

# Long Term Adequacy Metrics

## Nov 2018



## Introduction

The following report provides information on the long term adequacy of the Alberta electric energy market. The report contains metrics that include tables on generation projects under development and generation retirements, an annual reserve margin with a five year forecast period, a two year daily supply cushion, and a two year probabilistic assessment of the Alberta Interconnected Electric System (AIES). The Long Term Adequacy (LTA) Metrics provide an assessment and information that can be used to facilitate further assessments of long term adequacy. This report is updated quarterly in February, May, August, and November. Inquiries on the report can be made at [forecast@aesO.ca](mailto:forecast@aesO.ca).

## Summary of Changes since Previous Report

### New Generation and Retirements Metric

#### *Projects completed and removed from list:*

- N/A

#### *Generation Projects moved to “Active Construction”:*

- TransCanada Scoria 318S Cogen
- Capital Power Whitla Wind Power – Phase 1

#### *Generation projects moved to “Regulatory Approval”:*

- Fortis Vauxhall Solar DER
- EDP Renewables Sharp Hills Wind
- RESC Forty Mile WAGF
- Turning Point Gen Canyon Creek PHES
- Fortis Stirling 67S DG PV
- Fortis Jenner 275S DER
- Capital Power Whitla Wind Power – Phase 2
- Fortis Warner 344S DER Solar
- Greengate Power Wheatland Wind

#### *Generation projects that have been added to “Announced, Applied for AESO Interconnection, and/or Applied for Regulatory Approval”:*

- FortisAlberta Kaybob 3 Cogen
- GP JOULE Kennedy Farm Solar
- NextEra Kitscoty MPC Wind
- Chephren Power Gas
- ATCO Power Poplar Hill 790S Contract Change
- NGCI Ermineskin Cree Nation MPC Solar
- EDF Cypress Wind
- Northland Bow City MPC Solar
- EDF Bull Trail MPC Wind
- ACCEL Morse River Cogen
- Indigena Blood Pe-na-koam Wind

- Enerfin Winnifred MPC Wind
- Quill Rocky Mountain Gas
- PBC Paul Band Solar
- NextEra Jensen MPC Wind
- ATCO Rainbow Lake Gas
- ATCO Power Valleyview Gas
- ATCO Power Hanna Solar
- Maxim Power Milner Change
- Solar Krafte Wrentham Solar Project
- BluEarth Renewables Yellow Lake Solar Project

***Generation projects that have been removed:***

- Suncor Forty Mile P/V
- Fortis 257S Hull P/V
- Suncor Forty Mile Granlea Solar
- FortisAlberta High River 65S DER Solar 1
- FortisAlberta High River 65S DER Solar 2
- Kronos Solar Heisler Solar Park
- Kronos Solar Veteran Solar Park
- Aura Power Big Bend Solar

***Other changes to generation projects:***

| Project                                       | Change                            |
|---|-----------------------------------|
| NextEra – Heritage Wind                       | New ISD of Sep-2020 from Sep-2019 |
| Alberta Wind Energy – Windy Point             | New ISD of Oct-2020 from Jul-2019 |
| Alberta Wind Energy – Old Elm & Pothole Creek | New ISD of Oct-2019 from Dec-2020 |
| Enbridge – WhiteTail Peaking                  | New ISD of Jul-2019 from Jun-2020 |
| Inter Pipeline – Strathcona Cogeneration      | New ISD of Mar-2020 from May-2019 |
| Eolectric – Welsch Wind                       | New ISD of Dec-2020 from Jul-2019 |
| Greengate Power – Wheatland Wind              | New ISD of Dec-2019 from Oct-2019 |
| Invenergy – Schuler Windfarm                  | New ISD of Jul-2020 from Jan-2020 |
| Sequoia Energy – Schuler WAGF                 | New ISD of Dec-2019 from Jun-2021 |
| Fortis – Genalta Bellshill                    | New ISD of Mar-2019 from Sep-2020 |

