Formalizing the Integrated Bulk Power System Planning Process

High-level Design Overview

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Table of Contents

1. Introduction

The Independent Electricity System Operator (IESO) is responsible for conducting independent planning for electricity generation, demand management, conservation and transmission in the Province of Ontario.[1] In carrying out this mandate, the IESO has been undertaking planning activities to ensure that the province has, and will continue to have, an adequate and reliable supply of resources and transmission to meet Ontario's electricity needs.[2] These planning activities have historically delivered power system plans and products such as the Integrated Power System Plan (2007, 2012),[3] Ontario Planning Outlook (2016), Annual Planning Outlook (2019, 2020), and several individual bulk transmission plans.[4]

The IESO's planning generally consists of Regional Planning and Bulk System Planning. These are two separate but inter-related planning activities. Regional Planning, which is outside the scope of this document, is carried out according to a Regional Planning process endorsed by the Ontario Energy Board (OEB). Regional Planning produces plans that address system issues that are local in nature, within 21 regions as defined by the OEB process. Bulk System Planning, which is the focus of this document, is carried out by the IESO to address system issues which are more provincial in nature, such as the province-wide need for generation capacity, and transmission system solutions to enable transporting power reliably and economically across the province. While Regional Planning is carried out under the OEB process, the IESO relies on internal processes to carry out bulk system planning.

The IESO is formalizing the **Bulk System Planning Process** by making it more consistent, timely, and transparent in how plans are developed and implemented. The recent introduction of the Annual Planning Outlook (APO) represents improvements to the structure and transparency of the planning process, particularly with respect to resource planning. However, some bulk system planning is still carried out on an ad hoc basis (e.g. transmission planning), such as when system issues are detected through the normal course of planning and forecasting.

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[1] The IESO's objects, including for power system planning, are as set out in the *Electricity Act, 1998*.

[2] Planning for the electric power system has been carried out in Ontario for many decades – this accountability dates back to the former Ontario Power Authority, and Ontario Hydro before that.

[3] The IESO no longer produces the Integrated Power System Plan, or IPSP. The IPSP was a province wide power system plan that addressed issues at the system-wide, or bulk, level as well as supply to local areas. Power System Planning has since evolved into bulk system planning to address bulk system issues as they are detected and to comply with North American Reliability Corporation (NERC) and Northeast Power Coordinating Council, Inc. (NPCC) planning/reporting requirements, and regional planning under the Ontario Energy Board process to address supply to local areas.

[4] These plans generally focus on addressing specific issues or concerns forecasted to impact the reliability of the bulk power system. Examples of bulk transmission studies include those done to address reliability in Northwest Ontario, Windsor-Essex, etc.

A more structured process in terms of more consistent timelines and regular reporting will allow planning activities to be integrated more effectively with downstream processes aimed at implementing plan recommendations (e.g. implementing transmission or supply solutions to address system issues). In addition, enhancing opportunities for stakeholders to provide input and to be informed throughout the process will provide the IESO with better and more timely information on expected changes in demand and potential options for addressing system issues.

For the above reasons, the IESO is proposing improvements to how bulk system planning is carried out through a formal process. Once successfully implemented, the following will have been achieved:

1. A **public and transparent** process that allows stakeholders to provide input to the IESO on how demand is expected to grow and possible options for supplying that demand, which will improve the IESO's ability to predict and plan for future system conditions.

   The process will also ensure that information is shared with stakeholders, including planning data, assumptions, analytical results, evaluation criteria and other planning information that is relevant for stakeholders to be informed and provide the desired input to the IESO.

   Increased transparency should lead to the IESO understanding better where system "hot spots" require focus and attention; and provide stakeholders better visibility into the IESO's planning priorities. The process will inform stakeholders when and how they can get involved and when solutions need to be developed.

   Transparency will need to be balanced against the need to maintain information security around sensitive infrastructure and commercial information submitted by market participants into the planning process.

2. A process that has **regular** reporting and consistent timelines.

3. An **integrated** planning process that covers bulk system planning from end-to-end (i.e., from identifying issues through to recommending solutions), and that considers transmission, resources, and other innovative solutions.

This document provides an overview of the high-level design of the Bulk System Planning Process, with a focus on the new elements that are being introduced to the process. It takes into account feedback received from stakeholders in previous engagements. Stakeholder engagement will be carried out on this high-level design and on detailed aspects of the process design, as they relate to stakeholder engagement opportunities in bulk system planning. An engagement plan is available on the IESO's Integrated Bulk System Planning Process webpage.

