven.** The RAC will adopt processes to ensure that all stakeholders have a voice in decision-making, that subcommittees and work groups include individuals with subject matter expertise needed to complete each group’s work products and that all meetings, work product and decisions are vetted publicly and transparently.

7. **Proposed RAC Structure**

In proposing a structure for a combined RAC, the JPTRTF sought to ensure that:

- All products determined to be valuable to stakeholders could still be completed under the new structure; and
- Responsibilities for overseeing development of each product would be clear.

The proposed structure assigns the following responsibilities for addressing reliability assessment questions:

- Reliability Assessment Committee (RAC): What reliability risks might WECC face in the next 20 years?
- Scenario Development Subcommittee: What are the plausible future scenarios in which potential reliability risks could arise?
- Studies Subcommittee: What studies should WECC perform to better understand potential reliability risks and to test compliance with the Reliability Standards?
- Modeling Subcommittee: What models should WECC use to complete necessary reliability studies and to identify potential mitigation solutions? Data Subcommittee: What data will WECC need to complete necessary technical and economic reliability studies?

Figure 1 below shows the proposed RAC structure along with general responsibilities for each subcommittee. As subcommittees are formed and assume their responsibilities, it may be prudent to create work groups to focus on specific activities within the subcommittee’s purview. Such cases will be addressed as needs arise.
Figure 1: Proposed RAC Structure

[Diagram showing the structure of the Reliability Assessment Committee (RAC) with subcommittees and work groups.]

- Reliability Assessment Committee Governing Body
  - Scenario Development Subcommittee Governing Body
  - Studies Subcommittee Governing Body
  - Modeling Subcommittee Governing Body
  - Data Subcommittee Governing Body
    - Power Flow Data Work Group
    - PCM Data Work Group
    - Environmental Data Work Group
8. **RAC Responsibilities**

The RAC would provide overall guidance for WECC’s reliability assessment activities, consistent with the business plan and budget approved by the WECC Board of Directors. The RAC’s focus question is: “What reliability risks might the Western Interconnection face in the next 20 years and do we have the data and tools required to make reliability assessments?” Its primary function would be coordinating the activities of each of the subcommittees to ensure that specific work completed in each subcommittee is consistent across each function and that study results and data are shared consistently across the Western Interconnection. The RAC Governing Body and subcommittees (described below) are designed to enable most of the technical, analytical and other reliability assessment work to be completed at the subcommittee level. The RAC will work closely with WECC’s Reliability Planning staff to coordinate work plans, prioritize analytical work, ensure stakeholder participation and vetting and collaborate with federal, state/provincial and regional planning organizations.

The RAC is responsible for identifying and evaluating potential reliability risks that WECC may face in the approximate planning horizon of one to 20 years in the future. Specific reliability concerns and responses to be addressed by the RAC include, but are not necessarily limited to:

- Potential mitigation measures;
- System stability concerns;
- Load and resource balance issues;
- Resource adequacy;
- System utilization concerns (physical and economic);
- Reliability assessment models used by WECC;
- Data and models used by WECC’s, utility planners’ and planning regions’ reliability assessments; and
- Current and future trends affecting the reliability of the Western Interconnection.

The RAC includes the RAC Governing Body, subcommittees and identified work groups, and may include additional work groups or temporary task forces to complete its ongoing responsibilities. The RAC’s activities are designed to be transparent and inclusive of all stakeholders.

The RAC is responsible for all products and activities currently managed through TEPPC and the PCC. The JPTRTF has reviewed the current work completed under both committees and has prepared the table shown in Appendix A.1 to show how products would be managed under the proposed RAC and subcommittee structure.
9. RAC Governance

The RAC encompasses all of the stakeholders involved with WECC’s reliability assessment activities including subcommittee and work group activities. All stakeholders are invited and welcome to participate in all of the RAC’s assessment discussions and analyses. The RAC is expected to make most of its decisions by consensus. The RAC proposal includes a RAC Governing Body so that, if a consensus is not possible, decisions would be approved by a majority vote of RAC Governing Body members. The RAC Governing Body would be responsible for approving reports and technical documents arising from the work of the RAC subcommittees and would work collaboratively with WECC’s management to set direction and communicate goals and objectives for the RAC.

The RAC will be process driven. That is, it will adopt processes to ensure that all stakeholders have a voice in decision-making, that subcommittees and work groups include individuals with subject matter expertise needed to complete each group’s work products and that all meetings, work product and decisions are vetted publicly and transparently.

The RAC Governing Body would be composed of the following members:

1. RAC Chair
2. Scenario Development Subcommittee Chair
3. Studies Subcommittee Chair
4. Modeling Subcommittee Chair
5. Data Subcommittee Chair

The JPTRTF considered the appropriate size of the RAC Governing Body, based on the premise that most reliability assessment work would be completed at the subcommittee level. A small RAC Governing Body would be able to coordinate activities across the four subcommittees and facilitate efficient decision-making for the issues it would be expected to address. Most decisions made by the RAC are expected to be by consensus, but the odd number of RAC Governing Body members would facilitate decision-making in cases where a consensus is not possible. A final consideration in recommending the subcommittee chairs as members of the RAC Governing Body is the desire to have a strong connection between the subcommittees and their work and the RAC Governing Body itself.

The JPTRTF proposes that the RAC Governing Body report to the WECC CEO, rather than to the WECC Board of Directors. At the same time, the members of the JPTRTF believe that the reporting relationship of all standing committees should be consistent. When the Standing Committees and TEPPC were established a large Board of Directors governed WECC with the majority of directors representing various stakeholder interests. During this era it was the norm that the Board, consisting of a majority who had detailed technical knowledge, would provide specific direction and assign tasks to the various committees. Following the bifurcation of WECC and the establishment of a much
smaller Board consisting of independent directors, the focus of the Board has changed to governance matters rather than operational issues. To this end the Board has placed accountability for the operation of the Corporation with the Chief Executive Officer who is accountable for all operational aspects of WECC.

The current situation with a parallel path of accountability from the standing committees and TEPPC to the Board could lead to confusion relative to accountability for operational aspects of WECC and therefore the recommendation to have the proposed RAC Governing Body report to the CEO. This would be consistent with the reporting relationship in most organizations and would provide a mechanism for the committees to provide advice directly to management.

**RAC Governing Body Member Selection**

The RAC Governing Body Chair would be expected to have broad knowledge of and experience in reliability assessments, future planning, study program development, models used in reliability assessments and data used in reliability assessment models. Subcommittee Chairs would be expected to possess expert knowledge in the functional area for which their subcommittee is responsible.

For selecting the initial members of the RAC Governing Body, the JPTRTF will form a nominating committee made up of JPTRTF members not seeking a position on the RAC. The nominating committee will nominate one candidate for the RAC Governing Body chair and for each of the subcommittee chairs. The nominating committee will submit the recommended RAC Governing Body members to the WECC Board for ratification. The RAC Governing Body chair will serve for a two-year term and will be eligible for reelection when the individual’s term expires. Subcommittee chairs serving on the RAC Governing Body will also serve two-year terms. Half of the initial subcommittee chairs will serve one-year terms and half will serve two-year terms, with initial terms determined by a lottery. All subsequent RAC Governing Body appointments will be for (staggered) two-year terms.

The RAC Governing Body and the subcommittee governing bodies will select a vice chair from among their respective members. The terms of the governing body vice chairs will be two years and will be staggered with the terms of the chairs.

The RAC Governing Body will establish a nominating committee annually to conduct a search of qualified candidates for whichever subcommittee chair positions have expired. The nominating committee will develop a slate of candidates for vacant positions, each of which will be for a two-year appointment. Once the RAC Governing Body has developed a slate of candidates for each vacant subcommittee chair position, each subcommittee will select its chair either by consensus or, if consensus is not possible, by a vote of its members. A simple majority of voting members will be required to approve the subcommittee chair and vice chair.

When the term of the RAC Governing Body chair expires, the nominating committee will develop a slate of candidates for the position. Once the slate of candidates for the RAC chair has been prepared,
the four sitting subcommittee chairs will select the RAC chair. If it is not possible to reach consensus, the subcommittee chairs will vote. In the event of a tie vote, the chair of the nominating committee will cast the deciding vote.

The RAC chair and subcommittee chairs may be reappointed for additional terms.

**Decision Making**

It is expected that the RAC, its subcommittees and its work groups will make decisions primarily by consensus. If a consensus is not possible, decisions approved by the RAC Governing Body require a majority vote by RAC Governing Body members. Any stakeholder may raise a disputed matter with the WECC CEO who has ultimate authority for all RAC decisions.

**10. RAC Subcommittees**

As stated above, the RAC would complete its work products primarily through its subcommittees and work groups where technical, economic and policy expertise would be focused. The subcommittees and work groups described below are designed to concentrate on a particular aspect of reliability assessment, e.g., scenario development or data management. However, subcommittees’ and work groups’ activities are also intended to be collaborative.

Members would be expected to collaborate continuously across subcommittees and work groups to ensure that all needed expertise is available to support each work product. For example, development of an annual study program by the Studies Subcommittee would require collaboration with regarding the context for reliability assessments 10-20 years in the future with the Scenario Development Subcommittee, an understanding of the models available for assessments through the Modeling Subcommittee and knowledge of the data needed to populate assessment models through the Data Subcommittee. In addition, specific work groups such as the PCM Data Work Group and the PCM Modeling Work Group would need to collaborate to ensure that consistent data is available to populate selected assessment models.

As an example, consider the development of an annual study program. The process could be initiated by the Scenario Development Subcommittee examining trends and drivers to create four or five future scenarios for the Western Interconnection. Next, the Studies Subcommittee could identify key questions about potential reliability risks in each of the futures and identify the near term data sets required by utility planners in performing their compliance activities. This subcommittee would recommend power flow, production cost, capital expansion or other studies to cover all assessment requirements. Next, the Modeling Subcommittee could determine that one or more modeling tools would be appropriate to complete the studies and direct its work groups to explore in greater detail how specific study cases might be modeled. Finally, the Data Subcommittee could evaluate in detail the specific data needed to facilitate analysis with the specified modeling tools. Throughout the
process, subcommittees and work groups would likely need to participate in each other’s discussions to expedite issue identification and resolution.

Subcommittee Decision Making

Subcommittees are designed to be the primary forum for completing the work required for each of the deliverables for which the RAC is responsible. Any stakeholder is welcome to participate in any subcommittee or work group activities. This will ensure that subcommittee discussions and decisions, which are expected to be focused on the functional area for which the subcommittee is responsible, will include participants with broad technical knowledge, expertise and experience.

The experience of both TEPPC and PCC suggests that Subcommittee decision-making will be primarily by consensus. In cases where consensus is not possible, Subcommittee Governing Body will vote on decision items with a simple majority vote of Subcommittee Governing Body members being required to approve a decision. Member class representatives would poll the class members participating in the meeting and vote in accordance with the majority view of the class members participating in the meeting. Subcommittee Governing Body members not representing a member class would vote according to their individual view, but would not have an additional vote in their respective member class.

Work Group Governance

The Subcommittees Governing Bodies may appoint work groups as needed to assist with completing the work of the subcommittee. Initially, the Modeling Subcommittee Governing Body will appoint a Power Flow Modeling Work Group and a Production Cost Modeling Work Group. Also initially, the Data Subcommittee Governing Body will appoint a Power Flow Data Work Group, a Production Cost Data Work Group and an Environmental Data Work Group. Each Subcommittee Governing Body will appoint the work group chair and vice chair. Any interested stakeholder may participate in the work groups for each subcommittee.

Work group decision making will be primarily by consensus. However, in cases where consensus is not possible, work groups will vote on decision items with a simple majority vote of those participating in the meeting required to approve the decision.

Subcommittee Membership

Subcommittee membership is open to all stakeholders with an interest in the Western Interconnection and is not limited to WECC members.

Subcommittee membership is accomplished through self-nomination to the chair of the subcommittee. The nomination will provide the individual’s name, professional affiliation, contact information and should specify the interest group with which the individual is primarily aligned (e.g.,
one of the five WECC classes, consumer advocate, transmission developer, regulated utility, environmental advocate, etc.).

WECC staff will maintain the roster of subcommittee members. It is the responsibility of the member to advise the WECC staff of changes in professional affiliation, contact information or interest group alignment.

There is no limit to the term of subcommittee membership and a member may terminate membership at any time by giving notice to the WECC staff. Once each year, the WECC staff will attempt to contact each subcommittee member to confirm each member’s continued interest in continuing as a member of the subcommittee. If the WECC staff is unable to contact a member or otherwise confirm the member’s continued interest in being a member, the individual’s subcommittee membership will be terminated.

All subcommittee members are eligible to become governing body members and to participate on subcommittee work groups.

**Subcommittee Governing Body Member Selection**

The chair and the vice chair of each subcommittee will be selected as described above.

Subcommittees will generally make decisions by consensus. If consensus is not possible, the Subcommittee Governing Body, made up of the members designated for each subcommittee, will decide the issue by majority vote as described below in greater detail.

Except for the initial two years of operation, the term of subcommittee members will be three years with one third of the members’ terms expiring each year. For the initial membership of each Subcommittee Governing Body, one-third of the members will serve one-, two- or three-year terms, with the terms of each member being selected by lottery.

For selecting the initial members of the Subcommittee Governing Bodies, the JPTRTF will form a nominating committee made up of JPTRTF members not seeking a position on the RAC. The nominating committee will nominate one candidate for each Subcommittee Governing Body position and submit the recommended subcommittee members to the WECC Board for ratification.

The RAC will establish a nominating committee annually to conduct a search for qualified candidates for each Subcommittee Governing Body position for which the incumbent’s term is expiring. The nominating committee will develop a slate of candidates for each position that will become vacant. Incumbent members whose terms are expiring may be considered for reelection. Members for each position will be elected by the existing members of the Subcommittee Governing Body, including members whose terms are ending. If no single candidate receives a simple majority vote, the top vote recipient will be elected.
11. **Recommended Scenario Development Subcommittee Governing Body Membership**

The Scenario Development Subcommittee will have a unique mission, similar to the current Scenario Planning Steering Group (SPSG), under TEPPC.

It is important to distinguish the term “scenario” from the term “study case.” For this document, “scenario” is defined as a plausible future for the Western Interconnection. The Scenario Development Subcommittee creates narratives of these futures by reviewing drivers, such as economic growth, technological development, policy development and socio-political trends—that could affect the context in which planners will be expected to make decisions affecting reliability. Scenario development recognizes the uncertainty inherent in decision making, especially when looking 10-20 years in the future, and attempts to identify strategic choices needed to manage future reliability risks and opportunities. In contrast, a “study case” is a discrete assessment that analyzes specific data inputs using a specific modeling tool. A study case can be based on a future scenario, as described above, or on another set of defined data inputs.

The Scenario Development Subcommittee’s focus question is: “What are the plausible futures in which potential reliability risks could arise?” The subcommittee would focus on describing plausible futures that would set the context for WECC’s reliability assessment activities in the 10-to-20 year planning horizon. The Scenario Development Subcommittee chair must have experience in developing plausible futures for an organization, translating future scenarios into specific study cases and applying technical, societal, political, economic, policy and other trends to reliability assessments.

Following is the recommended Scenario Development Subcommittee Governing Body membership:

1. Scenario Development Subcommittee Chair
2. Studies Subcommittee Vice Chair
3. Member Class Representative - Class 1
4. Member Class Representative - Class 2
5. Member Class Representative - Class 3
6. Member Class Representative - Class 4
7. Member Class Representative - Class 5
8. Planning Region Representative
9. Consumer Advocate
10-11. Environmental Advocates (2)
12-13. Technology Advocates (2)
15. Tribal/First Nations Representative

12. **Recommended Studies Subcommittee Governing Body Membership**

The Studies Subcommittee would be responsible for developing, reviewing and approving an annual study program for reliability assessments. The Studies Subcommittee’s focus question is: “What studies should WECC perform to better understand potential reliability risks?” The Studies Subcommittee chair must have experience in developing and understanding reliability assessments to address a variety of potential reliability risks, such as those related to resource adequacy, economic dispatch, stability studies, dynamic analyses and transmission expansion.