|  |                                   |
|--|-----------------------------------|
| Fortis – GP Joule Canada Cluny DG          | New ISD of Oct-2019 from Nov-2019 |
| Fortis – Stirling 67S DG P/V               | New ISD of Mar-2019 from Sep-2019 |
| Fortis – Enchant 447S DER Solar            | New ISD of Aug-2019 from Aug-2019 |
| EDF EN – Red Rock WAGF                     | New ISD of May-2021 from Jun-2020 |
| Fortis – Krafte 257S Hull DER Solar        | New ISD of Jul-2019 from Sep-2019 |
| Archer – Piikani Solar                     | New ISD of Jun-2020 from Jan-2019 |
| TransAlta – Garden Plain Wind              | New ISD of Feb-2020 from Jul-2019 |
| Fortis – West Brooks DER Solar             | New ISD of Oct-2019 from Apr-2020 |
| RealPart – Calgary Area Solar              | New ISD of Oct-2019 from May-2019 |
| Fortis – Namaka DER Solar                  | New ISD of Jun-2019 from May-2019 |
| Fortis – Jenner 275S DER                   | New ISD of Jul-2019 from Aug-2019 |
| Fortis – Duchess DER Solar                 | New ISD of Mar-2019 from May-2019 |
| Fortis – Gleichen DG Solar                 | New ISD of Jun-2019 from Mar-2019 |
| Fortis – Coaldale Cogen DER                | New ISD of Nov-2019 from Nov-2020 |
| Pengrowth – Cold Lake Area Energy Centre   | New ISD of Aug-2020 from May-2019 |
| FortisAlberta – Bullshead 523S DER Solar 1 | New ISD of Jul-2019 from Sep-2019 |
| FortisAlberta – Bullshead 523S DER Solar 2 | New ISD of Sep-2019 from Sep-2019 |
| Imperial Oil – Edmonton 95S Cogen          | New ISD of Nov-2019 from Sep-2019 |
| FortisAlberta – Blackfalds 198S Gas 2      | New ISD of Jul-2019 from Oct-2020 |
| FortisAlberta – Brooks 121S DER Solar 1    | New ISD of Dec-2019 from Jul-2019 |
| FortisAlberta – Brooks 121S DER Solar 2    | New ISD of Dec-2019 from Sep-2019 |
| TransAlta – Tempest MPC Wind               | New ISD of Dec-2020 from Oct-2020 |
| Elemental Energy – WD MPC Wind             | New ISD of Dec-2021 from Dec-2021 |

## Reserve Margin Metric

The reserve margin has been updated to reflect changes to the project list.

## Supply Cushion Metric

The forecast supply cushion has been updated to reflect the new time period.

## Two Year Probability of Supply Adequacy Shortfall Metric

New values for the metric have been calculated with Total Energy Not Served equaling 142 MWh. This value is below the 1,600 MWh threshold.

## New Generation Projects and Retirements Metric

The New Generation Projects and Retirements Metric is a summary of generation at various stages of development in Alberta and is shown in Tables 1 to 4 below. In Alberta's deregulated electricity market competitive forces determine the location, magnitude and timing of new generation additions. Information on prospective generation additions and retirements provides context for the future market in Alberta. The information is drawn from a variety of public sources and includes new generation, changes to existing generation and the retirement of generating units. Changes in project in-service dates (ISDs) and regulatory stages occur as projects move forward and/or market conditions change. Current information on connection project ISDs can be found in the [AESO Project List](#) and information on power plant applications can be found at the [Alberta Utilities Commission](#) website.

**Table 1: Generation Projects under Construction**

| Sponsor(s)        | Project Name                  | Fuel | Unit Capacity* | ISD*     |
|-------------------|-------------------------------|------|----------------|----------|
| TransCanada       | Scoria 318S Cogen             | Gas  | 45             | Jan-2019 |
| Fortis            | Genalta Bellshill             | Gas  | 5              | Mar-2019 |
| Capital Power     | Whitla Wind Power - Phase 1** | Wind | 202            | Sep-2019 |
| <b>Total (MW)</b> |                               |      | <b>252</b>     |          |

\*Unit Capacity – Expected MW capacity; ISD – Estimated in-service date

\*\* - Denotes a project that was successful in the first Renewable Electricity Program competition. Companies successful in this round were awarded a Renewable Electricity Support Agreement and receive support through an Indexed Renewable Energy Credit in exchange for the project's renewable attributes.