2. The Bulk System Planning Process

The IESO's Bulk System Planning Process will guide how bulk system planning is carried out going forward. Because planning for the electric power system has been done in Ontario for many decades, the process being proposed is a formalization of the bulk system planning that the IESO already does, with some refinements to achieve the outcomes described in Section 1.

The process high-level design includes each of the main steps involved with planning the bulk power system, and indicates the progression through the process from beginning to end (or through a planning "cycle"). The high-level design is illustrated in Figure 1.

Figure 1 | High-level Design of the Bulk System Planning Process

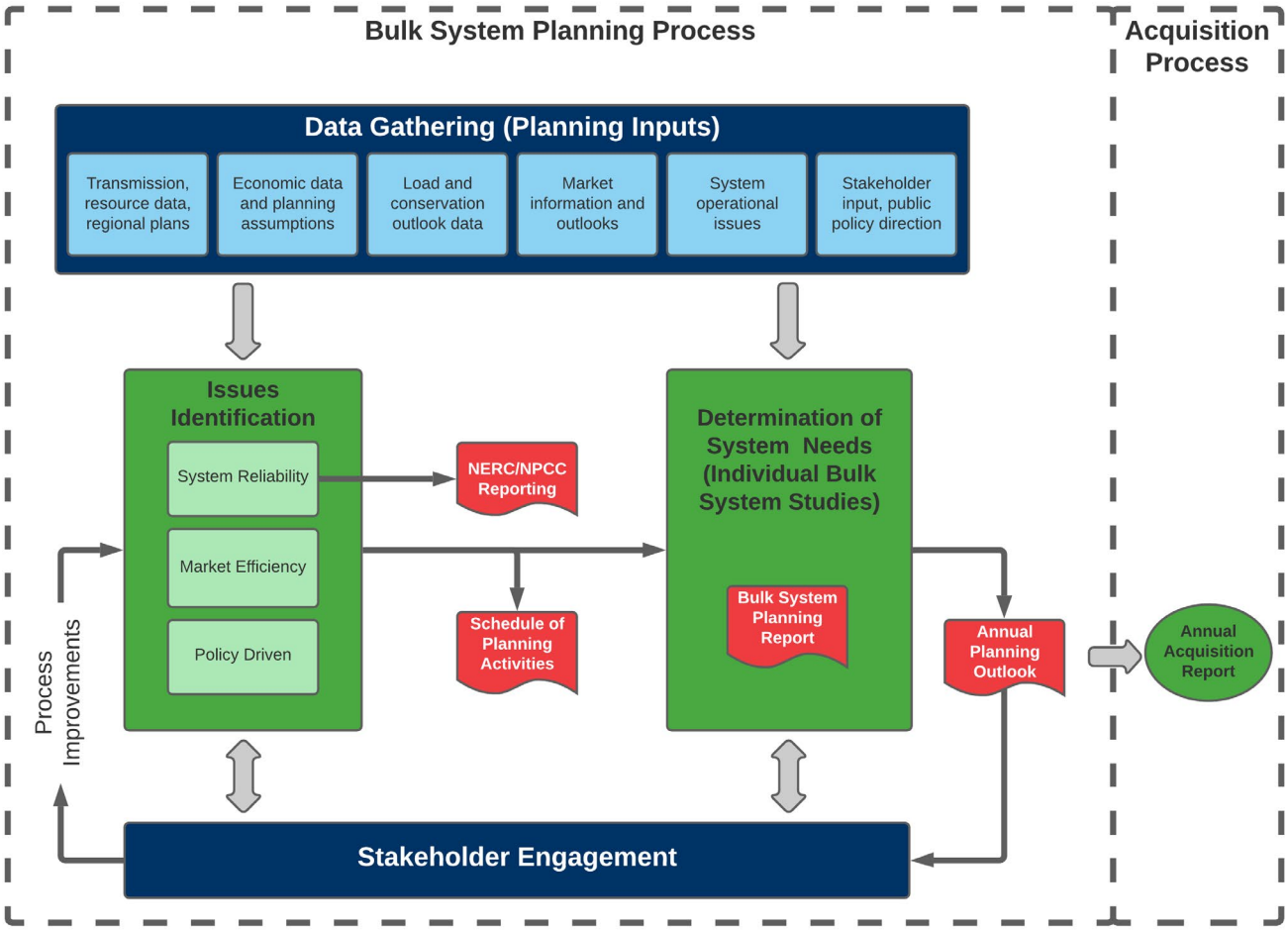

Figure 1 also shows how bulk system planning fits in relation to resource acquisition and the Annual Acquisition Report. Broadly speaking, the planning process will make decisions on what is needed (e.g., need for capacity, energy, ancillary services and/or transmission, etc.). Where solutions other than transmission are identified, these will be inputs into the Annual Acquisition Report.