The Studies Subcommittee would not require specific analytic skills, as its activities in developing study programs would be relatively broad. Members would be expected to be familiar with load, resource and transmission planning generally, as well as with current reliability assessment issues and potential reliability risks. In addition, members would need a working knowledge of the models and data used in WECC’s studies, as well as the types of reliability studies required by NERC.

Following is the recommended Studies Subcommittee Governing Body membership:

1. Studies Subcommittee Chair
2. Scenario Development Subcommittee Vice-Chair
3. Member Class Representative - Class 1
4. Member Class Representative - Class 2
5. Member Class Representative - Class 3
6. Member Class Representative - Class 4
7. Member Class Representative - Class 5
8-12. Five Individuals who collectively have a Variety of PCM, PF and Other Study Expertise
13. Peak Reliability Representative

13. **Recommended Modeling Subcommittee Governing Body Membership**

The Modeling Subcommittee (MS) would provide overall guidance for WECC’s models used in reliability assessment activities. The MS’s focus question is: “What models should WECC use to complete

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3 Reliability assessments could include power flow analyses, stability analyses, economic studies, resource adequacy assessments, policy-related analyses or any other studies needed to provide insight into potential future reliability risks and opportunities.
4 Other study expertise could include, but would not be limited to, short circuit studies, flexibility studies or probabilistic analyses.
necessary reliability studies?” The MS chair must have experience in using various modeling tools to analyze potential reliability risks, such as production cost models, power flow models, short circuit models and resource adequacy models. The chair also should have a working knowledge of the data used by such modeling tools and how loads, resources and transmission topology are modeled in the tools.

The Modeling Subcommittee would also include a Power Flow Modeling Work Group and a Production Cost Modeling Work Group.

Following is the recommended membership of the Modeling Subcommittee Governing Body:

1. Modeling Subcommittee Chair
2. Member Class Representative - Class 1
3. Member Class Representative - Class 2
4. Member Class Representative - Class 3
5. Member Class Representative - Class 4
6. Member Class Representative - Class 5
7. Member with power flow model expertise
8. Member with production cost model expertise
9. Member with other model expertise
10. Data Subcommittee vice chair
11. PCM Modeling Work Group chair
12. PF Modeling Work Group chair

14. Recommended Data Subcommittee Governing Body Membership

The Data Subcommittee (DS) would provide overall guidance for gathering, refining and applying data to WECC’s models and stand-alone databases. The DS’s focus question is: “What data will WECC need to complete necessary reliability studies?” The DS chair must have experience in working with the data used in various modeling tools to analyze potential reliability risks, such as production cost models, power flow models, short circuit models and resource adequacy models. The chair also should have a working knowledge of the modeling tools and how loads, resources and transmission topology are modeled in the tools.

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5 Other model expertise could include, but would not be limited to, capital expansion models, resource adequacy models or probabilistic analyses.
The Data Subcommittee would also include a Power Flow Data Work Group, a Production Cost Data Work Group and an Environmental Data Work Group.

The following is the recommended membership of the Data Subcommittee Governing Body:

1. Data Subcommittee Chair
2. Member Class Representative - Class 1
3. Member Class Representative - Class 2
4. Member Class Representative - Class 3
5. Member Class Representative - Class 4
6. Member Class Representative - Class 5
7. Member with power flow data expertise
8. Member with production cost data expertise
9. Member with capital cost data expertise
10. Member with loads and resources data expertise
11. Modeling Subcommittee vice chair
12. PCM Data Work Group chair
13. PF Data Work Group chair
14. Environmental Data Work Group chair
15. Peak Reliability Representative

15. **RAC Implementation**

Implementation of the RAC will require:

1. A transition plan that would enable WECC to move from its current PCC and TEPPC committee structure to the new RAC structure; and
2. Charters and protocols for the RAC Governing Body, each of the RAC subcommittees and, where necessary, subcommittee work groups.

The JPTRTF plans to begin these items following receipt of stakeholders’ comments on the first draft of the RAC proposal.
### Appendix A.1: Reliability Assessment Committee (RAC) Subcommittee and Work Group Responsibilities

<table>
<thead>
<tr>
<th>Reliability Assessment Committee</th>
<th>Scenario Development Subcommittee</th>
<th>Studies Subcommittee</th>
<th>Modeling Subcommittee</th>
<th>Data Subcommittee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Project Coordination, Path Rating, and Progress Report Processes</td>
<td>Create Future scenarios of the Western Interconnection</td>
<td>Create annual (PCC) study program</td>
<td>Oversee Base Case program enhancements</td>
<td>Collect 10-year base case data and 20-year data</td>
</tr>
<tr>
<td>Manage Power System Stabilizer (PSS) Policy Statement and related documents</td>
<td>Monitor and report on trends in scenario-related public events.</td>
<td>Create annual study program report (ITRA and PCC-related reports)</td>
<td>Develop dynamic and power flow model structure</td>
<td>Oversee base case development process modifications</td>
</tr>
<tr>
<td>(Move Standards and regional criteria development related to reliability assessment functions to Standards Committee)</td>
<td>Manage WECC Off-nominal Frequency Load Shedding Plan</td>
<td>Approve dynamic model list</td>
<td>Manage Data Preparation Manual</td>
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</tr>
<tr>
<td>Manage BES Inclusion Guideline</td>
<td>Manage Geomagnetic disturbance data and studies (shared with Modeling and Data Subcommittee)</td>
<td>Reconcile power flow and state-estimator models</td>
<td>Check and resolve base case data errors</td>
<td></td>
</tr>
<tr>
<td>Manage Performance</td>
<td>Manage Year 10 Study</td>
<td>Manage Generator</td>
<td>Identify reliability</td>
<td></td>
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<tr>
<td>Reliability Assessment Committee</td>
<td>Scenario Development Subcommittee</td>
<td>Studies Subcommittee</td>
<td>Modeling Subcommittee</td>
<td>Data Subcommittee</td>
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<tr>
<td>Category Upgrade Request Process (PCUR)</td>
<td></td>
<td>Cases</td>
<td>Testing Policy and related documents</td>
<td>assessment applications of synchrophasor data</td>
</tr>
<tr>
<td>Manage Methodology for defining Planning Coordinator Areas in the WECC Region</td>
<td></td>
<td>Create Annual Study Program</td>
<td>Manage Modeling guidelines for PV, wind, and composite loads</td>
<td>Oversee load forecast, resource inventory, resource and transmission addition data collection</td>
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<tr>
<td>Disseminate updates from entities and Regional Planning Groups on project status</td>
<td></td>
<td>Manage Year 20 Study Cases</td>
<td>Manage program user groups</td>
<td>Manage Project Coordination and Path Rating Process logs</td>
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<tr>
<td>Disseminate Updates on NERC activities</td>
<td></td>
<td>Review and approve reliability impact analyses</td>
<td>Manage Production Cost Model</td>
<td>Create progress Reports for generation and transmission logs</td>
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<tr>
<td>Disseminate updates on standards development activities</td>
<td></td>
<td>Create UFLS Assessment Report</td>
<td>Manage additional modeling assumptions</td>
<td>Create Common Case</td>
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<tr>
<td>Provide updates on other WECC activities</td>
<td></td>
<td>Oversee 10-year Power Supply Assessment</td>
<td>Manage Long-Term Planning Tool</td>
<td>Manage Common Case Transmission</td>
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<tr>
<td>Reliability Assessment Committee</td>
<td>Scenario Development Subcommittee</td>
<td>Studies Subcommittee</td>
<td>Modeling Subcommittee</td>
<td>Data Subcommittee</td>
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<tr>
<td>Disseminate updates from entities and Regional Planning Groups on project status</td>
<td>Manage probabilistic resource adequacy studies</td>
<td>Manage Round Trip functionality (shared with Data Subcommittee)</td>
<td>Manage development and updating of Capital Cost Calculator</td>
<td>Assumptions (CCTA)</td>
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<tr>
<td>Manage Probabilistic Resource Adequacy Studies</td>
<td>10-year Power Supply Assessment report</td>
<td>Re: synchrophasor data-create disturbance validation cases and implement reliability assessment applications for synchrophasor data</td>
<td>Manage development and updating of Load Forecast Tool</td>
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<td></td>
<td>Manage geomagnetic disturbance data and studies (shared with Data Subcommittee)</td>
<td>Address Anchor Data Set (ADS) modeling issues</td>
<td>Manage development and updating of environmental data WECC Environmental Data Viewer</td>
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<td></td>
<td>Issue-based analyses</td>
<td></td>
<td></td>
<td>Oversee Load forecast, resource inventory, resource and transmission additions</td>
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<tr>
<td>Reliability Assessment Committee</td>
<td>Scenario Development Subcommittee</td>
<td>Studies Subcommittee</td>
<td>Modeling Subcommittee</td>
<td>Data Subcommittee</td>
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<td></td>
<td>Develop and recommend criteria and guidelines for elements of power system design and performance that affect the reliability of the BES in the Western Interconnection</td>
<td>Manage WECC Project Portal</td>
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<td></td>
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<td>Gather power flow &amp; transmission stability model data</td>
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<td></td>
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<td>Manage geomagnetic disturbance data and studies (shared with Studies Subcommittee)</td>
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<td></td>
<td>Manage Round Trip functionality (shared with Modeling Subcommittee)</td>
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<td>Manage Round Trip functionality (shared with Modeling)</td>
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<td>Reliability Assessment Committee</td>
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<td></td>
<td></td>
<td>Address Anchor Data Set (ADS) data issues</td>
</tr>
</tbody>
</table>
## Appendix A.2: TEPPC Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Description of Product/Activity</th>
<th>Current Parent Committee</th>
<th>Current Responsible Group(s)</th>
<th>Proposed Parent Committee</th>
<th>Proposed Responsible Group(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Case</td>
<td>The common case is the year ten outlook of the Western Interconnection using a production cost model used by WECC and external entities for studies</td>
<td>TEPPC</td>
<td>DWG, MWG</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>10-Year Study Cases</td>
<td>Evaluation of transmission adequacy and resource mix based on input parameters requested by stakeholders or WECC staff</td>
<td>TEPPC</td>
<td>SWG, DWG, MWG</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>Production Cost Model (PCM)</td>
<td>Licensing and application of desired PCM used for Year 10 study cases. This activity also includes consideration of model modifications to increase functionality needed for reliability analyses</td>
<td>TEPPC</td>
<td>DWG, MWG</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Annual TEPPC Study Program</td>
<td>Development of an annual study program that prioritizes study requests, recognizes staff and stakeholder resource availability and assesses significant potential reliability risks in the year-10 and year 20 planning horizons.</td>
<td>SWG, SPSG</td>
<td>RAC</td>
<td></td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
<td>Current Parent Committee</td>
<td>Current Responsible Group(s)</td>
<td>Proposed Parent Committee</td>
<td>Proposed Responsible Group(s)</td>
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</tr>
<tr>
<td>Common Case Transmission Assumptions (CCTA)</td>
<td>The CCTA is a list of future transmission projects that are included in the Common Case</td>
<td>TEPPC</td>
<td>RPCG-DWG</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>Additional modeling assumptions</td>
<td>WECC stakeholder groups decide which PCM-specific information (e.g., hydro years) should be used to develop the Common Case</td>
<td>TEPPC</td>
<td>DWG</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>20-Year Study Cases</td>
<td>Evaluation of potential infrastructure changes needed to accommodate the load/resource balance in various study cases requested by stakeholders. Potential infrastructure changes are based on the results of a capital expansion model.</td>
<td>TEPPC</td>
<td>SPSG</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>Long-Term Planning Tool</td>
<td>A capital expansion model that optimizes transmission and generation based on levelized cost of energy (LCOE).</td>
<td>TEPPC</td>
<td>Staff with SPSG input</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
<td>Current Parent Committee</td>
<td>Current Responsible Group(s)</td>
<td>Proposed Parent Committee</td>
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<tr>
<td>Capital Cost Calculator</td>
<td>The Transmission Capital Cost Calculator and Capital Cost Calculator are two TEPPC products developed by a third party vendor that are necessary for TEPPC’s Long Term Planning Tool and used by non-WECC entities in their process.</td>
<td>TEPPC</td>
<td>Staff with SPSG input</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>Load Forecast Tool</td>
<td>A tool developed through a third-party vendor used to create forecasts of future load.</td>
<td>TEPPC</td>
<td>10 Year-DWG; 20-Year-MDTF</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>Environmental Data Tool</td>
<td>Environmental data, and the “viewer” tool for using it, are WECC products needed for both running the long term planning tool and evaluating the relative risk of encountering environmental and cultural resource conflicts for resource additions or transmission upgrades that may be needed to cost-effectively meet reliability requirements or policy-driven system solutions</td>
<td>TEPPC</td>
<td>EDWG</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
<td>Current Parent Committee</td>
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<td>Proposed Parent Committee</td>
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</tr>
<tr>
<td>Load forecast, resource inventory, resource and transmission additions</td>
<td>Contains data used to perform WECC's ten-year resource adequacy assessments</td>
<td>N/A</td>
<td>Staff</td>
<td>RAC</td>
<td>Data Work Group</td>
</tr>
<tr>
<td>Methods and Assumptions</td>
<td>Data request guidelines for Loads and Resources data</td>
<td>N/A</td>
<td>Staff</td>
<td>Data Subcommittee</td>
<td></td>
</tr>
<tr>
<td>10-year Power Supply Assessment report</td>
<td>The Power Supply Assessment is a report addressing the Western Interconnection's resource adequacy over the next ten years</td>
<td>PCC</td>
<td>Staff</td>
<td>RAC</td>
<td>Reliability Studies Subcommittee</td>
</tr>
<tr>
<td>Future scenarios of the Western Interconnection</td>
<td>The scenario planning process describes plausible futures for the 20-year timeframe and enables planners to consider strategic options in consideration of a diverse set of drivers - policy, economic, technological, social, political, etc.</td>
<td>TEPPC</td>
<td>SPSG</td>
<td>RAC</td>
<td>Scenario Development Subcommittee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
<td>Current Parent Committee</td>
<td>Current Responsible Group(s)</td>
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<tr>
<td>Integrated Transmission and Resource Assessment (ITRA)</td>
<td>The ITRA report provides a summary of analytical activities completed during the year.</td>
<td>TEPPC</td>
<td>SWG</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>Reliability Impact Analyses</td>
<td>These reports reflect special reliability analyses performed to evaluate the future system (e.g., Clean Power Plan)</td>
<td>TEPPC</td>
<td>Staff</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>Project Portal</td>
<td>The project portal contains information on future transmission projects</td>
<td>TEPPC</td>
<td>RPCG</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>Updates from entities and Regional Planning Groups on project status</td>
<td>Updates provided from utilities, transmission project sponsors, and Regional Planning Groups at stakeholder meetings</td>
<td>TEPPC</td>
<td>TEPPC</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Updates on other WECC activities</td>
<td>Updates to stakeholders on other WECC activities (including PCC updates)</td>
<td>TEPPC</td>
<td>All</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Round trip functionality</td>
<td>This functionality enables WECC to develop power flow snapshot cases from a selected hour of a production cost</td>
<td>TEPPC</td>
<td>Staff</td>
<td>RAC</td>
<td>Modeling and Data</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
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<tr>
<td>Anchor Data Set</td>
<td>The anchor data set is the common starting point for developing power flow and production cost models using Regional Planning Group plans as the basis for modeling assumptions</td>
<td>PCC/TEPPC</td>
<td>RAC</td>
<td>Modeling and Data Subcommittee</td>
<td></td>
</tr>
<tr>
<td>Probabilistic Resource Adequacy Studies</td>
<td>These studies use stochastic models to determine reliability measures such as loss of load probability for future time frames</td>
<td>TEPPC</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
<td></td>
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<tr>
<td><strong>10-year base case data collection</strong></td>
<td>Includes the request, submission, and collection of data needed to compile base cases</td>
<td>PCC</td>
<td>SRWG</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td><strong>Base case development process modification</strong></td>
<td>Oversight of the process for collecting and compiling base case data</td>
<td>PCC</td>
<td>SRWG/Staff</td>
<td>RAC</td>
<td>Data Subcommittee/Staff</td>
</tr>
<tr>
<td><strong>Annual PCC Study Program</strong></td>
<td>Document containing the case description sheets for base cases to be developed and a process for accepting base case and study requests</td>
<td>PCC</td>
<td>SRWG</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td><strong>Data Preparation Manual</strong></td>
<td>The Data Preparation Manual lists requirements for data submitters related to power flow and dynamics data submittal</td>
<td>PCC</td>
<td>SRWG</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td><strong>Data error checks and resolution</strong></td>
<td>Identifying data error categories and reporting errors to stakeholders for resolution (replog)</td>
<td>PCC</td>
<td>SRWG</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
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<tr>
<td>Program enhancements</td>
<td>Working with vendors to enhance existing power flow programs (e.g., PSLF, PSS/E)</td>
<td>PCC</td>
<td>SRWG/MVWG</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Dynamic and power flow model structure development</td>
<td>Developing dynamic model structures to be implemented in vendor programs (e.g., composite load models, RAS models)</td>
<td>PCC</td>
<td>MVWG/TSS</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Approved dynamic model list</td>
<td>Update the list that contains dynamic models approved for use by data submitters</td>
<td>PCC</td>
<td>MVWG</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>System model validation (creation of disturbance validation cases)</td>
<td>Includes the development of disturbance validation cases (e.g., the September 8, 2011 case) and validation of planning models</td>
<td>PCC</td>
<td>MVWG</td>
<td>RAC</td>
<td>Modeling and Data Subcommittee</td>
</tr>
<tr>
<td>Identifying planning applications of synchrophasor data</td>
<td>The Joint Synchronized Information Subcommittee (JSIS) pulls together a wide group of experts from the West to implement planning applications for synchrophasor data. This is a joint committee with the Operating Committee, but the work that JSIS does with respect to planning is directly</td>
<td>PCC</td>
<td>JSIS</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
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</tr>
<tr>
<td>Reconciliation of power flow and state-estimator models</td>
<td>related to modeling and system monitoring</td>
<td></td>
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</tr>
<tr>
<td>Annual Study Program Report</td>
<td>Addressing differences between the base case models and the West-wide System Model</td>
<td>PCC</td>
<td>WBRTF</td>
<td>RAC</td>
<td>Model</td>
</tr>
<tr>
<td>UFLS Assessment Report</td>
<td>The Annual Study Program Report contains a description of the base cases that were developed during the previous year and results of transient and post-transient simulations performed on the base cases for a limited number of contingencies</td>
<td>PCC</td>
<td>SRWG/TSS</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>UFLS Assessment Report</td>
<td>The Under-frequency Load Shedding (UFLS) Assessment Report contains the results of simulations that were run to test the effectiveness of WECC's UFLS</td>
<td>PCC/JGC</td>
<td>UFLSRG</td>
<td>RAC</td>
<td>Reliability Studies Subcommittee</td>
</tr>
<tr>
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<td>Description of Product/Activity</td>
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<tr>
<td>Load forecast, resource inventory, resource and transmission additions</td>
<td>Program.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Methods and Assumptions</td>
<td>Contains data used to perform WECC's ten-year resource adequacy assessments</td>
<td>N/A</td>
<td>Staff</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>10-year Power Supply Assessment report</td>
<td>Data request guidelines for Loads and Resources data</td>
<td>N/A</td>
<td>Staff</td>
<td>Staff</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>The Power Supply Assessment is a report addressing the Western Interconnection's resource adequacy over the next ten years</td>
<td>PCC</td>
<td>Staff</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>Project Coordination and Path Rating Process logs</td>
<td>Lists activity of transmission projects undergoing the WECC Project Coordination and Path Rating processes</td>
<td>PCC</td>
<td>PCC/TSS</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>Progress Reports for generation and transmission projects that meet a certain</td>
<td>Lists activity of generation and transmission projects that meet a certain</td>
<td>PCC</td>
<td>TSS</td>
<td>RAC</td>
<td>Data Subcommittee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
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<tr>
<td>transmission logs</td>
<td>size threshold</td>
<td></td>
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</tr>
<tr>
<td>Project Coordination, Path Rating, and Progress Report Processes document</td>
<td>The document outlines the process for taking projects through the Project Coordination and Path Rating processes and outlines how entities can report on generation and transmission projects</td>
<td>PCC</td>
<td>PCC</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Generator Testing Policy and related documents</td>
<td>The policy outlines the generator testing requirements in the Western Interconnection and associated documents provide guidance to generator owners on how to test units and provide information to their Transmission Planners</td>
<td>PCC</td>
<td>MVWG</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Power System Stabilizer (PSS) Policy Statement and related documents</td>
<td>The policy outlines PSS requirements for generators and associated documents provide guidance for designing, tuning, and testing PSS</td>
<td>PCC</td>
<td>TSS</td>
<td>RAS</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
<td>Current Parent Committee</td>
<td>Current Responsible Group(s)</td>
<td>Proposed Parent Committee</td>
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<tr>
<td>Standards (and regional criteria) development related to planning functions</td>
<td>Providing subject-matter expertise to participate on or inform standard drafting teams developing regional standards or criteria and to develop Standards Authorization Requests (SARs)</td>
<td>PCC</td>
<td>RS</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>WECC Off-nominal Frequency Load Shedding Plan</td>
<td>This plan outlines the WECC safety net for under-frequency load shedding including recommended trip points for load shedding</td>
<td>OC</td>
<td>OC</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
<tr>
<td>BES Inclusion Guideline</td>
<td>The BES Inclusion Guideline provides guidance to entities on how to determine whether an element should considered for inclusion in the Bulk Electric System</td>
<td>PCC</td>
<td>RS</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Performance Category Upgrade Request Process (PCUR)</td>
<td>This guideline provides a robust line design features and a seven-step process that transmission owners can undertake to demonstrate why particular contingencies have a low probability of occurrence and should be able to meet lower performance criteria</td>
<td>PCC</td>
<td>RS</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Product</td>
<td>Description of Product/Activity</td>
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<tr>
<td>Modeling guidelines for PV, wind, and composite loads</td>
<td>These guidelines provide information to planners when developing power flow and dynamic models</td>
<td>PCC</td>
<td>MVWG</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Methodology for Defining Planning Coordinator Areas in the WECC Region</td>
<td>Outlines different ways in which Planning Coordinators can define their Planning Coordinator Area</td>
<td>PCC</td>
<td>PCC</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Updates from entities and Regional Planning Groups on project status</td>
<td>Updates provided from utilities, transmission project sponsors, and Regional Planning Groups at stakeholder meetings</td>
<td>PCC</td>
<td>PCC/TSS</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Updates on NERC activities</td>
<td>Updates on NERC activities provided to the PCC by the WECC representative on the NERC Planning Committee</td>
<td>PCC</td>
<td>PCC</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Updates on standards development activities</td>
<td>Updates on NERC activities provided to the PCC by WECC</td>
<td>PCC</td>
<td>PCC</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
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<tr>
<td>Program user groups</td>
<td>The PSLF, PSS/E, PowerWorld, and Joint Users Groups provide a forum for program users to get together to share lessons learned, discuss upcoming enhancements to programs, and meet with program vendors to talk about issues and potential program enhancements</td>
<td>PCC</td>
<td>JUG, GEPUWG, PTIPUWG, PWUWG</td>
<td>RAC</td>
<td>Modeling Subcommittee</td>
</tr>
<tr>
<td>Updates on other WECC activities</td>
<td>Updates to stakeholders on other WECC activities (including TEPPC updates)</td>
<td>PCC</td>
<td>All</td>
<td>RAC</td>
<td>Reliability Assessment Committee</td>
</tr>
<tr>
<td>Short-circuit models</td>
<td>Process for collecting data and developing interconnection-wide short circuit models</td>
<td>PCC</td>
<td>PCC</td>
<td>RAC</td>
<td>Modeling and Data Subcommittee</td>
</tr>
<tr>
<td>Geomagnetic disturbance data and studies</td>
<td>This project is under development, but the vision is to develop a report with an assessment of the impact of geomagnetic disturbances (GMDs) on the system</td>
<td>PCC</td>
<td>TSS</td>
<td>RAC</td>
<td>Modeling and Data Subcommittee and Studies Subcommittee</td>
</tr>
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<td>Product</td>
<td>Description of Product/Activity</td>
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<tr>
<td>Anchor Data Set</td>
<td>The anchor data set is the common starting point for developing power flow and production cost models using Regional Planning Group plans as the basis for modeling assumptions</td>
<td>PCC/TEPPC</td>
<td>N/A</td>
<td>Modeling and Data Subcommittee</td>
<td></td>
</tr>
<tr>
<td>Probabilistic resource adequacy studies</td>
<td>These studies use stochastic models to determine reliability measures such as loss of load probability for future time frames</td>
<td>PCC</td>
<td>RAWG</td>
<td>RAC</td>
<td>Studies Subcommittee</td>
</tr>
</tbody>
</table>
Appendix B: Anchor Data Set Proposal