**Table 2: Generation Projects with Regulatory Approval**

| Sponsor(s) | Project Name              | Fuel  | Unit Capacity | ISD      |
|------------|---------------------------|-------|---------------|----------|
| EDF EN     | Vulcan Solar PV - Phase 1 | Solar | 55            | Dec-2018 |

|                     |                               |       |     |          |
|---------------------|-------------------------------|-------|-----|----------|
| EDF EN              | Vulcan Solar PV - Phase 2     | Solar | 23  | Dec-2018 |
| Fortis              | Buffalo Atlee Cluster 1 WAGF  | Wind  | 18  | Mar-2019 |
| FortisAlberta       | Blackfalds 198S Gas 1         | Gas   | 6   | Mar-2019 |
| Fortis              | Buffalo Atlee Cluster 3 WAGF  | Wind  | 17  | Mar-2019 |
| Fortis              | Stirling 67S DG P/V           | Solar | 17  | Mar-2019 |
| Fortis              | Spring Coulee 385S Solar DG   | Solar | 29  | Apr-2019 |
| Fortis              | Warner 344S DER Solar         | Solar | 10  | May-2019 |
| BluEarth Renewables | Burdett DG PV                 | Solar | 20  | May-2019 |
| Fortis              | 498S Tilley DG PV             | Solar | 22  | Jun-2019 |
| Fortis              | 895S Suffield DG PV           | Solar | 22  | Jun-2019 |
| Fortis              | 275S Jenner Solar DER         | Solar | 23  | Jun-2019 |
| Fortis              | 158S Vauxhall DG PV           | Solar | 16  | Jun-2019 |
| Fortis              | 421S Hays DG PV               | Solar | 23  | Jun-2019 |
| Enel                | Castle Rock Ridge - Phase 2** | Wind  | 31  | Jun-2019 |
| Joss Wind           | Jenner Wind                   | Wind  | 122 | Jun-2019 |
| Fortis              | Vauxhall Solar DER            | Solar | 22  | Jun-2019 |
| Naturener           | Wild Rose 2                   | Wind  | 192 | Jul-2019 |
| Naturener           | Wild Rose 1                   | Wind  | 218 | Jul-2019 |
| Fortis              | Jenner 275S DER               | Gas   | 23  | Jul-2019 |
| Enbridge            | WhiteTail Peaking             | Gas   | 200 | Jul-2019 |
| Fortis              | Krafte 257S Hull DER Solar    | Solar | 25  | Jul-2019 |
| EDP Renewables      | Sharp Hills Wind**            | Wind  | 300 | Aug-2019 |
| Fortis              | Enchant 447S DER Solar        | Solar | 74  | Aug-2019 |
| Suncor              | Hand Hills                    | Wind  | 80  | Sep-2019 |

|                     |                              |         |      |          |
|---------------------|------------------------------|---------|------|----------|
| Maxim Power         | HR Milner Expansion Gas      | Gas     | 90   | Sep-2019 |
| ATCO                | Three Hills 770S DER Solar 1 | Solar   | 25   | Sep-2019 |
| Mustus Energy       | Mustus Biomass               | Biomass | 41   | Sep-2019 |
| ATCO                | Heartland Power Station 1    | Gas     | 510  | Nov-2019 |
| Fortis              | Coaldale Cogen DER           | Gas     | 6    | Nov-2019 |
| Imperial Oil        | Edmonton 95S Cogen           | Gas     | 46.5 | Nov-2019 |
| Pteragen            | Peace Butte                  | Wind    | 120  | Dec-2019 |
| Greengate Power     | Wheatland Wind               | Wind    | 120  | Dec-2019 |
| Turning Point Gen   | Canyon Creek PHES            | Other   | 75   | Jan-2020 |
| Inter Pipeline      | Strathcona Cogeneration      | Gas     | 101  | Mar-2020 |
| Three Creeks        | Three Creeks Unit 1          | Gas     | 230  | Jun-2020 |
| Three Creeks        | Three Creeks Unit 2          | Gas     | 230  | Jun-2020 |
| Three Creeks        | Three Creeks Unit 3          | Gas     | 230  | Jun-2020 |
| RESC                | Forty Mile WAGF              | Wind    | 400  | Jun-2020 |
| NextEra             | Heritage Wind                | Wind    | 291  | Sep-2020 |
| BluEarth Renewables | Hand Hills Wind Farm         | Wind    | 80   | Sep-2020 |
| Capital Power       | Whitla Wind Power - Phase 2  | Wind    | 97.2 | Sep-2020 |
| Alberta Wind Energy | Windy Point                  | Wind    | 50.4 | Oct-2020 |
| BowArk Energy       | Queenstown Power Plant       | Gas     | 80   | Oct-2020 |
| Maxim Power         | Deerland Peaking 1-Phase 1   | Gas     | 186  | Dec-2020 |
| Capital Power       | Halkirk 2                    | Wind    | 150  | Dec-2020 |
| ENMAX               | Zephyr Wind Farm             | Wind    | 200  | Dec-2020 |
| E.ON                | Grizzly Bear                 | Wind    | 120  | Dec-2020 |
| Eolectric           | Welsch Wind                  | Wind    | 69   | Dec-2020 |

