APPENDIX B AESO LOAD AND GENERATION FORECAST

1 Introduction

1.1 Load and generation forecasts are an essential input to the AESO's transmission planning process. This document describes the forecasts used in the Downtown Calgary planning studies ("Planning Studies") discussed in the *Downtown Calgary Transmission Reinforcement Planning Studies Report*.

1.2 The forecasts in this document are a subset of the corporate forecasts published separately by the AESO.[1]

1.3 The Planning Studies are focused on the Downtown Calgary Area only, which consists of ENMAX's No. 1, No. 5, and No. 8 substations. Therefore, the information and data presented in this document focuses on the load growth forecasts at these three substations, and related generation forecasts, over the 20-year planning horizon. For additional reference, however, data and information are also presented on the AESO's broader Calgary Planning Area ("Area 6") and on total provincial load, or Alberta Internal Load ("AIL").

1.4 Three sets of forecast load data for the Downtown Calgary area are presented in this document. Load data from the 2014 LTO Main Outlook ("MO") and the Low Growth ("LG") scenario are presented along with a recommended forecast sensitivity on the Low Growth scenario.

Details and clarifications around the use of these forecasts, for the purposes of assessing Downtown Calgary transmission system adequacy and planning for respective transmission system reinforcement in this area, are included within this document. A brief description of the associated generation forecast information and data is also discussed.

[1] The AESO updates its corporate load and generation forecast annually. The AESO's latest corporate load forecast and associated forecast scenarios, released May 2014, are found in the 2014 Long-term Outlook, also referred to as the 2014 LTO. This forecast is available online on the AESO Forecasting page found at:
http://www.aeso.ca/downloads/AESO_2014_Long-term_Outlook.pdf

2 Historical Load

2.1 Table 2-1 summarizes historical winter and summer load levels for the Downtown Calgary area, the Calgary area and AIL at their respective peak demands.

Table 2-1: Historical Peak Loads (MW)

	Winter Peak				Summer Peak		
Year	Downtown Calgary (No. 01, 05, 08)	Calgary (Area 6)	Alberta Internal Load (AIL)	Year	Downtown Calgary (No. 01, 05, 08)	Calgary (Area 6)	Alberta Internal Load (AIL)
2005/06 HX	226	1,481	8,417	2006 HX	306	1,465	9,186
2006/07 HX	233	1,535	8,761	2007 HX	309	1,523	9,224
2007/08 HX	220	1,550	9,105	2008 HX	308	1,557	9,262
2008/09 HX	236	1,612	9,449	2009 HX	293	1,494	9,300
2009/10 HX	238	1,619	9,793	2010 HX	296	1,496	9,338
2010/11 HX	242	1,600	10,137	2011 HX	318	1,563	9,376
2011/12 HX	245	1,607	10,481	2012 HX	325	1,582	9,885
2012/13 HX	239	1,560	10,586	2013 HX	313	1,670	10,063
2013/14 HX	232	1,664	11,134	2014 HX	314	1,644	10,419
2014/15 HX	231	1,612	11,229	2015 HX	306	1,657	10,520

HX = Historical

The compound average annual summer peak load growth rates for Downtown Calgary and Calgary area over the past 6 years (2010 to 2015) are 0.6 percent and 1.7 percent respectively.

As Table 2-1 shows, summer peak load in the Downtown Calgary area has historically been greater than winter peak load. This is primarily due to cooling (air conditioning) requirements, which are more load-intensive than winter heating requirements. The AESO expects forecast summer peak load to continue to exceed winter peak load over the 20-year planning horizon. Consequently, only summer peak conditions were assumed in the Planning Studies and this document focuses on summer peak forecasts only.

3 Load Forecast

3.1 Table 3-1 summarizes the 2014 LTO MO forecast summer peak loads for the Downtown Calgary area, the Calgary area, and AIL at their respective peak demands. As the data show, under the MO forecast, load in the Downtown Calgary area is forecast to grow at a compound average annual growth rate of about 2.6 percent (2015 to 2034/35).

Table 3-1: 2014 LTO
Summer Load at Peak (MW)

Year	Downtown Calgary (No. 01, 05, 08)	Calgary (Area 6)	Alberta Internal Load (AIL)
2015 F	363	1,667	10,765
2016 F	375	1,709	11,170
2017 F	387	1,748	11,799
2018 F	396	1,786	12,390
2019 F	405	1,821	12,938
2020 F	418	1,859	13,429
2021 F	428	1,895	13,865
2022 F	440	1,931	14,148
2023 F	453	1,980	14,460
2024 F	466	2,030	14,731
2025 F	483	2,093	15,048
2026 F	497	2,144	15,327
2027 F	512	2,202	15,627
2028 F	523	2,241	15,817
2029 F	538	2,294	16,083
2030 F	551	2,344	16,329
2031 F	563	2,387	16,554
2032 F	574	2,429	16,760
2033 F	588	2,481	16,975
2034/35 F	601	2,530	17,167

3.2 The LG scenario in the 2014 LTO is intended to represent future uncertainty regarding economic growth rates and timing of growth by forecasting lower load growth in Alberta, and corresponding reduced generation forecasts (see pages 30-37 of the 2014 LTO for more details). Whereas the MO is typically the main forecast used by the AESO to assess transmission system adequacy and plan transmission system developments, scenarios such as LG are intended to assess the implications to the AESO's plans under different forecast conditions. Table 3-2 summarizes the 2014 LTO LG scenario summer peak loads for the Downtown Calgary area, the Calgary area, and AIL, which were used for study.