1. Executive Summary

The Anchor Data Set (ADS) is a compilation of load, resource and transmission topology information used by the WPR in their regional transmission plans as well as by other stakeholders in various planning analyses. Data included in the ADS is intended to be compatible with Production Cost Models (PCM) and power flow (PF) models, including dynamic data and associated assumptions. The data is expected to reflect applicable state and federal public policy requirements.

The purposes for creating the Anchor Data Set (ADS) are to facilitate the following:

- Create a common representation of the loads, resources and transmission across the Western Interconnection 10 years in the future. Such a representation would include data used by the Western Planning Regions (WPR) to create regional plans and will be compliant with public policy requirements (such as: Renewable Portfolio Standards (RPS));
- Establish a common starting point for load, resource and transmission topology data that will be used as a starting point by WECC, the WPR and other stakeholders to analyze the bulk electric transmission system reliability;
- Establish consistent processes and protocols for gathering planning data, including reviews for consistency and completeness, for use in reliability assessments that use Production Cost Model (PCM), Power Flow (PF), and dynamic models.

The ADS is comprised of four primary types of data.

1. Existing, planned, and retired transmission topology through the ten year planning horizon;
2. Existing, planned, and retired resources (generators) through the ten year planning horizon;
3. Load forecasts through the ten year planning horizon; and
4. Other data needed for planning studies, such as generating unit start-up times, variable O&M costs, emission costs, and other data necessary for PCM (economic grid simulation) modeling.

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6 In this process, “Western Planning Regions” refers to those FERC registered entities that have a legal obligation to comply with FERC Order 1000 or have voluntarily agreed to affiliate with the transmission planning processes of the California Independent System Operator (CAISO), ColumbiaGrid, WestConnect, and Northern Tier Transmission Group (NTTG). CAISO is the only regional planning group with compliance obligations under FERC Order 1000. Other WPR-affiliated entities with FERC compliance obligations are individual FERC-jurisdictional entities that are members of Columbia Grid, Northern Tier Transmission Group (NTTG) or WestConnect.

7 This starting point would be a year 10 planning horizon data set that could be modified for other Production Cost Modeling (PCM), Power Flow (PF) and even year 20 studies.

8 The PCM is designed to simulate economic grid operations for every hour of a year. Because of computational requirements, the solution algorithms have to be simplified and a DC solution technique is used. Unlike the AC power flow...
This proposal lays out the timing for developing the first ADS as well as subsequent versions of the ADS.

2. **Purposes for Creating the Anchor Data Set**

The purposes for creating the ADS are to:

- Create a common representation of the loads, resources and transmission across the Western Interconnection 10 years in the future. Such a representation would include data used by the Western Planning Regions (WPR)\(^9\) to create regional plans and will be compliant with public policy requirements (such as: Renewable Portfolio Standards (RPS));
- Establish a common starting point\(^10\) for load, resource and transmission topology data that will be used as a starting point by WECC, the WPR and other stakeholders to analyze the bulk electric transmission system reliability;
- Establish consistent processes and protocols for gathering planning data, including reviews for consistency and completeness, for use in reliability assessments that use Production Cost Model (PCM), Power Flow (PF), and dynamic models.

3. **Regional and Interregional Planning Process**

Among the stakeholders in the Western Interconnection are the WPR. The WPR have compliance obligations under FERC Order 1000 (among other requirements) that call for FERC-jurisdictional members of each WPR to:

- Participate in a regional transmission planning process that satisfies FERC Order No. 890 principles and produces a regional transmission plan;
- Participate in a regional transmission planning process that evaluates transmission alternatives at the regional level that may resolve the transmission planning region’s needs more efficiently or cost-effectively than alternatives identified by individual public utility transmission providers in their local transmission planning processes. A more cost-effective regional solution may include an interregional transmission project that the neighboring

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\(^9\) In this process, “Western Planning Regions” refers to those FERC registered entities that have a legal obligation to comply with FERC Order 1000 or have voluntarily agreed to affiliate with the transmission planning processes of the California Independent System Operator (CAISO), ColumbiaGrid, WestConnect, and Northern Tier Transmission Group (NTTG). CAISO is the only regional planning group with compliance obligations under FERC Order 1000. Other WPR-affiliated entities with FERC compliance obligations are individual FERC-jurisdictional entities that are members of Columbia Grid, Northern Tier Transmission Group (NTTG) or WestConnect.

\(^10\) This starting point would be a year 10 planning horizon data set that could be modified for other Production Cost Modeling (PCM), Power Flow (PF) and even year 20 studies.
transmission planning regions determine to be a more efficient or cost-effective interregional transmission solution than identified regional solution(s).

- Give stakeholders an opportunity to participate in the planning process by identifying and evaluating potential solutions to regional needs. Utility transmission providers\(^{11}\) must also consider transmission needs driven by public policy requirements in developing their regional transmission plans.

The members of the WPR meet FERC planning obligations (FERC Order 1000 for jurisdictional members only) by participating in regional transmission plan preparation for their respective WPR. Regional transmission planning processes are biennial, with the exception of CAISO that has an annual planning process. The transmission plans produced through the planning processes include the identification of transmission needs within the region. While International Planning Regions are not FERC-jurisdictional, they also have planning processes that result in periodic transmission plans.

The WPR and WECC may have different methods for representing load, resource and transmission topology information based on their differing regulatory and analytical needs. To date, these differences have led to inconsistencies in the data used in WECC’s various planning models, resulting in challenges in meeting WECC’s and WECC stakeholders’ varying analytical needs. The ADS is intended to resolve these inconsistencies and facilitate consistent data application for WPR, WECC and other stakeholders in the Western Interconnection. Creating the ADS would allow for a common starting point for:

- Transmission Plan(s), developed by NERC registered entities in the Western Interconnection;
- Regional Transmission Plan(s) developed by the WPR;
- Reliability planning studies (Resource Adequacy, System Stability and Adequacy) undertaken by WECC or other entities in the Western Interconnection.