|                     |                                   |       |              |          |
|---------------------|-----------------------------------|-------|--------------|----------|
| RESC                | McLaughlin WAGF                   | Wind  | 47           | Dec-2020 |
| Capital Power       | Genesee 4                         | Gas   | 525          | Mar-2021 |
| Kineticor           | Peace River Power Generator       | Gas   | 98           | Sep-2021 |
| Enmax               | Calgary Energy Centre Peaking     | Gas   | 150          | Dec-2021 |
| Capital Power       | Genesee 5                         | Gas   | 525          | Mar-2022 |
| C&B Alberta Solar   | Newell Solar Project              | Solar | 13           | Jan-1999 |
| Altogas             | Kent Generation-Phase 1           | Gas   | 100          | Jan-1999 |
| Enmax               | Bonnybrook                        | Gas   | 168          | Jan-1999 |
| TransCanada         | Saddlebrook                       | Gas   | 350          | Jan-1999 |
| TransAlta           | Sundance 7                        | Gas   | 850          | Jan-1999 |
| PetroChina          | MacKay-Phase 1                    | Gas   | 85           | Jan-1999 |
| Maxim Power         | Milner 2 Phase 1                  | Gas   | 260          | Jan-1999 |
| Maxim Power         | Milner 2 Phase 2                  | Gas   | 260          | Jan-1999 |
| Nexen               | Long Lake South                   | Gas   | 85           | Jan-1999 |
| Imperial Oil        | Kearl - Phase 2                   | Gas   | 100          | Jan-1999 |
| Imperial Oil        | Kearl - Phase 3                   | Gas   | 35           | Jan-1999 |
| Kronos Solar        | Oyen Solar Park                   | Solar | 10           | Jan-1999 |
| City of Calgary     | Bonnybrook Cogen Expansion        | Gas   | 10           | Jan-1999 |
| Syncrude            | Mildred Lake (Base Plant)-Phase 1 | Gas   | 85           | Jan-1999 |
| NAT3                | Jenner DG                         | Gas   | 20           | Jan-1999 |
| BluEarth Renewables | Yellow Lake Solar Project         | Solar | 19           | Jan-1999 |
| <b>Total (MW)</b>   |                                   |       | <b>8,931</b> |          |

**Table 3: Generation Projects that have been Announced, Applied for AESO Connection, and/or Applied for Regulatory Approval**

| Sponsor(s)        | Project Name                   | Fuel  | Unit Capacity | ISD          |
|-------------------|--------------------------------|-------|---------------|--------------|
| FortisAlberta     | Willesdengreen DER Gas Turbine | Gas   | 10            | Nov-2018 (A) |
| Chiniki           | Solar                          | Solar | 40            | Dec-2018 (A) |
| Fortis            | Bassano DER Solar              | Solar | 10            | Jan-2019 (A) |
| Fortis            | Wainwright DER Solar           | Solar | 13            | Jan-2019 (A) |
| Fortis            | Provost DER Solar              | Solar | 16            | Jan-2019 (A) |
| Fortis            | Killarney Lake DER Solar       | Solar | 16            | Jan-2019 (A) |
| Seven Generations | Gold Creek Gas Plant           | Gas   | 32            | Jan-2019 (P) |
| Fortis            | Hays 421S DER Solar            | Solar | 10            | Jan-2019 (A) |
| ATCO              | Coronation 802S Solar DG       | Solar | 10            | Mar-2019 (A) |
| ATCO              | Vilna 777S DER Solar           | Solar | 22.7          | Mar-2019 (A) |
| Fortis            | Coaldale 254S DG P/V           | Solar | 20            | Mar-2019 (A) |
| Fortis            | Coaldale 254S DER Solar 2      | Solar | 20            | Mar-2019 (A) |
| Fortis            | Duchess DER Solar              | Solar | 16            | Mar-2019 (A) |
| TransAlta         | Cowley Ridge 1 Wind            | Wind  | 21            | Apr-2019 (A) |
| Joss Wind         | Jenner Phase 2                 | Wind  | 180           | May-2019 (A) |
| Fortis            | Empress DER Solar              | Solar | 23            | May-2019 (A) |
| Fortis            | Provost DER Solar              | Solar | 23            | May-2019 (A) |
| Fortis            | Metiskow DER Solar             | Solar | 23            | May-2019 (A) |
| Fortis            | Burdett DER Solar 1            | Solar | 8             | May-2019 (A) |
| Fortis            | Burdett DER Solar 2            | Solar | 16            | May-2019 (A) |
| Fortis            | Taber DER Solar 1              | Solar | 12            | May-2019 (A) |