The main process steps involved in bulk system planning are described in the subsections that follow. Where there are changes or refinements proposed, as compared to the bulk system planning currently done by the IESO, it is noted.

2.1 Data Gathering (Planning Inputs)

The collection and maintenance of data and information that is necessary and/or relevant for system planning studies is a critical and ongoing part of the Bulk System Planning Process. Data includes technical assumptions, model parameters, economic information, market trends, and/or public policies related to electricity demand, energy efficiency, generation, transmission, and emerging technologies.

The Bulk System Planning Process high-level design (Figure 1) lists the types of information that will need to be maintained.[5] The detailed process design will consider how external parties will provide input to this step, and the need for infrastructure (e.g., databases) to ensure the efficient collection, maintenance, and retrieval of planning data.

This is a continuous activity that is critical to enable good planning throughout the process, as data will continue to feed in and datasets may be updated or amended at various stages of bulk system planning. In addition, it is acknowledged that data can be used for other power system assessments and planning activities, such as for Regional Planning.

What's New?

The revised process will allow for external stakeholders to provide data and will include a clear process for formally storing, collecting, maintaining, and sharing planning data.

2.2 Issues Identification

This step is the start of the bulk planning process and will be executed annually. Issues Identification makes use of the planning data maintained in the previous step and is the process by which future reliability concerns, opportunities to improve market efficiency, and/or the need for plans to implement public policies are identified. At this stage, the process does not identify transmission and/or supply resources that are required, but rather, describes issues on the bulk power system that must be resolved (e.g., insufficient supply to address the load growth).

Issues Identification includes:

Scoping to review planning data and determine, on that basis and based on other inputs, what assessments will be carried out to identify future system issues. The required assessments will also be informed by North American Electric Reliability Corporation (NERC) and Northeast Power Coordinating Council (NPCC) requirements and take into account planning assessments that are needed for reporting and compliance.

[5] Although it is not explicitly shown in the high-level design diagram (Figure 1), the Bulk System Planning Process also identifies the sources of data as well as the internal IESO accountabilities to maintain datasets.

Analyses to assess the performance of the bulk power system against technical/reliability planning criteria (both resource and transmission reliability criteria), perform economic/market efficiency assessments (e.g., identifying opportunities to alleviate transmission constraints restricting where capacity can be sited, and/or allowing lower cost capacity to be procured in those restricted areas), and/or public-policy driven assessments, in accordance with the scope determined above. The result of these assessments will be a description of future system issues and/or opportunities that will need to be resolved through system planning studies.

Triaging, which includes reviewing all of the system issues/opportunities identified and determining if there is a potential benefit from "bundling" some of them based on factors such as driver, geography, timing, etc. The goal of triaging is to permit a more efficient process to find solutions, which could include assessing the benefit of considering bulk system and regional issues together.

Documenting the results in reporting products. In addition to providing input for reports such as the Annual Planning Outlook, a **Schedule of Planning Activities** is proposed as a new product that will communicate the expected timeline/work plan for when the IESO will develop power system plans to address the system issues (i.e., a schedule for when the Individual Bulk Studies to address the issues identified would be carried out).

Engagement with stakeholders in a regular, predictable and transparent manner. There will be opportunities for stakeholders to provide input to Issues Identification, including advice on policy, planning considerations, data or feedback. The IESO will inform stakeholders about the nature of the system issues uncovered through the assessment.

As the Issues Identification stage is initiated annually, if no material changes in system conditions are detected from the previous assessment, then no new assessments may be needed. This result would be communicated to stakeholders.

What's New?

The Bulk System Planning process will be initiated on a predictable cycle, rather than only if specific reliability concerns are detected in the course of planning. The scope of assessments in this stage will include economic considerations, such as congestion studies, and public policy considerations, in addition to reliability-centric planning.