4. Definition and Components of ADS

The ADS is a compilation of load, resource and transmission topology information used by the WPR in their regional transmission plans as well as by other stakeholders in various planning analyses. Data included in the ADS is intended to be compatible with Production Cost Models (PCM) and power flow (PF) models\(^{12}\), including dynamic data and associated assumptions. The data is expected to reflect

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\(^{11}\) According to 18 CFR 37.3, (Title 18 -- Conservation Of Power And Water Resources; Chapter I - Federal Energy Regulatory Commission, Department Of Energy; Subchapter B - Regulations Under The Federal Power Act; Part 37 - Open Access; Same-Time Information Systems), Transmission Provider means “any public utility that owns, operates, or controls facilities used for the transmission of electric energy in interstate commerce.”

\(^{12}\) Data generally includes forecast loads, existing and planned transmission, existing and planned generation additions and retirements, and other planning data necessary to perform production cost analyses, power flow studies, and dynamic system performance studies.
applicable state and federal public policy requirements, such as: Renewable Portfolio Standard (RPS), Regional Haze Programs, and Mercury and Air Toxic Standards (MATS).

The ADS is comprised of data developed by Data Submitters, defined as NERC Registered Entities (Balancing Authorities (BA), Transmission Planners (TP) and/or Planning Coordinators (PC)) in the U.S. and by other entities in Canada and Mexico (or their designees). This data is used by WPR and may also be used by any other authorized entities such as:

- IPR (Alberta Electric System Operator (AESO), British Columbia Coordinated Planning Group (BCCPG) and El Centro Nacional de Control de Energía (CENACE));
- NERC Registered Entities in the U.S. that may be affiliated to the WPR whether or not they have FERC planning obligations;
- Transmission Owners (TO), Generation Owners (GO) or Load Serving Entities (LSE) not affiliated with the WPR or IPR; and
- WECC and other stakeholders in the Western Interconnection.

Data developed by these entities may be transmitted to WECC via Data Submitters pursuant to, but not limited to, these organizations’ responsibilities to satisfy the NERC standards, WECC reliability criteria, and other criteria as may be applicable to individual entities. The ADS will reflect the WPR and IPR view of loads, resources and transmission topology for a ten-year planning horizon.

The ADS provides a data set that is intended to be a common starting point for WPR. It may be used by WECC and stakeholders to conduct PCM studies and coordinated PF/dynamic studies. WECC will communicate with the Data Submitters (with copies to the WPR) when submitted data appears to be inconsistent with existing data collection processes. The Data Submitters will consider WECC’s feedback and modify the initially-submitted data if appropriate. Modified data will be submitted to WECC by the relevant Data Submitters (representing their TP/BA/PC obligations). In situations where the WPR is responsible for gathering or developing certain data, the WPR will consider WECC’s feedback. The respective Data Submitters will modify the initially-submitted data if appropriate and re-submit the data to WECC. In such cases, the entities modifying ADS data will document their changes and make the documentation available to interested stakeholders following CEII confidentiality requirements. For the purpose of creating the ADS, WECC will not change data provided by the WPR or IPR through their respective Data Submitters.

## 5. Components of the Anchor Data Set

The ADS is comprised of four primary types of data.

1. Existing, planned, and retired transmission topology through the ten year planning horizon;
2. Existing, planned, and retired resources (generators) through the ten year planning horizon;
3. Load forecasts through the ten year planning horizon; and

4. Other data needed for planning studies, such as generating unit start-up times, variable O&M costs, emission costs, and other data necessary for PCM\textsuperscript{13} (economic grid simulation) modeling.

The data provided by the Data Submitters will be coordinated with the most recent regional transmission plans by WPR and with the most recent transmission plans by TO, GO and LSE not represented by the WPR or IPR. To create solvable PCM and PF/dynamic cases, the ADS also includes data that may not be provided by the above entities (e.g., NREL data: hourly output profiles for wind or solar resources located in specific areas, heat rate curves, forecast fuel prices). The sources of such information may be from the WPR or other entities associated with the WPR.

6. Approved Regional Plans

Regional transmission plans developed by the WPR and IPR are the foundation upon which significant planning decisions within the WPR and IPR are made. As such, these regional transmission plans provide a source of data included in the ADS. Data used in regional transmission plans generally reflect a ten-year planning horizon and includes load projections, existing resources, planned resource additions and retirements, and transmission topology assumptions including recommended transmission additions.

The ADS is expected to include data that reflects the WPR and IPR regional transmission plans across a ten-year planning horizon. This data will be provided to WECC by the Data Submitters regardless of whether or not they are affiliated with and/or members of a WPR or IPR. The data is expected to reflect applicable state and federal public policy requirements, such as: Renewable Portfolio Standard (RPS), Regional Haze Programs, and Mercury and Air Toxic Standards (MATS).

7. Coordination between Registered Entities and Planning Regions

The WPR and IPR depend on the Data Submitters to provide WECC with the actual data and assumptions that reflect applicable criteria and that are used in the regional transmission plans of each of the four planning regions of the WPR and by members of the IPR. Assembling, reviewing and finalizing planning data will require significant coordination between the Data Submitters (or their designee) and the WPR or IPR to produce an accurate, consistent, and complete data set. Additionally, to help ensure that data developed by the WPR, IPRs, and Data Submitters is accurate, consistent and complete, WECC will review the initial data submissions and report any inaccuracies or inconsistencies to the data providers. The final data subsequently provided to WECC will be included in the ADS.

\textsuperscript{13}The PCM is designed to simulate economic grid operations for every hour of a year. Because of computational requirements, the solution algorithms have to be simplified and a DC solution technique is used. Unlike the AC power flow analysis, the DC solution technique does not require data for reactive loads or reactive supply sources and does not solve for voltages.
8. Data for Entities Not Covered by a Regional Planning Group

Each of the WPR’s members covers a large electrical/geographical footprint. However, there are entities within the Western Interconnection that are outside of these footprints. Such entities may be transmission operators, transmission providers, or have balancing area responsibilities but may not be subject to FERC planning requirements (i.e. independent transmission developers) and/or may choose not to affiliate with or become members of the WPR. Entities not part of the WPR are encouraged to submit data to the WPR and WECC.

9. Data for International Entities

The Western Interconnection includes British Columbia and Alberta in Canada, as well as a portion of Baja California in Mexico. While Canadian and Mexican planning authorities do not have compliance obligations under FERC Order 1000, they undertake transmission planning that would be a source of data for the Anchor Data Set. The ADS process assumes that high quality load, resource and transmission topology data will be available from entities in Canada and Mexico to populate the ADS, as described below in greater detail.

10. Registered Entity and Other NERC-Required Data Submittals to WECC

Some data needed for the ADS is included in existing NERC required data submittals. The following submittals by the Data Submitters occur regularly and will be a source of data for the ADS:

- **MOD-031 Data Submittals (Load and Resource Data)** This NERC standard provides authority for WECC to collect demand, energy and related data to support reliability studies and assessments. This standard ensures that WECC, its members, and its stakeholders have access to complete and accurate load forecasts, as well as the supporting methods and assumptions used to develop these forecasts. The standard also includes consistent documentation and information sharing activities to improve efficient planning practices and support the identification of needed system reinforcements. Collection of actual demand and Demand Side Management (DSM) program performance data during the prior year will allow for comparison to prior forecasts and further contribute to enhanced accuracy of load forecasting. Details of required load and resource data are included in the MOD-031-1 description.

- **MOD-032 Data Submittals (Power Flow and Dynamics Data)** This standard establishes consistent modeling data requirements and reporting procedures for development of long-term planning cases necessary to support reliability analyses of the interconnected transmission system. PCs and each of their TPs are required to jointly develop steady-state, dynamics, and short circuit modeling data. Details of required steady-state, dynamics, and short circuit modeling data are included in the MOD-032-1 description.
11. Other Data Submittals

Data submittals required under MOD-031 and MOD-032 provide much of the data needed to populate the ADS. However, other data that is not developed by the above-mentioned entities are needed to create solved PCM and PF/dynamic cases and meet other modeling needs. This may include: fuel prices, emission rates, inflation, and hourly output profiles for wind or solar resources located in specific areas. Such data will be collected through existing relationships and efforts with WECC members and stakeholders. This is explained in greater detail in a following section of this report.

12. Alternative Views of the Future

As previously discussed, the purpose of the ADS is to provide a common representation of the loads, resources and transmission consistent with the WPR’s ten-year planning horizon for generation and transmission topology across the Western Interconnection. The ADS establishes a baseline or starting point upon which other studies or analysis which may require assumptions or representations that are different than the WPR regional transmission plans. As such WECC, the WPR, and their stakeholders may create “alternative views” or “scenarios” to those represented by the ADS. Creation of “alternative views” or “scenarios” is an expected product of the planning process. These alternative views will be reflected in scenarios and associated study cases that build off of the “common starting point” ADS.

13. Benefits of Creating the ADS

The benefits resulting from creating the ADS provide significant value to WECC, the WPR, and their stakeholders. The Joint PCC-TEPPC Review Task Force (JTPRTF) has considered the following benefits of creating the ADS:

1. **Common Starting Point.** The ADS is intended to be a common starting point that the WPR, IPR, WECC and stakeholders can use to develop alternative cases to perform transmission and reliability assessments. It is suggested that the development of alternative cases be documented through change case files and those change case files be made available to stakeholders;

2. **Reduced duplication in data collection.** WECC’s modeling activities frequently leverage different sources and types of data for reliability planning. The ADS process is intended to leverage coordination and collaboration between members of the WPR, IPR and WECC to develop a common data set that provides a single data source for the WPR, IPR, WECC, and their stakeholders to use in performing analysis that meets their needs. It is expected that this proposed approach will require some modification of existing WECC processes that if left unmodified can create challenges in coordinating data collection efforts. The successful
development of the ADS suggests that ongoing data collection and utilization will be more streamlined and consistent with WPR, WECC, and stakeholder needs;

3. **Repository of accurate and consistent data.** The ADS would create a single repository for much of the data collection and validation that parties need to perform their various reliability and economic assessments. This would enable any existing and/or future stakeholder committees to efficiently use the same data repository and allow validation back to the original source(s);

4. **Stakeholder support.** Using the ADS as a common “starting point” for WECC, WPR, IPR and other stakeholders could increase stakeholder support for future alternative studies being conducted by WECC and all other stakeholders. In addition, stakeholder involvement in data collection and validation could reduce concerns about the validity of data included in the ADS;

5. **Increased synchronization between year 10 and year 20 studies.** Creation of ADS should facilitate increased linkage of year 10 and year 20 studies as a result of a common starting point of reliability planning data. This would occur through clarity in relevant input assumptions that can be modified over different time horizons; and

5. **Assistance with Western Planning Regions (WPR) FERC Order 1000 Compliance.** At least annually, the WPR are required to make available planning data and information (e.g., study plans) to stakeholders and other planning regions. While the WPR engage in interregional coordination through their regional planning processes to meet this requirement, the development and support of the ADS provides the WPR an additional opportunity to coordinate and share planning data and information with stakeholders.
14. Anchor Data Set Compilation and Review Process

Figure 2 depicts a simple five phase “process-flow” perspective of ADS compilation and review.

Figure 2: Anchor Data Set Process Flow
Figure 3: Anchor Data Set Operational Process Map
1. **Phase 1: Complete WPR and IPR Transmission Plans**

During regional planning cycles (annual, biennial or other), planning regions will finalize their transmission plans, including the data and assumptions supporting the analyses used to develop the plans. Upon completion of their transmission plans, WPR and IPR will collaborate with registered entities or Data Submitters to harmonize the relevant load, resource and transmission topology data (included in the transmission plans) to be submitted to WECC as part of the initial data submittals.

2. **Phase 2: Compilation and Initial Review of Submitted Data**

WECC will review the initially submitted data for accuracy, consistency and completeness. In the event that WECC identifies potential inconsistencies or gaps in the submitted data, WECC will contact the submitting entities for clarification and recommend consultation with WPR or IPR on any needed data modifications. Any communications not directed to a WPR or IPR (for example, a request for clarification sent directly to a Balancing Authority) would include a copy to the WPR or IPR to ensure that WPR and IPR are fully aware of the data review. To the extent this initial review results in the Data Submitters making changes to the initially submitted data, such modified data will be included in the “review version” of the ADS.

3. **Phase 3: Review of Draft ADS**

A review version of the ADS will be posted. Registered entities, WPR, IPR and other stakeholders will have an opportunity to offer feedback on the “review version” of the ADS. Stakeholders may choose to submit comments to the respective planning regions for consideration through their regional planning process. Similar to the initial data submittals, changes to the draft ADS data will be limited to correcting inconsistencies. To the extent that the Data Submitters, after coordinating with the WPR and IPR, make changes to the “review version” of the ADS, such modified data will be included in the final version of the ADS. Oversight of this effort is explained in further detail in the Process Management section.

4. **Phase 4: Post ADS**

WECC will incorporate any provided changes and publish the ADS.

5. **Phase 5: Input for Next ADS Version**

WPR’s and IPR’s planning processes are ongoing; as soon as they issue a transmission report, work on the next plan generally begins. Similarly, load, resource and transmission data is dynamic. As soon as the ADS is posted, it is ready for use to create other PCM and PF/dynamic stability cases. Consistent with the WPR even-year/odd-year interregional planning cycle the final version of the ADS will remain in effect for two years. Updates based on revised regional transmission plans or revised load, resource or transmission topology data will be reflected in
Completion of the ADS (beginning in 2016 and ending in early 2018) can provide opportunities for the WPR and WECC to consider refinements to data coordination processes and to the software used for this coordination. Such refinements would enable a consistent, repeatable and permanent process that can be implemented in subsequent planning cycles. In 2018, data coordination and software development efforts will continue.
Figure 4: ADS Development Timeline

- **Post Draft ADS**: 3/31/2018
- **Post Final ADS**: 6/30/2018

**2017**
- **Complete Data Quality Protocol and Other Documentation**: 1/1/2017 - 9/30/2017
- **WPRs and IPRs Complete Transmission Plans**: 10/1/2017 - 12/31/2017
- **CAISO Completes Transmission Plan**: 10/1/2017 - 03/31/2018
- **Compile 2018 ADS**: 1/1/2018 - 3/31/2018
- **Stakeholder Review of 2018 ADS**: 4/1/2018 - 5/31/2018
- **Final Review of 2018 ADS**: 6/1/2018 - 6/30/2018
- **Apply 2018 ADS; Begin Preparing 2020 ADS**: 7/1/2018 - 12/31/2018
15. **Data Review – Responsibility for Reconciliation of ADS Input Inaccuracies**

Because the ADS is designed to build off the WPR and IPR representation of their transmission plans, the final set of data developed by the WPR and IPR and submitted to WECC will not be modified. WECC staff will identify inaccuracies, inconsistencies or incomplete data for resolution and communicate the same to the Data Submitters. Reconciliations will involve coordination of the registered entities and the WPR or IPR.

16. **Modeling Considerations – Integrating Economic versus Reliability Study Models**

There can be significant challenges in integrating DC PCM with AC power flow/dynamic stability models into a common data set such as envisioned by the ADS. While modeling advances have been made to integrate the supporting data-sets to these differing models, key modeling considerations will need to be accounted for as part of the development of ADS. These considerations include:

1. Generator Locations
2. Load Allocation Differences
3. Transmission Topology & Voltage Control Differences
4. Generator Station Service Load
5. Generator Output Allocation between Units in Certain Plant Types

Appendix B.1 elaborates on each of these key considerations as part of any effort to import power flow- based data into a PCM and export PCM results (for a particular hour) into a power flow/dynamic stability case that is representative of the system conditions (for that particular hour).

