AESO LOAD AND GENERATION FORECAST

Load and Generation Forecast

P7073: North Lethbridge 370S Substation Modification

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Introduction

Load and generation forecasts are an essential input to the AESO's transmission planning process. This document describes the forecast used in the North Lethbridge 370S Substation Modification Project planning studies (Planning Studies), described in the *North Lethbridge 370S Substation Modification Project Planning Report*.

As defined in the Planning Studies, the Study Area includes the following AESO planning areas in the Southwest sub-region of Alberta: Stavely (Area 49), Fort Macleod (Area 53), Lethbridge (Area 54) and Glenwood (Area 55). Accordingly, the information and data presented in this document provides load growth forecasts and related generation forecasts in this area over the 10-year planning horizon based on the AESO's 2019 Long-Term Outlook (LTO) forecast.

Details and clarifications around the use of the forecast, for the purpose of assessing transmission system adequacy and planning for respective transmission system development in this area, are included within this document. A description of the associated generation forecast information and data is also discussed.

1. Historical Load

Table 1-1 provides historical load levels for the Study Area at the summer peak[1] (SP), and summer light (SL) loading levels for the last 5 consecutive season years.

Table 1-1: Historical Load in the Study Area

Year	SL (MW)	SP (MW)
2016	130	338
2017	146	371
2018	133	368
2019	134	340
2020	131	355

The summer peak load compound annual growth rate (CAGR)[2] for the Study Area from 2016 to 2020 is 1.2 per cent, while the summer light load CAGR over the same period is 0.2 per cent. Load in the Lethbridge and Fort Macleod areas is primarily comprised of residential and commercial load, in addition to some industrial load in Lethbridge. In the rest of the Study Area, other load types include agricultural and gas processing.

[1] The summer season is from May 1st to Oct 31st; The winter season is from Nov 1st to Dec 31st and Jan 1st to Apr 30th of the following year. The "peak" load represents the maximum load during the season; "light" load represents the minimum load during the season.

[2] $CAGR\ (\%) = \left(\left(\frac{Load_{2020}}{Load_{2016}}\right)^{\frac{1}{n-1}} - 1\right) \times 100, where\ n = Number\ of\ years$

2. Forecast Load

While developing the load forecast for the Study Area, the AESO considered historical load and reviewed the latest load forecast information, including past projects, current load connection projects, and the substation-level forecasts from the legal owners of electric distribution systems in the Study Area, Lethbridge Electric Utility and FortisAlberta. Table 2-1 below summarizes the AESO's 2019 LTO forecast summer light (SL) and summer peak (SP) loads for the Study Area.

Table 2-1: Forecast Load in the Study Area

Year	SL (MW)	SP (MW)
2021	139	364
2025	138	358
2031	144	362

The AESO's load forecast in the Study Area projects load growth at a CAGR of -0.1 and 0.4 per cent for summer peak and summer light load, respectively, from 2021 to 2031.The difference in the SP load growth rate relative to historic growth rates is driven by a milder weather profile assumed in the forecast compared to the more extreme weather observed in the historical data, as well as by higher anticipated rooftop solar output in some areas.

3. Existing Generation

Several generation facilities are located within the Study Area. They include hydroelectric, gas-fired and wind power generating units. Table 3-1 summarizes the existing generation capacity in the Study Area as of September 2020. Generation within the Study Area includes the distribution-connected Coaldale (COD1) generating facility. Total existing generation in the Study Area is 1,265 MW.

Table 3-1: Existing Generation in the Study Area

Asset Name	Asset MPID	Type	Planning Area	Maximum Capability (MW)
Chin Chute	CHIN	Hydro	54	15
Irrican Hydro	ICP1	Hydro	55	7
CUPC Oldman River	OMRH	Hydro	53	32
Raymond Reservoir	RYMD	Hydro	55	21
Taylor Hydro	TAY1	Hydro	55	14
Coaldale	COD1	Cogen	54	5
AltaGas Parkland	ALP2	SC	49	10
Drywood	DRW1	SC	55	6

Lethbridge Coaldale	ME04	SC	54	6
McBride Lake Windfarm	AKE1	Wind	53	73
Ardenville Wind	ARD1	Wind	53	68
Blackspring Ridge	BSR1	Wind	49	300
Blue Trail Wind	BTR1	Wind	53	66
Castle River #1	CR1	Wind	53	39
Castle Rock Wind Farm	CRR1	Wind	53	77
Cowley Ridge	CRWD	Wind	53	20
Soderglen Wind	GWW1	Wind	53	71
Summerview 1	IEW1	Wind	53	66
Summerview 2	IEW2	Wind	53	66
Kettles Hill	KHW1	Wind	53	63
Oldman 2 Wind Farm 1	OWF1	Wind	53	46
Suncor Magrath	SCR2	Wind	55	30
Suncor Chin Chute	SCR3	Wind	54	30
Enel Alberta Riverview 1	RIV1	Wind	53	105
Castle Rock Ridge 2	CRR2	Wind	53	29
Total Generation				1,265

4. Generation Forecast

In addition to the above existing facilities, the generation forecast for the Study Area includes two Renewable Energy Program (REP) wind projects in the Lethbridge and Fort Macleod planning areas, as well as two solar projects in the Stavely planning area. These projects, totaling 850 MW of potential additional generation, are summarized in Table 4-1.

Table 4-1: Proposed Generation Projects in the Study Area

Project Name	Type	Planning Area	Maximum Capability (MW)
Travers Solar Project Connection	Solar	49	400
Claresholm Solar Project Connection	Solar	49	130
Stirling Wind Project Connection	Wind	54	113
Windrise Wind Project Connection	Wind	53	207

As of June 2021, the Claresholm Solar and Windrise Wind projects have been energized.

4.1 Non-renewable Dispatch Assumptions

Existing non-renewable generation is dispatched to their anticipated in-merit levels based on historical observed dispatches during each load condition (light load or peak load). Existing non-renewable generation can also be set to varying observed historical ranges in order to test certain stressed generation scenarios.

4.2 Renewable Dispatch Assumptions

Existing and future wind generation is typically dispatched to either 92% or 0% of maximum capability, in order to capture either a high wind or low wind generation scenario, respectively. Similarly, existing and future solar generation is dispatched to 80% of maximum capability during Summer Light, and to 100% during Summer Peak, to capture a high solar generation scenario, and to 0% for both, to capture a low solar generation scenario. Table 4-2 summarizes these assumptions. All these capacity factor assumptions are based on historically observed maximum and minimum values during similar load conditions for existing wind and solar generating facilities.

Table 5-2: Renewable Generation Dispatch Assumptions

	SL		SP	
	Low Scenario	High Scenario	Low Scenario	High Scenario
Wind Dispatch (% of MC)	0%	92%	0%	92%
Solar Dispatch (% of MC)	0%	80%	0%	100%