

E.S. Cornwall Memorial Scholarship July to September 2018 Overview

Infrastructure Development, California ISO

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THE UNIVERSITY
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July to September 2018 Overview

This document provides an overview of the work I, Christopher du Plessis, completed from July to September 2018 as part of the 2018 – 2019 ES Cornwall Memorial Scholarship and the impressions gained. During this period I visited the California Independent System Operator's (CAISO) to observe the Transmission Planning Process (TPP), with most of my time focused on the TPP Reliability Assessment and the Pacific Northwest informational special study.

Scholarship theme

The underlining theme of my Scholarship proposal is to find ways which the National Electricity Market's (NEM) national transmission planning role can be enhanced. Motivation for this came from Recommendation 5.3 of the Finkel Review:

The COAG Energy Council, in consultation with the Energy Security Board, should review ways in which the Australian Energy Market Operator's role in national transmission planning can be enhanced.

The North American context

The state of California is the fifth largest economy in the world after the United Kingdom and has one of the world's most ambitious renewable energy policies. In September 2018 California approved 100 percent Renewable Portfolio Standard (RPS) by 2045 and is currently ahead of the required trajectory to achieve 33 percent by 2020. Through all this change the CAISO is charged with ensuring the safe and reliable transportation of electricity on a power grid which serves almost half of the customers in western USA.

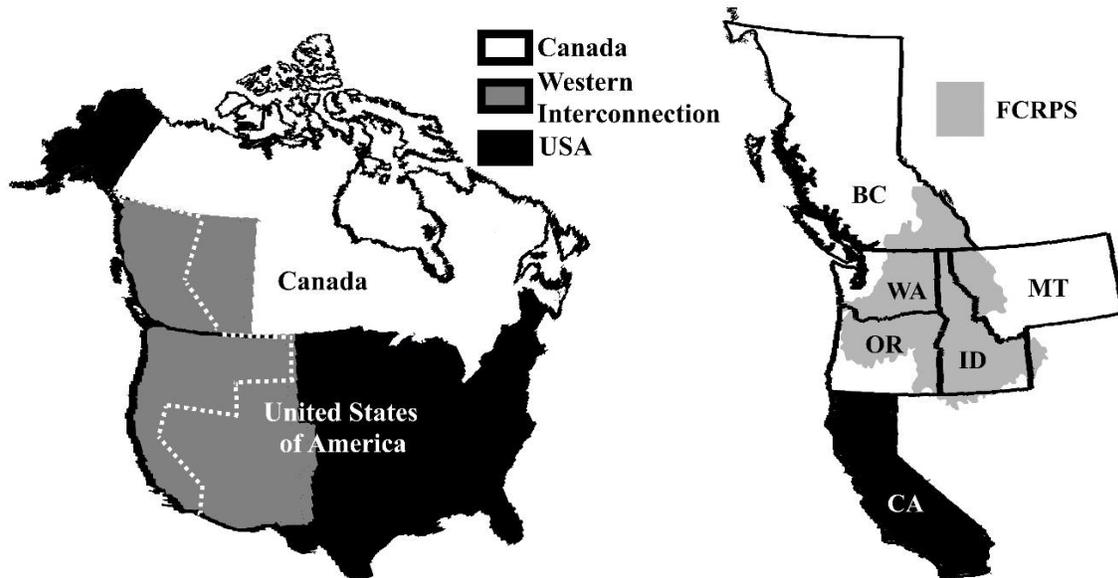
Transmission Planning Process

CAISO is required by the CAISO Tariff to develop a comprehensive Transmission Plan and approve transmission solutions using the TPP. The need for transmission augmentations are identified through the Reliability Assessment, Economic Assessment and the Policy Assessment.

As part of the 2018-2019 TPP, CAISO will be conducting an informational study to identify opportunities to increase the transfer capability between California and the Pacific Northwest region. This study is not required by the Tariff but was requested by the California Energy Council and California Public Utilities Commission.

The Pacific Northwest is a major electrical neighbour of the California power system and consists of a collection of transmission networks crossing a number of western US states and the Canadian province of British Columbia. The Federal Columbia River Power System (FCRPS) snakes through this region and solely contributes 40 percent of the hydro power in the US. Additionally, this region includes one of the largest hydro generators in the world, Grand Coulee. The figure below shows Canada (white area) and the United States of America (black area) on the left. The Western Interconnection is shown by the grey which includes parts of Canada and the USA. The border of California and the Pacific Northwest states are shown by the broken line. The figure on the right zooms into the area defined by the broken line and shows California in black and the

Pacific Northwest regions in white. The shaded area illustrates the expanse of the FCRPS.



Work Completed

From July to September 2018, I conducted studies in the Fresno local area and consolidated results for the northern Bulk transmission system Reliability Assessment. I began by familiarising myself with the Reliability Assessment process, focusing on the expansive Reliability Standards and the process used to assess the performance of the system against the reliability criteria. The broad range of contingencies required by the Reliability Standards not only identify the need for transmission development but also provide a warning of developing limitations. This area will be expanded on in the Final Report: Part One (the next report).

Most of my time was focused on the Pacific Northwest informational special study which provides a unique opportunity to assess the performance of the Bulk Electric System under high import and export conditions. This study will identify opportunities to increase the transfer capability between California and the Pacific Northwest, to enhance supply adequacy, system reliability and renewable integration in California. A key challenge in this study is the consideration of non-power requirements of hydro generation facilities in the FCRPS. During this period I developed material to present to stakeholders the impact of non-power requirements, tuned power system cases and tuned inputs for the production simulation model in preparation for the technical and economic assessment. This work will be expanded on in the Final Report: Part One.

Areas of work outlined in this report

- Reliability Assessment
- Increase transfer capability between California and the Pacific Northwest

Impression

The TPP Reliability Assessment considers a broad range of inputs prescribed in the reliability standards. The study scope is extensive, considering a range of scenarios, contingencies, extreme events, local and bulk system performance. Extensive collaboration with Participating Transmission Owner's (PTO's) throughout the TPP is necessary to ensure mitigation efficacy.

Understanding the capability of the neighbouring interconnected power systems, and associated interdependencies, is necessary to achieve the policy goals in California. Identifying opportunities to increase transfers is a good next step in reaching the 100 percent Renewable Portfolio Standards (RPS) by 2045.

Next steps

The next report, Final Report: Part One, will further develop the areas of work identified above and expand on what Australia can learn from the CAISO's TPP. Additionally, other areas of work will be addressed such as the TPP Economic Assessment, large scale solar integration and modeling of distributed energy resources in planning studies.

More details will be provided in the Final Report: Part One

- **Reliability Assessment**
- **Increase transfer capability between California and the Pacific Northwest**
- **Economic Assessment**
- **Policy Assessment**
- **Large scale solar integration**
- **Modeling distributed energy resources in near term and long term transmission planning studies (time permitting)**