17. **Implementation Process & Deliverables**

Based on the proposal described in this report, development of the first ADS would begin in 2016. The development effort will align existing data collection processes within WECC with the timelines of the WPR and IPRs as determined by their respective transmission plan(s) schedules prescribed in their Attachment K/tariff. Once the ADS criteria and components are finalized in concept, and the WPR and IPRs have progressed in the development of their transmission plans prior to end of 2017, the first cycle of ADS development will take place in Q1 2018. During 2018, specific attention will be addressed to collecting planning data from entities that are not inherently covered by the stakeholder driven processes of the entities affiliated with the WPR or IPRs.

18. **Western Planning Regions – Annual ADS Development and Timeline**

The purpose of this section is to describe the WPR’s process and timeline to develop the 2028 ADS. During 2016-2017 the WPR will follow their respective regional planning process to develop the
“power flow” data to populate the 2028 ADS during the first two quarters of 2018. During 2016-2017 there will be three opportunities for refinement of the dataset creation process. First, it is the WPR’s second iteration of the Order 1000 regional planning biennial process (or the third and fourth iteration for an annual planning cycle). Second, it is the first Order 1000 interregional transmission project (“ITP”) joint evaluation process where the WPR will use WECC’s 2026 Common Case (“2026 CC”) to coordinate their planning assumptions for ITP evaluation. Third, developing the ADS process now provides a transition period for the WPR (and WECC) to develop an ADS process that harmonizes the ten-year PCM and PF transmission and generation topology using the “round trip” process. These opportunities necessarily require development of a timeline and decision process which can be followed by the WPR and WECC.

Figure 5: Annual ADS Development Activities

<table>
<thead>
<tr>
<th>High Level WPRs 2028 ADS Development Process</th>
<th>WPR’s Regional Planning Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate to update 2026 CC to 2016 WPRs 2026 CC TP/BA/PC</td>
<td>Coordinate to update to 2017 WPRs 2026 CC TP/BA/PC</td>
</tr>
<tr>
<td>6/30 10/31</td>
<td>10/31</td>
</tr>
<tr>
<td>Qtr4 Oct Dec</td>
<td>Qtr4 Jan Mar</td>
</tr>
<tr>
<td>2026 CC Posted</td>
<td>2028 HS PF with WPRs Gen &amp; Trans Topology</td>
</tr>
<tr>
<td>WECC Processes</td>
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</tbody>
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The process displayed in Figure 5 indicates this process is cyclical, repeatable, and consistent with the interregional coordination planning cycles from this point forward.

Beginning in 2016, WECC began preparation of the 2026 CC to support the 2016 TEPPC study program. Also beginning in 2016, the WPR’s first biennial interregional coordination planning cycle was initiated. The WPR also determined that a “WPR focused” data set was needed for the WPR to coordinate their joint evaluation of the Interregional Transmission Projects (ITP) that had been submitted into their regional processes. Through a coordination effort with WECC, the WPR are providing their input to the 2026 CC in an effort to finalize this PCM data set. After review and update of the 2026 CC, the WPR propose to use the WPR’s version of the WECC 2026 CC as the starting point for the WPR’s regional
economic planning studies conducted during the 2016-2017 interregional coordination planning cycle. As noted earlier, these regional studies will consider properly submitted ITPs, evaluated per the joint evaluation process which seeks to coordinate data among the WPR.

While it is expected that each of the Western Planning Regions will use the 2026 Common Case as a starting point for their 2016-2017 regional assessments, they must also look forward to developing an ADS to be used in the 2018-2019 interregional coordination planning cycle. In consideration of this need, and to further coordinate with WECC on data development, the WPR have developed a timeline\textsuperscript{14}. The WPR propose that this timeline be used by the WPR and WECC to prepare for the 2028 ADS and the 2018-2019 interregional coordination planning cycle. This timeline, displayed in Figure 5, shows a high level representation of the WPR intend to follow in developing the 2028 ADS. The 2028 ADS will be published in the second quarter of 2018 and will reflect the WPR’s and the IPR’s planning data and information developed through their 2016-2017 planning processes. Appendix B.2 provides a chronological breakdown for each of the three calendar years of coordination efforts between the Data Submitters and WECC Staff on data compilation and power flow/stability case development.

19. **PCC Technical Studies Subcommittee (TSS) 10 Year Data Survey Response Revision**

Appendix B.3 provides a summary description of the PF Base Case survey response form that each registered entity, including those affiliated with any of the members of the WPR, would need to populate for the 2028 ADS compilation process. This data will be requested by WECC in October, 2017.

20. **Loads and Resources Data Request Revision**

WECC’s Loads and Resources data collection process will need to be amended to reflect the collection of data on existing and planned generation for ADS purposes. Such an amendment to the process would be reflected in the Data Collection Manual and especially, in section 2 – “Existing and Planned Generation Reporting Instructions.”

21. **ADS Other Data Sources**

Appendix B.4 provides details on the “Other Data Sources” that may be used to populate the ADS. Other [PCM] data includes: hourly output profiles for renewable energy generation, flexibility requirements, operating parameters for dispatchable generation sources, emission rates for fossil fuel generators and other economic data (e.g., opportunity costs, inflation indices, and variable costs).

\textsuperscript{14} The timeline does not represent or include the IPR’ coordination and update process with WECC for their input into the 2028 ADS. However, the IPR may follow a similar timeline.
22. Stakeholder Review of Data

Stakeholder review would include the review of ADS’ supporting power flow data and “other data sources” and the stakeholder opportunities provided by the WPR as part of their processes. These opportunities are further described in Appendix B.5.

23. WECC 2018 ADS Deliverables

Once the Anchor Data Set is finalized, WECC will post the following components:

1. The 2028 initial Power Flow Case - a typical WECC peak summer hour (between 17:00 to 19:00 PDT) power flow developed from the Updated WPR’s 2026 Common Case PCM (“Updated 2026 PCM”) power flow export. This case represents the Bulk Electric System (generation and transmission) topology of the regions’ latest transmission plans.

2. A 2028 solved Production Cost Model (PCM).

3. A 2028 solved Power Flow Case - the PCM exported heavy summer hour (an 17:00 to 19:00 hour PST of the peak August day).

4. Change files, or other comparative data, provided by the WPR that reflect the differences between (i) the WPR’ 2026 Common Case, and (ii) the production cost version of the posted 2028 ADS. The WPR will provide a summary of the key differences which WECC will also post.

24. Potential Applications of the Anchor Data Set by Stakeholders

Once the ADS is published, it will be available for use by WECC, WPR, IPR, Registered Entities and other stakeholders for reliability-related analyses. Entities may use the ADS directly or may create new data sets as needed, using the ADS as the starting point. For example:

- WECC may modify certain data in the ADS to develop a Common Case and specific year 10 or year 20 study cases, and contrast the results of those cases with the results of those using the ADS.

- WPR or IPR may also modify elements of the ADS to create specific study cases for their own purposes.

The WPR will use the 2028 ADS as a starting point for their future studies. The ADS is one of the methods through which the WPR will coordinate their planning data since it should reflect the transmission plans and assumptions of each of the four western planning regions, in the most current planning cycle (e.g.: electrical topology, generator data and bus mapping, among other information). The ADS will provide a coordinated data set that the WPR will use as a starting point to develop their power flow base cases and production cost data sets for their regional planning studies (reliability and economic).
• Registered Entities may choose to use the ADS data to perform system simulations and associated assessments to ensure that reliable systems are developed that meet specified performance requirements.

• Any other interested stakeholder may use the ADS data to perform any scenario-based PF or PCM analyses.

It is suggested that entities using the ADS as the starting point for creating alternative cases employ change case files to document the differences between (i) the ADS, and (ii) the alternative cases.

25. Process Management

The ADS could provide significant value to WECC and its stakeholders. Like any other process that is in transition, developing the ADS, especially in the first planning cycle is expected to be a challenging process. As such, it is important that WECC define an effective management process or framework to oversee the ADS compilation. It is the responsibility of the WPR and IPR to coordinate their regional transmission plan data with the Data Submitters (or their designee) that will be submitted to WECC.

26. Responsibility for the ADS:

The proposed Reliability Assessment Committee (RAC) would assume the responsibilities for compiling and overseeing the ADS.
Appendix B.1: Representation Differences between Base case Power Flow and Production Cost Model

Security constrained production cost models (PCM) are used for economic grid simulation studies. AC power flow/dynamic stability models are used for reliability studies. Historically, these two sets of studies have proceeded along separate paths. Modeling advances are providing an opportunity to combine the datasets used to perform all of this modeling. This reduces the need to assemble and maintain duplicate sets of data and enhances overall modeling efficiency. The bus-level load distribution, resource mix and transmission topology included in an AC power flow model are used to populate essential data elements in the PCM. With recent software enhancements, the output of a PCM can now be used to populate AC power flow/dynamic stability models.

An AC power flow case represents a single steady state system at a particular moment in time, while a PCM typically is set up to provide a representation for every hour of an entire year. The power flow case for a moment in time needs to be compatible with transient stability programs to allow simulation of system swings during approximately 30 seconds immediately after a disturbance, and with post-transient power flow capability to facilitate studies a minute or two after a disturbance event. This requires that each power system element in the power flow model be modeled in greater detail than is needed in the PCM. The AC power flow/dynamic stability models, on the other hand, do not need the economic and dispatch parameters used in the PCM.

An AC power flow case provides the following information needed by the PCM:

1. Bus-level locations for generators. Generators not included in the base case power flow must be added to the “power flow case” imported into the PCM.
2. Allocation of balancing authority level single-point-in-time load forecast information to individual bus take-out locations.
3. Transmission topology (which includes voltage control devices that are not used by the PCM).

The “power flow case” also provides the following information that, depending on the way specific resources are modeled in the PCM, may not be used by the PCM, but is important if the PCM solution for a particular hour is to be exported for purposes of creating a subsequent AC power flow case representative of that hour’s system condition.

2. Individual generating unit modeling for certain kinds of generating plants that may be modeled in the PCM as an aggregate, single, generating unit (e.g., cascading hydroelectric systems, combined cycle plants).
If the PCM is not structured to use separate generator station service load, or to represent generating plants at the individual generating unit level, the data exported for a particular hour will require augmentation in order to create a power flow/dynamic stability case with the desired level of load and resource detail.

This document provides a discussion regarding issues encountered in

1. Using power flow cases to populate data in the PCM, and
2. Exporting PCM results for a particular hour to create a power flow/dynamic stability case that is representative of the system conditions for the exported hour.

**Generator Locations**

There are certain data needed for the PCM that, typically, is not represented in an AC power flow case in a compatible manner. This data should be added to the power flow case imported into the PCM case. Several of the categories of data that may need to be added to the power flow case are listed below:

1. Experience indicates that some generators added for the PCM to meet renewable portfolio standards may not be modeled in power flow cases. The “round trip” process used to export an hour from the PCM will ensure that these generators are included in the exported PF case and thereby available for the import into the next cycle’s PCM.

2. Individuals that assemble power flow cases often assume that renewable resource generators are not dependable sources of power during the system condition that the power flow case is designed to test because they are intermittent in nature. Those generators and associated transmission facilities may have been omitted entirely from the power flow case. The “round trip” process used to export an hour from the PCM will ensure that these generators and associated transmission facilities are included in the exported PF case and thereby available for the import into the next cycle’s PCM.

3. Individuals that assemble power flow cases often load-net generators that are smaller than 10 MW (i.e., forecast loads are reduced by the expected output of these generators during the system condition being studied and the difference becomes the modeled load in the imported power flow case used to populate data in the PCM). If those generators are needed to meet renewable portfolio standards, they are represented explicitly in the PCM. The “round trip” process used to export an hour from the PCM will ensure that these generators are explicitly modeled in the exported power flow case and thereby available for the import into the next cycle’s PCM.

Note that the exported hour will reflect forecast loads, not the load modeled in the imported power flow case. This is because forecast loads are manually entered into the PCM and override the loads modeled in the power flow case.
4. There are planned generation additions for which the specific location, and even generator type, may not be known to the individuals assembling the PCM or power flow cases. Information about some planned generation additions may not be public knowledge which may mean the individuals assembling the power flow case are not permitted to include the resources in the model or they may be required to disguise the actual location and/or type of such resources in the power flow model (such as by aggregating the generation with other generators, load-netting the generation, or modeling the generation at a bus other than the generator’s actual location).

5. There are often situations where planned generation and transmission is so uncertain that the individuals assembling the power flow case may choose to exclude that infrastructure from the power flow case. If that information is desired for the PCM, it will need to be added to the starting point power flow case that is imported into the PCM.

Load Allocation Differences

The PCM allocates the monthly balancing authority level peak and energy forecast to hours based on the balancing authority’s hourly load shape (usually a historical year). The PCM allocates the hourly balancing authority loads to specific buses based upon the bus allocation embedded in the power flow case except for those buses with a flag set to indicate that the load for that bus does not conform to the aggregate hourly load shape. For flagged buses, the load shape is assumed to be flat, and loads at the other buses within the balancing authority are adjusted so that the monthly peak load and the aggregate amount of monthly energy consumption for the balancing authority matches the balancing authority’s monthly peak and energy forecast.

Transmission Topology and Voltage Control Differences

The transmission topology is imported directly into the PCM from the starting point power flow case. To the extent a different transmission topology is to be represented in the PCM, it will be necessary to modify the power flow case prior to its importation.

Experience by planners at Northern Tier Transmission Group (NTTG) suggests that it is most efficient to make changes to the power flow case and then solve the modified power flow case, prior to its importation into the PCM.

Voltage control devices are not used by the PCM, which uses a shift factor matrix to allocate flows to lines (otherwise known as a DC power flow), but are needed to solve an AC power flow case exported from the PCM. The PCM retains the voltage control devices and settings from the power flow case. These devices and settings are included when the PCM results for a particular hour are exported for purposes of creating a power flow/dynamic stability case that is representative of the system conditions for that hour. However, since the system conditions for the exported hour will inevitably be different than the system conditions contained in the imported power flow case (e.g., the exported
hour may be for a shoulder hour in the spring while the power flow case may have been for a summer peak condition, or the exported hour may be for a similar time period but the generation dispatch pattern from the PCM solution is entirely different than assumed in the starting point power flow case), voltage control devices need to be adjusted manually in the exported power flow case to provide for appropriate voltage control.

It can be a very time consuming process to get the voltage profile correct. Experienced transmission planners that are familiar with the locations of devices with reactive power capability will be able to activate (or deactivate) shunt capacitors and reactors as necessary to solve the exported power flow case. Transmission planners working with NTTG have found that once a workable voltage profile is found for an exported hour, finding a solution for other exported hours is much easier. This is because the process of finding a workable voltage profile causes the transmission planner to become familiar with the reactive devices modeled in the case.

Users of the AC power flow case exported from the PCM should be aware that there may be power flows on some transmission elements that exceed the thermal ratings of those elements. This possibility exists for two principle reasons.

First, the PCM does not account for the system’s reactive power requirements. When the AC power flow case is executed, reactive power requirements must be modeled and the resulting flows of reactive power when combined with real power flows may exceed the thermal ratings of some transmission elements.

Second, because of computational limitations, not all contingencies can be tested in the PCM and not all transmission elements in the PCM can be monitored to ensure power flows are within the elements’ thermal capabilities. Accordingly, there can be undiscovered overloads which if detected in the system condition studied in the power flow case, will need to be mitigated in the power flow case. Alternatively, care should be taken in the PCM to (i) identify the contingency conditions most likely to result in congestion, and (ii) identify the transmission elements most likely to approach their thermal limits so they can be monitored in the PCM to prevent the thermal overload (through generator dispatch) in the first instance. Power flow users should be especially watchful for thermal overloads on facilities operated below 200 kV because the limits on those lines are often not monitored in the PCM.