There will be opportunities for stakeholder engagement and feedback on any issues that are identified. The IESO is proposing a new reporting deliverable that will be published and updated annually that communicates a five to ten-year work plan. This new Schedule of Planning Activities will set out, based on the best available information and studies at the time, when the IESO will develop power system plans to address the issues and opportunities identified in this stage. It will also assist stakeholders to anticipate when opportunities for engagement related to a specific issue may take place, and also improve overall transparency in the planning process.

2.3 Determination of System Needs (Transmission, Capacity, Energy, Ancillary Services)

In this step of the process, the IESO will complete Individual Bulk System Studies ("Bulk Studies") in accordance with the Schedule of Planning Activities to identify what is needed to resolve the issues identified (e.g., transmission, capacity, energy, ancillary services, etc.). This is an IESO-led planning activity in which options are created, assembled, and evaluated based on a set of criteria, such as cost, reliability, etc., and a preferred solution or solutions is recommended in a Bulk System Planning Report.

The Bulk Study is similar in scope to the bulk studies carried out in the past by the IESO. The sequence of activities in a Bulk Study generally includes:

A **scoping** exercise to frame the issues and opportunities to be addressed, assemble key data and assumptions, develop a study work plan, schedule, and engagement strategy.

Engagement is a key part of this process, both at the early stage in seeking input on possible alternatives, and later at the stage of evaluation toward making plan recommendations. An engagement plan specific to each Bulk Study will be developed, and executed over the course of the study.

With stakeholder input, creating a range of **alternatives** for addressing the issues identified, which will then be put forward for analysis. Alternatives may include discrete resource and/or transmission options, or integrated solution alternatives that combine these with other possible approaches such as non-wires alternatives.

Conducting **analyses** to evaluate, compare, iterate and refine the alternatives, with the objective of narrowing the possible options down to an investment plan to be recommended.

Documenting the studies and recommendations in a **Bulk System Planning Report**.

A Bulk Study may take from one to three years to complete, depending on the scope and complexity of the issues or the possible solution alternatives. To be clear, the step described in Section 2.2, which identifies the issues/opportunities that require a power system plan to be developed, produces a Schedule of Planning Activities, will be carried out annually. Bulk Studies as identified in the Schedule of Planning Activities could take up to 3 years to complete, meaning that multiple cycles of Issues Identification may be done over the course of a single Bulk Study. When developing the Schedule of Planning Activities, the IESO will need to ensure that the power system plans will be completed in time to address the issues.

What's New?

The key differences being proposed include opportunities for stakeholders to provide input on the scope of alternatives being considered, transparently identifying decision criteria and reporting on how they are applied to make recommendations, and providing more detail on the functional specification and desired performance of recommended solutions to facilitate stakeholder input and supporting downstream implementation.

2.4 Stakeholder Engagement

Stakeholder engagement is an important part of bulk system planning and will be beneficial throughout the process. The IESO will work with stakeholders to define the specific aspects of stakeholder engagement during the finalization of the high-level design and the detailed design of the process.

2.5 Continuous Improvement

The Bulk System Planning process is largely a formalization of bulk system planning as it is presently carried out by the IESO, with improvements to ensure a more consistent, timely and transparent process. Integrating continuous improvement into the process provides for process refinements based our experience undertaking bulk system planning, as well as including feedback from regular and targeted outreach to stakeholders. The process will be reviewed periodically with the goal of determining what is working well and identifying opportunities for improvement.

2.6 Deliverables of this Process and Linkage to Resource Adequacy

The process will deliver the following products:

a. The **Schedule of Planning Activities**, as described in Section 2.2, will document the IESO's schedule for completing Bulk Studies to address system issues.

b. **Bulk System Planning Reports** will document the scope, alternatives, assessments, decision criteria, and recommendations for specific investments needed to address system issues, as determined through Bulk Studies.

c. The **Annual Planning Outlook** will summarize what is needed (e.g., capacity, energy, transmission, etc.) as determined through this process.

All of these products will serve as input into the IESO's decisions on how to address system needs. Where solutions other than transmission are identified, these will serve as inputs to the **Annual Acquisition Report**.

3.0 Summary and Next Steps

Following the publishing of this high-level design document, the IESO will undertake stakeholder engagement according to the Engagement Plan posted on the Formalizing the Integrated Bulk System Planning Process webpage.

The IESO will finalize the high-level design and develop the detailed process design elements throughout 2021, and prepare to begin implementing the new Bulk System Planning Process starting in 2022.

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