Table 3-2: 2014 LTO Low Growth Scenario Summer Load at Peak (MW)

Year	Downtown Calgary (No. 01, 05, 08)	Calgary (Area 6)	Alberta Internal Load (AIL)
2015 F	351	1,613	10,260
2016 F	360	1,640	10,449
2017 F	367	1,657	10,633
2018 F	373	1,680	10,942
2019 F	377	1,694	11,144
2020 F	384	1,710	11,300
2021 F	391	1,734	11,555
2022 F	400	1,755	11,657
2023 F	407	1,782	11,700
2024 F	416	1,814	11,806
2025 F	428	1,853	11,939
2026 F	438	1,888	12,095
2027 F	446	1,919	12,206
2028 F	452	1,938	12,249
2029 F	461	1,962	12,332
2030 F	466	1,983	12,395
2031 F	471	1,998	12,453
2032 F	475	2,011	12,495
2033 F	482	2,032	12,564
2034/35 F	487	2,050	12,606

3.3 For the purposes of the Planning Studies, the AESO determined that the current MO overestimates the load growth potential for the specific Downtown Calgary area. That determination followed a review of 2014 and 2015 historical peak load data and 2014 LTO load forecasts in the Downtown Calgary and Calgary areas. This review also included consideration of the latest load forecast information including recently revised ENMAX Distribution Facility Owner (DFO) substation-level forecasts. Collectively, this latest information indicates that load growth projections for the Downtown Calgary area are lower than the MO forecast.

3.4 Instead of the MO, the AESO used two forecast scenarios to account for this most recent information:

- The current 2014 LTO LG scenario; and
- The LG scenario minus 45 MW (-45 MW) sensitivity to assess near-term load growth uncertainty.

3.5 The LG scenario's growth projections are more consistent with the DFO's forecast revisions and the underlying drivers affecting load growth in the Downtown Calgary area, than is the MO. This is especially true over the medium to long-term (10-20 years).

3.6 The 2014 LTO LG scenario, however, forecasts 351 MW peak load in 2015, and 360 MW in 2016. This near-term load level is higher than recent historical peak loads of 314 MW and 306 MW, in 2014 and 2015, respectively. As such, the -45 MW forecast sensitivity ("Sensitivity Scenario"), as shown in Table 3-3, reduces the LG scenario in each year by 45 MW to align the forecast starting point according to 2015 actual summer peak load. The purpose of the Sensitivity Scenario is to test the timing of the need for transmission reinforcement in the Downtown Calgary area considering load growth uncertainties in the near-term.

3.7 In regards to near-term forecast assumptions, numerous buildings are currently under construction in Downtown Calgary and there are three main potential sites slated for redevelopment (West Village, East Village and Eau Claire). The pace of load growth resulting from the new buildings is unclear due to economic uncertainty. A rapid economic turnaround will result in a faster load growth while a prolonged economic downturn will result in a slower load growth. It is anticipated that the LG scenario and Sensitivity Scenario forecasts appropriately address the range of potential near-term uncertainties associated with the load growth in the Downtown Calgary Area.

Table 3-3: 2014 LTO Low Growth Sensitivity Scenario
Summer Load at Peak (MW)

Year	Downtown Calgary (No. 01, 05, 08)
2015 F	306
2016 F	315
2017 F	322
2018 F	328
2019 F	332
2020 F	339
2021 F	346
2022 F	355
2023 F	362
2024 F	371
2025 F	383
2026 F	393
2027 F	401
2028 F	407
2029 F	416
2030 F	421
2031 F	426
2032 F	430
2033 F	437
2034/35 F	442

4 Existing Generation

4.1 In the development of credible stressed study cases, the following existing generating units were identified and are shown in Table 4-1.

Table 4-1: Existing Local Generation

Existing Local Generation	
Unit	**Size (MW)**
ENMAX Shepard Energy Centre	873
Calgary Energy Centre	320
Southern Wind Generation	1,202

5 Generation Forecast

5.1 For the purpose of the Planning Studies, generation capacity assumptions were provided for the LG scenario in the near-term (2017–2020), mid-term (2021-2025) and long-term (2035) time frames. These generation capacities are shown in Table 5-1.

Table 5-1: 2014 LTO Low Growth Forecast Generation

Local Forecast Generation Capacity (MW)					
Study Condition	**Year**	**Shepard (MW)**	**Calgary Energy Center (MW)**	**Southern Wind (MW)**	**Bonnybrook (MW)**
2014 LTO Low Growth	2017	873	320	1,203	0
	2020	873	320	1,353	0
	2021	873	320	1,353	0
	2025	873	320	1,440	0
	2035	873	320	1,632	168

5.2 The forecast generation capacity was dispatched in the study scenarios based on a combination of capturing reasonable stressed conditions and anticipated in-merit energy. The details of study scenarios are listed in section 3.1 of the *Downtown Calgary Transmission Reinforcement Planning Studies Report*.

5.3 Within the study scenarios, high wind generation in southern Alberta and high Shepard output were assumed. High wind generation was dispatched to 92% of forecast southern wind generation capacity. Given the variable nature of wind, 92% was determined to be a credible stress condition based on historical hourly wind capacity factors. High output for Shepard considered temperature derates experienced by gas-fired generators during hot summer load days. A credible high summer dispatch for Shepard was set to 763 MW assuming ambient air temperatures above 30 Degrees Celsius.