Additionally, the base case power flow normally represents out-of-service generators with the generator step-up transformer open. The PCM needs all the step-up-transformers closed to permit

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15 Power flow studies consider a very limited number of system conditions. WECC’s annual power flow study program typically studies about ten different system conditions. An annual PCM simulation evaluates 8760 different system conditions.

16 Theoretically, a PCM can monitor every transmission element in the system. However, it is impractical to do so because solution times for an 8760 hour simulation would be impossibly long.
generators to be dispatched, so the step-up transformers must be closed in the starting point power flow case imported into the PCM.

**Generator Station Service Load**

Generation in power flow cases is generally represented with gross power capability and station service load is modeled as a separate load. The user creating the PCM model generally models generation with net power capability (i.e., station service load at the generating plant is subtracted from the gross generator capability). The gross generation capability is needed for the power flow case to accommodate the dynamic models, which are based upon the gross power capability.

Net generator capability is generally used for the PCM for several reasons:

- Balancing Authorities submitting loads to WECC do not provide forecasts of station service loads. Station service loads for each generator need to be determined in some other way. Lacking a better alternative, the PCM uses a net generator capability that is calculated exogenously. This net generator capability is determined by subtracting the station service load modeled in a power flow case from the gross generator output modeled in the same power flow case. Or, net generator capability can be determined through physical testing. However determined, model users need to be aware of the differences in the way unit capability is modeled in PF and PCM.

- The PCM model does not dispatch hourly station loads because, currently, there is no accepted method for estimating station service loads as a function of generator output.

- The heat rate curves for thermal generating units correspond with fuel use associated with net generation output.

**Generator Output Allocation between Units in Certain Plant types**

The generation dispatch created by the PCM is used directly for the power flow case exported for the selected hour. Power flow users should be aware of certain PCM modeling conventions that may cause problems for certain desired uses of the exported power flow case for reliability studies.

The PCM data generally lumps the output for cascaded hydroelectric systems together and, based upon user specification, allocates the output proportionally back to all individual generating stations within the cascaded systems.\(^1\) However, in actual operation, the amount allocated to a given generating station governs how many hydro units are actually running at that station. The number of units running impacts system frequency response and voltage control capability. Additionally, there are time delays between when the water reaches the plants on a river system and the resulting generation

\(^1\) This is not a limitation of the PCM; rather, it is usually done as a modeling convenience. More detailed modeling of hydroelectric systems in the PCM would eliminate this allocation problem.
changes. The exported power flow therefore may not have the correct allocation of output to individual hydroelectric generating units. Manual changes would be needed to the exported power flow case to reflect the desired distribution of electric power production among the individual generating units comprising a cascaded hydro system and to turn off the individual units as needed. Additionally, a combined cycle plant may be modeled as a lumped unit in the PCM. However, for stability studies to work correctly, the plant output must be allocated correctly back to the individual units in the plant.
Appendix B.2: WPR Process and Timelines

The ADS process in terms of compilation of data by WPR is explained below through a chronological breakdown of activities conducted in each of the three years.

2016 Activities

2016 is the beginning of the FERC Order 1000 annual regional planning cycle for the California ISO, the first year of the biennial regional planning cycles for NTTG and WestConnect and the second year for ColumbiaGrid’s planning cycle. As can be seen below from Figure 6, the ADS timeline starts in 2016 and includes the 2026 CC which WECC released for use on July 6, 2016. Commensurate with the proposed WPR coordination process, the 2026 CC will be utilized by each of the WPR as a starting point in their development of the specific PCM and power flow cases they will use in their regional planning processes. It should be understood that each WPR may modify the 2026 CC to reflect the unique attributes of their region as dictated by their established regional planning process. Through their regional planning processes the WPR will coordinate their updates to the 2026 CC with the other WPR through change case files. The final coordinated data will represent the 2016 WPR’ 2026 CC based on data available in year 2016.

The 2016 WPR 2026 CC is a coordinated PCM data set and a PF base case that is extracted from the PCM using the round trip process.\(^{18}\) It is important to recognize that the 2016 WPR 2026 CC will represent the initial coordinated WPR data set of a “load, resource and topology data thread” that will be included in the WPR’s future PCM datasets and PF base cases and will remain unchanged unless a specific data element is incrementally changed/deleted/added through change case files by a WPR. Sharing these future change case files for the generation and transmission topology with others throughout the Western Interconnection, including WECC, (with appropriate CEII confidentiality or non-disclosure agreement) will maintain consistency in load, generation and transmission topology assumptions through time. This will eliminate any future need to recreate a PCM dataset and/or PF base case generation or transmission topology; historically, the practice has been to recreate these datasets each year.

If requested by WECC, the WPR or their respective Data Submitters\(^{19}\) will provide change case files representing the changes from the 2026 CC to the 2016 WPR’ 2026 CC, full PCM dataset and a PF base case exported from one selected hour of the PCM (assuming the round trip process is functional).

\(^{18}\) Not all WPR’s will use the round trip process during the 2016-2017 biennial planning cycle.
\(^{19}\) The Data Submitters are the TPs/BAs/PC or their designated entity assigned the responsibility.
2017 Activities
During the 2016-2017 interregional planning cycle each WPR will follow its regional planning process to develop their regional transmission plans. By October 2017 the WPR, following their regional planning processes, will coordinate and update the 2016 WPR 2026 CC with their latest regional transmission planning results and transmission topology using change case files. These updates will maintain the generation and transmission topology data thread that started in 2016 with the 2016 WPR 2026 CC because only incremental generation and transmission topology updates to the 2016 WPR’s 2026 CC representing each WPR’s latest final (or draft final) regional transmission plan will be applied. This updated PCM data will be named the Updated 2016 WPR 2026 CC and will include an extracted PF base case. The Updated 2016 WPR 2026 CC will be provided to WECC in October, 2017. The data that will be provided includes the following: change case files representing changes from the 2016 WPR 2026 CC to the Updated 2016 WPR 2026 CC, full PCM data set and a PF base case representing a selected hour exported from the PCM.

The Updated 2016 WPR 2026 CC extracted heavy summer PF generation and transmission topology data will be provided to WECC in October, 2017 as the initial case that WECC will use to develop the 2028 heavy summer power flow case (“2028 HS PF case”). The development of the 2028 HS PF case through the WECC Study Review Work Group’s (SRWG’s) 10 Year Base Case Compilation Schedule will include heavy summer loads consistent with ten year data to be submitted by the WPR’s Data Submitters in response to the WECC Quarter 1 2018 Loads and Resources (L&R) data request. Also, the generation and transmission topology will be consistent with ten year project additions and retirements submitted by the Data Submitters in response to the Quarter 1 L&R data request. During the October-December, 2017 timeframe the WPR and other stakeholders will have an opportunity to provide any other relevant transmission planning updates to the SRWG during the development of the 2028 HS PF case. This case will be posted by January 20, 2018.

2018 Activities
During Quarter 1 of the 2018-2019 interregional coordination planning cycle, the Data Submitters will submit their response to the WECC 2028 L&R data request for 2028 planning data and information. The submitted data and information is intended to be consistent with the WPR and IPR finalized 2016-2017 regional transmission plans and is provided to WECC so that WECC staff can compile the 2028 ADS. This data will be combined with other data not provided by the WPR (e.g., operating parameters for new generating units that will be added between years 2026 and 2028) to compile the 2028 ADS. By the end of the first quarter 2018, WECC will develop a draft 2028 ADS using the Updated 2016 WPR 2026 CC with extracted PF, the 2028 HS PF case, 2028 data from WECC’s existing L&R data collection

Planning regions that follow a biennial planning cycle may use data from their current draft transmission plan or System Assessment and planning regions that follow an annual planning cycle may use their prior year’s approved transmission plan or data from their current draft or near-final transmission plan.
process,\textsuperscript{21} and input from other WECC processes. WECC will post the 2028 draft ADS by the end of Quarter 1, 2018. Together the draft production cost version and draft power flow/dynamic stability version of the ADS constitute the draft 2028 ADS.

Subsequent to WECC’s posting of the 2028 draft ADS and during the remainder of Q2, 2018 the WPR will provide their respective Data Submitters with comments on the draft ADS based on information received or developed through the WPR regional processes. WECC will finalize and post the final 2028 ADS by June 30, 2018. This posting will include – the 2028 ADS, change case files providing changes from TEPPC’s 2026 CC to the 2028 final ADS, and the 2028 HS PF case.

WECC and the WPR will use the 2028 ADS as a starting point for their future studies. When developing the future studies, it is strongly recommended that WECC and the WPR create change case files that reflect the difference between the ADS and the alternative study cases. Subject to any applicable confidentiality or non-disclosure requirements, these change case files should be made available to all stakeholders. The WPR and other stakeholders using the 2028 ADS as the starting point for their own studies are likewise encouraged to use change case files and to make those change case files available to stakeholders.

The 2028 ADS will be utilized by each of registered entities affiliated to the WPR in their development of the specific PCM and power flow cases they will use in their 2018-2019 regional planning processes. It should be understood that each WPR may create alternative PCM and power flow cases that are different than the 2028 ADS to reflect the unique attributes of their region as dictated by their established regional planning process.

**Beyond 2018**

As indicated earlier, following this approach provides key opportunities for the WPR and WECC to not only develop the 2028 ADS but to also consider and refine the data coordination process into a framework that can be followed in future interregional coordination planning cycles beyond 2018. WPR acknowledge that their efforts during the 2016-2017 interregional coordination planning cycle are transitional in nature and rely on new features in the software; but commensurate with these efforts, the WPR expect that coordination between the WPR and WECC will include the initiation of a discussion on establishing a permanent process for interregional coordination planning cycles beyond the current cycle. Such a future permanent process will reflect consistency and replicability of the ADS - data coordination process.

**Timeline**

A timeline of the WPR’ involvement in the 2028 ADS development process is shown in Figure 6.
### WPR Timeline to Develop 2028 ADS

**2016**
- July 6, 2016 – WECC announced the availability of TEPPC 2026 CC
- WPR’s follow their regional planning process timelines in developing their regional transmission plans
- By Oct 2016 - WPR updates the TEPPC 2026 CC with their regional transmission planning data using change cases to develop the 2016 WPR’s 2026 CC
- Oct – if requested by WECC the WPR and/or their Data Submitters provide the 2016 WPR’s 2026 CC change cases (TEPPC 2026 CC → 2016 WPR’s 2026 CC), 2016 WPR’s 2026 PCM and exported PF base case

**2017**
- WPR follow their regional planning process timelines in developing their regional transmission plans
- By Oct - WPR members coordinate and update the 2016 WPR’s 2026 CC PCM and exported PF with their latest draft/final Regional Transmission Plan results (load forecast, generation and transmission topology) to create the Updated WPR’s 2026 CC
- Oct - WPR and/or their Data Submitters provide WECC the Updated WPR’s 2026 CC change case files (2016 WPR’s 2026 CC → Updated WPR’s 2026 CC), solved PCM and exported PF base case

**2018**
- WPR follow their regional planning process timelines in developing their regional transmission plans
  - Q1 – WPR and/or their Data Submitters work with WECC during their L&R data reviews to mitigate, if appropriate, inaccuracies or inconsistencies to data
  - End Q1 - WECC posts draft ADS for stakeholder review with comments provided directly to WPR and/or their Data Submitters
- Q2 - WPR uses their regional planning processes, as appropriate, to vet any stakeholder comments
  - WPR’s Data Submitters provide applicable 2028 ADS edits to WECC
- WPR, Data Submitters, WECC committees and stakeholders can access the WECC posted 2028 ADS that includes the 2028 PCM with exported 2028 heavy summer PF, 2028 HS PF case, and change case files (Updated WPR’s 2026 CC → 2028 ADS)
- The 2028 ADS will not be changed. WECC and WPR will use the 2028 ADS as a starting point for creating their own study cases. Change cases should be used to document the differences between the ADS and these study cases. The change cases should be made available to stakeholders (with appropriate CEII confidentiality or non-disclosure agreement).
Appendix B.3: 2018 Base Case Survey Response – 2028 ADS Data Submittal

CASE DESCRIPTION FORM

I. **CASE DUE DATES:** (to be completed by SRWG and WECC Staff)
   - To Area Coordinator: November 04, 2017
   - To Staff: December 09, 2017

II. **PURPOSE:** 10 YEAR CASE WITH ADDITIONS AND RETIREMENTS FOR TRANSMISSION, LOAD, GENERATION. REPRESENT COAL SHUTDOWNS AND RENEWABLE ADDITIONS CONSISTENT WITH DATA SUBMITTED TO WESTERN PLANNING REGIONS FOR THE YEAR 2028. NO TARGET FLOWS THROUGHOUT WECC; HOWEVER FLOWS SHOULD BE TYPICAL FOR A HEAVY SUMMER CASE.

III. **ITEMS TO BE PREPARED:**
   - Stability Data Master Dynamics File (MDF)
   - Significant Changes From Existing System

IV. **LOADS:** Consistent with loads submitted to Western Planning Regions. Expected peak load for August.

V. **TIME:** 1800 to 2000 hours MST

VI. **GENERATION HYDRO THERMAL RENEWABLE**

<table>
<thead>
<tr>
<th>Region</th>
<th>Hydro</th>
<th>Thermal</th>
<th>Renewable</th>
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<tr>
<td>Northwest</td>
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<tr>
<td>Idaho/Montana</td>
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<tr>
<td>Colorado/Wyoming</td>
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<tr>
<td>Northern California Hydro</td>
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<td>Northern California</td>
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</tr>
<tr>
<td>Southern California</td>
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<tr>
<td>Arizona/New Mexico/Southern Nevada</td>
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VII. **INTERCHANGE**

<table>
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</tr>
<tr>
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<td>COI (Path 66)</td>
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<tr>
<td>PDCI (Path 65)</td>
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<tr>
<td>Midway – Los Banos S-N (Path 15)</td>
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<td>Idaho to Northwest (Path 14)</td>
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<tr>
<td>Montana to Northwest (Path 8)</td>
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<tr>
<td>Utah/Colorado to Southwest</td>
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<tr>
<td>(Path 31, 35, 78 &amp; Durango – Coyote 115 kV)</td>
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<tr>
<td>Southwest to Calif. (EOR Path 49/WOR Path 46)</td>
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</tr>
<tr>
<td>Intermountain to Adelanto DC (Path 27)</td>
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</table>

22 Only Corrections to the MDF or new data for the MDF need be submitted.
23 All loads are coincident unless indicated otherwise. Specified time supersedes specified percentage of load.
24 Renewables should be based on individual entities’ Renewable Portfolio Standard.
25 Targets may be altered as anticipated operating conditions become more clearly known.
NOTE: Where no target flows are specified, actual scheduled transfers should be based on each area’s load and generation (deficiency/surplus) balance and economical generation dispatch. The objective of the case should be kept in mind and schedules should be coordinated between areas prior to data submittal.
Appendix B.4: Other Data Sources

Background

As currently envisioned, upon formation, the Reliability Assessment Committee (RAC) will have at its disposal the year 2026 Common Case. The Common Case will include all of the data necessary to simulate economic operation of the western electric grid for every hour of year 2026. For purposes of assembling the first ADS, which will reflect the WECC electric system ten years from 2018, or year 2028, there will be a need to update the 2026 Common Case with two additional years of data. In the October – December, 2017 timeframe, the Western Planning Regions (WPR) will provide the WECC staff with (i) the WPR version of the 2026 Common Case, and (ii) an extracted 2026 heavy summer power flow case\(^{26}\) that reflects the WPR transmission planning information as of the date of submittal to the WECC staff. The extracted 2026 heavy summer power flow case will “inform” the development of WECC’s the official 2028 heavy summer power flow case (“2028 HS PF case”).

Mechanically, the “2028 HS PF case” is developed in accordance with the WECC System Review Work Group’s (SRWG’s) (or successor subcommittee’s) 10 Year Base Compilation Schedule and will include information provided in the responses of the Data Submitters’ responses to the SRWG’s (or successor subcommittee’s) October, 2017 “Case Description Form” data request for year 2027.\(^{27}\)

In addition to being “informed” by the extracted 2026 heavy summer power flow case provided by the WPR, the “2028 HS PF case” will reflect the heavy summer loads, generation mix and transmission topology data included in the Data Submitters responses to WECC’s first-quarter 2018 “Loads and Resources” data request for year 2028. WECC’s first-quarter 2018 “Loads and Resources” data request for year 2028 will request that the generation mix and transmission topology data provided by the Data Submitters be consistent with the WPR transmission plans.

In Quarter 1, 2018, the “2028 HS PF” case will be used by the RAC (or the appropriate WECC committee) to assemble the production cost version of the year 2028 “Draft ADS.”\(^{28}\) The production cost version of the 2028 Draft ADS will be assembled by uploading the “2028 HS PF case” into the 2017 WPR 2026 Common Case. This upload process replaces the transmission topology and resource mix in the 2017 WPR’ 2026 Common Case with the transmission topology and resource mix in the “2028 HS PF case.”

\(^{26}\) This extraction process is part of the so-called “round trip” process. Note that while the description in this paper refers to creation of a “power flow” case, the data necessary to perform dynamic stability assessments will accompany the extracted power flow data.

\(^{27}\) Data provided by the Data Submitters in response to the Case Description Form data request will reflect, among other things, transmission topology changes and resource mix changes (retirements and additions) known at the time of submittal.

\(^{28}\) See slide 11 of the Ian McKay’s May 4, 2016 presentation.
The RAC will post the production cost version of the 2028 Draft ADS, along with the “2028 HS PF case.” Stakeholders are welcome to review the production cost version of the 2028 draft ADS and -- subject to applicable access restrictions and non-disclosure provisions -- the “2028 HS PF case.”

WPR will use their regional planning processes, as appropriate, to vet any stakeholder comments. Based on the comments received, the Data Submitters, in consultation with the WPR, may make changes to certain data and submit these changes to the RAC (or the appropriate WECC committee). The RAC will use these changes to assemble the production cost version of the 2028 ADS. An hour will be exported from the production cost version of the 2028 ADS to create a companion power flow version of the 2028 ADS. Collectively, the production cost and power flow versions of the ADS will be known as the ADS. The RAC will post the ADS for stakeholder use subject, as applicable, to access restrictions and non-disclosure provisions.

“Other [Production Cost Model] Data”

There are certain data and parameters that will likely not be provided in the Data Submitters’ responses to WECC’s “Loads and Resources” data request and to WECC’s “Case Description Form” data request, but which are needed for a solvable production cost version of the 2028 ADS. This data includes the following:

<table>
<thead>
<tr>
<th>“Other Data” Item</th>
<th>Notes and Possible Sources</th>
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<tbody>
<tr>
<td>Hourly output profiles for different renewables in different locations of the WECC grid</td>
<td>NREL, LBNL, CAISO, other Balancing Authorities</td>
</tr>
<tr>
<td>Flexibility requirements (MW) for different planning areas of the WECC grid.</td>
<td>CAISO staff, other Balancing Authorities</td>
</tr>
<tr>
<td>Flexible capacity available from each generating resource and demand response resource (e.g., how many MW can be dispatched up or down and held for four consecutive hours)</td>
<td>Generation owners including utilities.</td>
</tr>
<tr>
<td>Operating parameters for dispatchable generating units (start-up times, start-up costs and fuel consumption during start-up, minimum up/down times, minimum output levels, hour-to-hour ramp rates)</td>
<td>Generation owners including utilities. Consultants that offer this data for a fee.</td>
</tr>
</tbody>
</table>

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29 As noted earlier, when the power flow case is created by exporting an hour from the production cost model, the accompanying dynamic data will also be exported.

30 This data may be provided in future responses.

31 This list is not intended to be exhaustive. Additionally, this list is premised on the existing GridView model used in a “deterministic” manner; i.e., a single system dispatch for each hour of a year. The RAC’s modeling tools are expected to evolve over time and may include the capability to consider multiple dispatches for many hours of a year; e.g., incorporating the potential variability of loads, wind output and solar output in different hours of the year.
<table>
<thead>
<tr>
<th><strong>“Other Data” Item</strong></th>
<th><strong>Notes and Possible Sources</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification of “must-run” thermal generating units and the hourly output profile of such units across all hours of the year.</td>
<td>Balancing authorities, generation owners including utilities</td>
</tr>
<tr>
<td>Heat rate curves for all thermal resources.</td>
<td>Generation owners including utilities. However, generation owners usually consider this information to be confidential because of its competitive implications. CEC and Columbia Grid using data from the public CEMS data base. Consultants that offer this data for a fee.</td>
</tr>
<tr>
<td>Emission rates (CO₂, NOₓ, SO₂, PM₂, etc.) for all fossil-fired resources (e.g., lbs/BTU)</td>
<td>DOE/NREL. Consultants that offer this data for a fee.</td>
</tr>
<tr>
<td>Variable O&amp;M costs for generating units.</td>
<td>Generation owners including utilities. However, generation owners may consider this information to be confidential because of its competitive implications. Consultants that offer this data for a fee.</td>
</tr>
<tr>
<td>Planned and forced outage rates for each generating unit.</td>
<td>Planned and forced outage rates from GADS. Scheduled outage rates may be available from generation owners including utilities. However, generation owners may consider this information to be confidential because of its competitive implications.</td>
</tr>
<tr>
<td>Forecast fuel prices for each thermal generating unit.</td>
<td>CEC, NWPPC, EIA. Consultants that offer fuel price forecasts for a fee.</td>
</tr>
<tr>
<td>Opportunity costs where applicable (e.g., opportunity costs associated with curtailing the output of renewable resources, opportunity costs of dispatching resources with limited fuel supply such as hydroelectric resources with storage capability).</td>
<td>Needs to be derived through consultation with stakeholders and consultants with experience in this area. (e.g., E3)</td>
</tr>
<tr>
<td>Estimated inflation rates as needed to place all variable costs on a consistent basis.</td>
<td>All cost information included in “Other Data” should clearly identify whether the costs are in nominal dollars or in constant dollars. If the former, the underlying rate of annual inflation should be identified. If the latter, the constant-dollar year needs to be specified.</td>
</tr>
<tr>
<td>Base hourly load shapes, not reflecting the impacts of separately-modeled demand response programs or the impact of separately-modeled behind-the-load meter generation and/or storage, for each take-out point on the WECC grid.</td>
<td>As a practical matter, it is challenging for entities to develop and provide the RAC with forecasts of end-use load for every WECC take-out point for every hour of a year. To make the process more manageable, WECC issues a data request to BAs and TPs that asks for a forecast of each reporting entities’ monthly coincident system peak and monthly energy consumption. (Note: It is important that provided forecasts exclude the impacts of any separately-identified demand response programs and the impacts of any separately-identified behind-the-load meter generation and/or storage.) Using historical hourly loads for each month for each balancing</td>
</tr>
<tr>
<td>“Other Data” Item</td>
<td>Notes and Possible Sources</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Authority [the production cost model disaggregates the forecast monthly peak and forecast monthly energy consumption into an hourly load forecast for each balancing authority. For each hour of the month, the production cost model then distributes each balancing authority’s forecast load across all bus-level take-out points within each balancing authority. For the production cost version of the year 2028 ADS, this distribution will reflect the nodal load distribution included in the year 2028 power flow case. ]</td>
<td></td>
</tr>
<tr>
<td>Hurdle rates between balancing authorities to reflect the individual or combined impacts of wheeling expenses, carbon taxes, minimum trading margins and institutional friction.</td>
<td>OATT, Air Quality Districts’ rules. Determination of minimum trading margins and institutional friction requires consultation with stakeholders and may reflect the results of back-casting studies where hurdle rates are adjusted such that the economic grid simulation of a historical period approximates actual grid operations for that historical period.</td>
</tr>
<tr>
<td>Information necessary to model reserve sharing among different balancing authorities.</td>
<td>Balancing authorities.</td>
</tr>
<tr>
<td>Ancillary service requirements for different balancing authorities (e.g., spinning reserves, non-spinning reserves, regulation capacity).</td>
<td>Balancing authorities.</td>
</tr>
<tr>
<td>Information allowing generating units aggregated for purposes of production cost analyses, to be disaggregated for purposes of power flow/stability analysis. This information will likely involve: On-site station power loads.</td>
<td>Generation owners including utilities. However, generation owners may consider this information to be confidential because of its competitive implications. For the production cost version of the year 2028 ADS, snap-shot station power loads will be available in the year 2028 power flow case. The extent to which these station power loads are representative of all hours of operation during a year, needs to be assessed.</td>
</tr>
<tr>
<td>Behind-the-load meter generation. This could include, for example, behind-the-load meter solar PV generation and hourly output patterns at specific locations. It could also include the hourly output and consumption of behind-the-load meter battery storage applications.</td>
<td>Load Serving Entities (LSEs). CEC. Note that the operating parameters for behind-the-load meter battery storage applications could be challenging to model considering that these applications are mainly designed to avoid retail demand charges and are therefore highly customer-specific.</td>
</tr>
<tr>
<td>Multiple hydroelectric generating units linked through water flow (e.g., cascaded hydro units)</td>
<td>Utilities. BPA, WAPA, BC Hydro and AESO.</td>
</tr>
<tr>
<td>Steam turbine and multiple gas turbines comprising a combined cycle plant</td>
<td>Generation owners including utilities. Note that for the production cost version of the year 2028 ADS, individual unit data will be available from the year 2028 power flow case. However, there are differences that will need to be reconciled. For example,</td>
</tr>
<tr>
<td>“Other Data” Item</td>
<td>Notes and Possible Sources</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>the production cost model typically uses net maximum output for the entire combined cycle plant since this is usually the basis upon which heat rate curves are developed. The year 2028 power flow case will reflect gross output for each individual generating unit, with separate modeling of the station service load. (Separate modeling is needed for the dynamic models.)</td>
<td></td>
</tr>
<tr>
<td>Dispatch “dead-zones” (output levels through which a generator may be dispatched, but not held to).</td>
<td>Generation owners including utilities. This information may also be available from Balancing Authorities. However, generation owners and Balancing Authorities may consider this information to be confidential because of possible competitive implications. Note that this information is only relevant to the production cost model if the model’s dispatch algorithm has the ability to recognize “dead-zones.”</td>
</tr>
<tr>
<td>Duct-firing output levels (if separately modeled)</td>
<td>Generation owners including utilities. However, generation owners and Balancing Authorities may consider this information to be confidential because of possible competitive implications.</td>
</tr>
<tr>
<td>Hourly energy output of each run-of-river hydro unit during “wet,” “dry” and “average” hydro conditions.</td>
<td>Utilities, CAISO, Balancing Authorities including BPA, WAPA, BC Hydro, AESO, Public Utility Districts, Bureau of Reclamation, Corps of Engineers</td>
</tr>
<tr>
<td>Monthly and/or daily storage capacity at hydroelectric generating facilities with water storage capability for “wet,” “dry” and “average” hydro conditions.</td>
<td>Utilities, CAISO, Balancing Authorities including BPA, WAPA, BC Hydro, AESO, Public Utility Districts, Bureau of Reclamation, Corps of Engineers</td>
</tr>
<tr>
<td>Minimum output requirements (by hour, day, week or month) for hydroelectric generating facilities with water storage capability (for fish and other environmental and recreational requirements).</td>
<td>Utilities, CAISO, Balancing Authorities including BPA, WAPA, BC Hydro, AESO, Public Utility Districts, Bureau of Reclamation, Corps of Engineers Various LSE, Regional, County and Public Utility District data sources e.g., Bureau of Reclamation, Corps of Engineers</td>
</tr>
<tr>
<td>Monthly and/or daily storage capacity at Compressed Air Energy Storage (CAES) facilities.</td>
<td>Developers of CAES facilities.</td>
</tr>
<tr>
<td>Hourly storage capacity and bus-level location of battery storage systems.</td>
<td>Utilities and developers of battery storage systems. Also, the Energy Storage Alliance may be a source of generic data.</td>
</tr>
<tr>
<td>Round-trip charge/discharge efficiency for all storage facilities requiring electricity for charging.</td>
<td>Utilities and developers of battery storage systems or other storage facilities such as pumped hydro plants. Also, the Energy Storage Alliance may be a source of generic data. Note that developers of CAES facilities need to provide any related natural gas-firing requirements.</td>
</tr>
<tr>
<td>Parameters necessary to model proportional load-following for those hydroelectric facilities whose electrical output is determined to be best-modeled as following designated loads.</td>
<td>NTTG. Parameters may include PLF k value: Average weekday minimum for Hydro output and for load, the average weekday maximum hydro output and load.</td>
</tr>
</tbody>
</table>
### “Other Data” Item

<table>
<thead>
<tr>
<th>Item</th>
<th>Notes and Possible Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hourly availability of each modeled demand response program along with a proxy dispatch cost for each hour of availability.</td>
<td>Utilities</td>
</tr>
<tr>
<td>Penalty prices for relaxation of each modeled type of constraint in order to achieve a production cost solution.</td>
<td>Needs to be derived through consultation with stakeholders and consultants with experience in this area. (e.g., E3, Brattle)</td>
</tr>
<tr>
<td>Bus-specific hourly pattern of load reduction achieved from forecast levels of Additional Achievable Energy Efficiency (AAEE).</td>
<td>CEC, Utilities. Note that disaggregating monthly or annual forecasts of AAEE into hourly impacts at specific buses requires considerable effort and necessitates many assumptions. In the past LBNL has provided support in this area.</td>
</tr>
<tr>
<td>Parameters necessary to develop Nomograms that reflect the interaction between multiple system limitations (for example, where maximum allowed flows on one transmission path are dependent on the flows on a different transmission path).</td>
<td>If not available from utilities or Balancing Authority, then need to be derived through consultation with utilities, Balancing Authorities, stakeholders and consultants with experience in this area. (e.g., ABB, E3)</td>
</tr>
<tr>
<td>List of N-1 and N-1-1 contingency conditions, if any, that are to be applied for purposes of establishing a feasible dispatch for each hour of the production cost simulation. (Note that given existing computational capabilities, the number of contingencies that can be evaluated in an annual simulation is, as a practical matter, currently quite limited.)</td>
<td>CAISO and other Balancing Authorities, Transmission Planners. Note that this analysis is to identify “chronic” congestion and not reliability analysis. Finding the appropriate balance between the number of contingency tested in the production cost model, and model run-times, requires input from experienced modelers.</td>
</tr>
<tr>
<td>List of essential transmission elements that are to be “monitored” for thermal overloads. (Note that given existing computational capabilities, the number of transmission elements for which thermal limits can be enforced in an annual simulation is, as a practical matter, quite limited.)</td>
<td>CAISO and other Balancing Authorities, Transmission Planners. Note that finding the appropriate balance between the number of monitored transmission elements in the production cost model, and model run-times, requires input from experienced modelers.</td>
</tr>
<tr>
<td>Parameter settings necessary to model “flow control” devices in the production cost model (e.g., phase shifters, AC/DC inverters). These parameters include phase angle set point, ratio setting to distinguish between phase shifters and DC elements, and cost to adjust. (Note that in the current version of the GridView model, these parameters are fixed for all hours of the simulation period. Also note that the upper and lower bounds for phase angles is available from data included in the AC power flow model which is uploaded into GridView.)</td>
<td>Needs to be derived through consultation with utilities, Transmission Planners and production cost model experts familiar with the intended use of the flow control devices as well as the capabilities and limitations of the production cost model to capture these intended uses.</td>
</tr>
</tbody>
</table>
As the above table indicates, the sources of “Other [Production Cost Model] Data” vary widely depending on the data element. Historically, much of this information was gathered and developed through the ongoing efforts of TEPPC (including its stakeholders) and TEPPC predecessor organizations. Where data is difficult to obtain (e.g., the hourly impacts of new energy efficiency programs) or requires significant effort to assemble into a format suitable for use in the production cost model (e.g., hourly output profiles for wind and solar in different locations of the WECC grid), consultants have sometimes been employed.

As suggested by the background section above, it appears likely that most of the “Other [Production Cost Model] Data” needed to assemble the production cost version of the year 2028 ADS is already available in TEPPC’s year 2026 Common Case. This data will be automatically carried forward into the production cost version of the 2028 ADS when it is created by uploading the 2028 power flow case into the 2017 WPR’ 2026 Common Case.

However, some “Other [Production Cost Model] Data” will need to be manually added to the production cost version of the 2028 ADS. Data that will need to be added is generally associated with the new resources (including behind-the-load meter resources that are separately modeled) that will be brought into the production cost version 2028 ADS through the upload process. For example, hourly output profiles will need to be associated with new wind and solar resources. Likewise, operating parameters for new thermal units will need to be specified: fuel type, heat rate curves, variable O&M costs, emission rates, ramp rates, start-up and shut-times, start-up fuel consumption and costs, and minimum output levels. Planned and forced outage rates will need to be designated. Additionally, the hourly parameters necessary to capture energy efficiency or demand response impacts for programs that will be added or augmented between years 2026 and 2028 will need to be manually input. The dispatch parameters for any new flow control devices included in the 2028 power flow case will also need to be manually set in the production cost version of the 2028 ADS.
Appendix B.5: Stakeholder Vetting of Data

To understand the vetting that occurs in connection with development of the Anchor Data Set (ADS), it is necessary to have a full understanding of the purpose, design, and intent of the ADS. The purpose of developing the ADS on an on-going basis is to improve the accuracy, consistency, and completeness of the data used in transmission planning and reliability assessment in the Western Interconnection. Coordination of data and assumptions between the WPR, Data Submitters, WECC and stakeholders will be key to achieving this purpose. The ADS is specifically designed to reflect the data and input assumptions used by the WPR in their most recent transmission plans. The ADS is intended to be a common starting point that WPR, IPR, WECC and stakeholders can use to develop alternative cases to perform transmission and reliability assessments. Use of a common starting point data set, should facilitate improved transmission planning and reliability assessments in the West.

To be clear, the ADS is a starting point; it is not a final data set and therefore the input data and assumptions of the ADS have important implications for the vetting of the ADS. The vetting of the ADS occurs before and during the ADS development process. Additionally, in connection with the development of alternative study cases that use the ADS as a common starting point, WPR, IPR, RAC and stakeholders may choose to undertake their own review of the underlying data supporting the ADS. The type of vetting and the entities responsible for examination of the ADS differ at each of these stages and involves active engagement by the WPR, IPR, WECC and stakeholders throughout their respective planning or assessment vetting process. The concept of this “vetting” approach is described in the following discussion.

Vetting Prior to Development of the ADS

The WPR assume the primary responsibility for vetting prior to development of the ADS. Each public utility transmission provider must participate in a regional transmission planning process (including interregional coordination and interregional cost allocation) that produces a regional transmission plan meeting the FERC Order 1000 planning principles of coordination, openness, transparency, information exchange, comparability, dispute resolution, regional participation, economic planning studies, and cost allocation for new projects. Regional transmission planning is a tariff obligation of each transmission provider (or designated ISO) and is set forth in an Attachment K/Tariff that describes the region’s regional planning process and the obligations it is required to meet. Attachment K/Tariff is also the means to ensure that the planning region’s planning process is carried out in a coordinated, open, and transparent manner. While the ultimate responsibility for planning in compliance with applicable NERC Standards and WECC reliability criteria remains with transmission providers (or designated ISO) the WPR are obligated to give effect to the interregional coordination and cost allocation obligations under FERC Order 1000.

32 California ISO Tariff Section 24 Comprehensive Transmission Planning Process
Stakeholders are offered a reasonable opportunity to provide input to each planning region during the development of its regional transmission plan. The “regional planning processes” have been designed to facilitate stakeholder participation and to carefully consider important input that is related to the planning region and the development of its regional transmission plan. Stakeholders are included at key steps in the planning process starting from the early stages of planning data and information development through finalization of the regional transmission plan. Stakeholders’ participation in a planning region’s process is especially important and necessary if the stakeholder has specific issues or concerns which they want the planning region to address; and while stakeholders are encouraged to actively participate in all of the region’s open transmission planning meetings and to submit planning data and information into the regional planning process, participation is voluntary. The timing of the regions’ open stakeholder meetings vary by planning region, but are held regularly as described through each regional planning process. Stakeholder participation opportunities in the regional transmission planning processes continue throughout the individual planning region’s transmission planning cycle. As part of each region’s regional planning process, in consultation with stakeholders, alternative transmission and non-transmission solutions that might meet the needs of the transmission planning region more efficiently or cost-effectively are described.

The vetting of data and input assumptions by the WPR occurs prior to development of the ADS and includes:

- **Coordination among the WPR and IPR as to input data and assumptions for each regional planning process.** The WPR will use WECC’s 2026 Common Case in the 2016-2017 planning cycle and in subsequent planning cycles. The WPR and IPRs will coordinate their input data and assumptions using the ADS that is available at the beginning of each planning cycle;

- **Information that describes the existing generating units used in each WPR regional planning process.** This information will be vetted through each utility’s integrated planning process and reviewed as appropriate through its WPR regional planning process;

- **Information that describes the existing transmission lines used in each WPR regional planning process.** This information will be vetted in the utility’s integrated planning process and reviewed as appropriate through its WPR regional planning process;

- **Load forecasts used in each WPR’s regional planning process.** These load forecasts will be vetted through each utility’s integrated planning process and reviewed as appropriate through its WPR regional planning process; except for the California ISO load forecast which is vetted through a California Energy Commission (CEC) process;

- **Future resource information used in each WPR’s regional planning process.** This resource information will be vetted through the utility’s integrated planning process and reviewed as appropriate through its WPR regional planning process;
• **Future transmission information used in each WPR’s regional planning process.** This resource information will be vetted through each utility’s transmission planning process and/or through its WPR regional planning process.

• **Other information for the WPR’s production cost modeling (e.g., hourly load shapes, wind and solar hourly production profiles, generation dispatch information, etc.).** To the extent not developed by the WPR and provided to WECC through Data Submitters, this information will be vetted through WECC’s processes (e.g., the current TEPPC and PCC processes);

### Vetting During the Development of the ADS

WECC staff and stakeholders will have an opportunity to vet data during compilation of the ADS. The flow of data from the Data Submitters to WECC is described in a separate section of this report. WECC is responsible for compiling the input data into the ADS. The data and models should be accurate and need to be compliant with the computer software resources that are maintained by WECC. Potential issues identified by WECC during their compilation process will be shared with the Data Submitters who provided that data for resolution. Once WECC has received final data from the Data Submitters the ADS will be finalized and posted. Vetting of the ADS during the compilation process includes:

- Electronic screening of data to identify data anomalies and outliers (e.g., forecasted load differs from the forecasted load in the prior plan by plus or minus a designated percentage);

- Electronic screening of data to identify data input errors (e.g., forecasted loads should be in megawatt-hours, not kilowatt-hours);

- Manual screening to identify inconsistencies in submitted data (e.g., forecasted load growth for two neighboring utilities being widely divergent);

- Opportunity for stakeholders to review posted draft ADS and provide comments to the Data Submitters and/or WPR.

### Subsequent Uses of the ADS

In connection with the development of the next cycle’s ADS, and in connection with the development of alternative study cases that use the current cycle’s ADS as a common starting point, the WPR, IPR and WECC will vet data and assumptions on an on-going basis after the posting of each cycle’s ADS. As mentioned at the beginning of this section, the purpose of developing the ADS on an on-going basis is to improve the accuracy, consistency, and completeness of the planning data and information used in transmission planning and reliability assessment in the Western Interconnection. Once the ADS is developed in each planning cycle, it is the expectation that it would be used by WECC, WPR, IPR and other stakeholders to:

1. Create alternative PCM and PF/stability cases for WECC to carry out its’ mission of reliability impact studies.
2. Enable all stakeholders in the Western Interconnection to develop alternative PCM and PF cases for their own purposes and to support WECC’s mission. The “use” of the ADS to create alternative study cases necessarily suggests that the WPR and WECC may use different data than included in the ADS. These differences will reflect the using entity’s own expectations and assumptions.

The WPR’s vetting of ADS and input assumptions that occurs after the ADS development includes:

- Coordination among the WPR’s as to updated input data and assumptions for use in each WPR’s then-current regional planning process;
- Coordination of input data and assumptions through the WPR use of the ADS in the subsequent planning cycles. The WPR and IPR will coordinate their input data and assumptions using the ADS that is available at the beginning of the planning cycle;
- Review and vetting of each WPR’s regional transmission plan input data and assumptions; and
- A reasonableness check of the results and conclusion from each WPR’s regional planning process. This reasonableness check is conducted by each WPR through the planning region’s open planning meetings and stakeholder processes.

The WECC’s vetting of data and input assumptions that occurs after the development of the ADS includes:

- Opportunity for stakeholders to submit study requests in the RAC’s annual study request process;
- Opportunity for stakeholder input through WECC’s annual study plan development process;
- Development of specific planning data necessary to carry-out the RAC’s annual study plan:
  - Information that describes alternative operating parameters for existing generating units;
  - Information that describes alternative transmission upgrades;
  - Alternative loads and resource scenarios;
  - Certain alternative information for production cost modeling;
- Reliability focused analyses of the Western Interconnection in accordance with NERC Standards and WECC reliability criteria; and
- Examination of the need for new or upgraded transmission facilities or non-transmission alternatives as a result of future load growth and/or new generating units from a Western Interconnection perspective.
Appendix C: WECC Management Recommendation on NGO and State/Provincial Funding

Background

In 2010, the U.S. Department of Energy awarded WECC a $14.5 million grant to expand its transmission planning activities through the American Recovery and Reinvestment Act (ARRA). Among other provisions of the grant, WECC created two new stakeholder groups—the Scenario Planning Steering Group (SPSG) and the Environmental Data Task Force (EDTF), later renamed the Environmental Data Work Group (EDWG). In addition, the grant provided funding to reimburse Non-Governmental Organization (NGO) representatives and tribal representatives who were members of the SPSG and EDWG, as well as other NGO and tribal representatives who received advance reimbursement approval, for their travel expenses associated with participating in WECC’s planning activities. NGO and tribal representatives also could receive an hourly stipend for their time spent in WECC-related planning activities.

After WECC’s ARRA funding expired in 2014, WECC continued to fund NGOs’ travel expenses and stipends with Section 215 funding through 2015 and 2016.

Similar to WECC’s funding of NGO and tribal representatives’ travel expenses, the Western Interstate Energy Board (WIEB) funded State/Provincial Representatives’ travel expenses related to their participation in the State-Provincial Steering Committee (SPSC), also funded through an ARRA grant. WIEB also reimbursed State/Provincial Representatives for their participation in WECC’s SPSG. When WIEB’s ARRA funding expired in March, 2015, WECC continued to reimburse State and Provincial representatives for their travel expenses incurred while participating in WECC’s planning activities.

The TEPPC Review Task Force (TRTF) was tasked with, among other things, recommending whether WECC should continue to fund travel expense and stipend reimbursements for NGO and tribal representatives, and travel expenses for State and Provincial representatives, after 2016. The Joint PCC-TEPPC Review Task Force (JPTRTF) incorporated this review into its work plan when the TRTF and the PCC Review Task Force joined forces in April, 2016.

The following table shows historic reimbursement costs from 2010 through 2016, including the projected annual cost through the end of 2016.
NGO Expense Reimbursements  
2010-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Travel</th>
<th>Stipends</th>
<th>Total NGO Expenses</th>
<th>Travel Expenses</th>
<th>NGO and State Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>$61,470</td>
<td>$51,650</td>
<td>$113,120</td>
<td>$0</td>
<td>$113,120</td>
</tr>
<tr>
<td>2011</td>
<td>$46,132</td>
<td>$40,203</td>
<td>$86,334</td>
<td>$0</td>
<td>$86,334</td>
</tr>
<tr>
<td>2012</td>
<td>$36,935</td>
<td>$73,718</td>
<td>$110,652</td>
<td>$0</td>
<td>$110,652</td>
</tr>
<tr>
<td>2013</td>
<td>$49,840</td>
<td>$100,664</td>
<td>$150,504</td>
<td>$0</td>
<td>$150,504</td>
</tr>
<tr>
<td>2014</td>
<td>$72,811</td>
<td>$96,666</td>
<td>$169,477</td>
<td>$0</td>
<td>$169,477</td>
</tr>
<tr>
<td>2015</td>
<td>$24,165</td>
<td>$48,221</td>
<td>$72,386</td>
<td>$2,310</td>
<td>$74,697</td>
</tr>
<tr>
<td>2016 YTD</td>
<td>$7,786</td>
<td>$12,375</td>
<td>$20,161</td>
<td>$2,709</td>
<td>$22,871</td>
</tr>
<tr>
<td>2016 Annualized</td>
<td>$31,146</td>
<td>$49,500</td>
<td>$80,646</td>
<td>$10,838</td>
<td>$91,483</td>
</tr>
</tbody>
</table>

**WECC Management Recommendation**

WECC’s management recommends that WECC continue to fund travel expenses for NGO Representatives and State and Provincial Representatives participating in WECC’s planning processes in 2017 and beyond. The following considerations support this recommendation:

1. Both NGO Representatives and State/Provincial Representatives have been valuable participants in WECC’s planning processes. The quality and depth of WECC’s stakeholder collaboration will depend on their continuing participation in WECC’s planning activities.

2. Most NGOs and State/Provincial governments have limited funds available for employees’ travel expenses. In the absence of WECC’s travel expense reimbursement, many planning process participants would be unable to attend committee, subcommittee and work group meetings in person. While remote participation via webinar is usually an option, such participation is less effective than in-person participation and does not facilitate the same degree of collaboration.

3. The benefits of NGO and State/Provincial Representatives’ participation in WECC’s reliability assessment activities far exceed the costs of their travel reimbursements, which historically have averaged less than $50,000 per year. For example, NGO Representatives have contributed significantly to the development of WECC’s future scenarios, environmental data processes and annual study program. And, State/Provincial Representatives have contributed significantly to the technical review of study cases, regulatory perspectives on the annual study program and state/provincial governmental perspectives on future scenarios. Moving forward, their contributions will be a critical component of WECC’s stakeholder-vetted study programs as WECC assesses the impacts of regulatory policies, technology developments and other drivers on potential future reliability risks.
4. WECC has developed the NGO and State Representative Reimbursement Protocol to manage use of funds for NGO and State/Provincial Representative reimbursements. The document addresses cost control, documentation, approvals and other guidelines for managing reimbursement funds to ensure that funds are spent prudently. WECC reviews this document annually to ensure that reimbursement policies are current and appropriate.

5. Some stakeholders have supported continuing funding for stipends for NGO Representatives participating in reliability assessment activities while other stakeholders have expressed concerns about continuing this practice. WECC management recommends funding travel expenses but not stipends as a compromise position that all stakeholders could reasonably support.