|                  |                                  |       |      |              |
|------------------|----------------------------------|-------|------|--------------|
| Fortis           | Taber DER Solar 2                | Solar | 22   | May-2019 (A) |
| Fortis           | Fincastle DER Solar              | Solar | 20   | May-2019 (A) |
| Fortis           | Killarney DER Solar              | Solar | 22   | May-2019 (A) |
| ATCO             | Michichi DER Solar               | Solar | 75   | May-2019 (A) |
| ATCO             | Monitor DER Solar                | Solar | 10   | May-2019 (A) |
| FortisAlberta    | Taber 83S DER Solar              | Solar | 16   | May-2019 (A) |
| FortisAlberta    | Empress 394S DER Solar           | Solar | 15.6 | May-2019 (A) |
| FortisAlberta    | Taber 83S DER Solar              | Solar | 19   | May-2019 (A) |
| Keyera           | West Pembina 359S Gas Turbine    | Gas   | 12   | May-2019 (A) |
| ATCO Power       | Poplar Hill 790S Contract Change | Gas   | 32   | Jun-2019 (A) |
| Fortis           | Namaka DER Solar                 | Solar | 20   | Jun-2019 (A) |
| Fortis           | Gleichen DG Solar                | Solar | 17   | Jun-2019 (A) |
| Enel             | Riverview Wind Farm**            | Wind  | 115  | Jun-2019 (A) |
| Fortis           | Burdett 368S DG P/V              | Solar | 10   | Jun-2019 (A) |
| Irma             | Wainwright Wind Project          | Wind  | 90   | Jul-2019 (A) |
| Greengate Power  | Paintearth Wind Farm             | Wind  | 150  | Jul-2019 (A) |
| Greengate Power  | Stirling Wind                    | Wind  | 115  | Jul-2019 (A) |
| Imperial Oil     | Aspen SAGD Project               | Gas   | 30   | Jul-2019 (A) |
| Fortis           | Carseland Solar                  | Solar | 12   | Jul-2019 (A) |
| FortisAlberta    | Bullshead 523S DER Solar 1       | Solar | 20   | Jul-2019 (A) |
| FortisAlberta    | Blackfalds 198S Gas 2            | Gas   | 4    | Jul-2019 (A) |
| Fortis           | Conrad DER Solar                 | Solar | 23   | Jul-2019 (A) |
| Renewable Energy | Rattlesnake Wind                 | Wind  | 100  | Jul-2019 (A) |
| Fortis           | Brooks DER Solar                 | Solar | 22   | Aug-2019 (A) |

|                     |                               |       |     |              |
|---------------------|-------------------------------|-------|-----|--------------|
| Altogas             | Glenridge Wind                | Wind  | 150 | Sep-2019 (A) |
| Acciona Energy      | Glenwood Area Wind            | Wind  | 120 | Sep-2019 (A) |
| ATCO                | Three Hills 770S DER Solar 2  | Solar | 25  | Sep-2019 (A) |
| ATCO                | Michichi Creek 802S DER Solar | Solar | 25  | Sep-2019 (A) |
| FortisAlberta       | Innisfail 214S DER Solar      | Solar | 24  | Sep-2019 (A) |
| ATCO                | Kneehill                      | Solar | 25  | Sep-2019 (P) |
| Solar Krafte        | Wrentham Solar Project        | Solar | 42  | Sep-2019 (P) |
| FortisAlberta       | Bullshead 523S DER Solar 2    | Solar | 20  | Sep-2019 (A) |
| NaturEner           | Buffalo Trail WAGF            | Wind  | 100 | Sep-2019 (A) |
| NaturEner           | Ross Creek WAGF               | Wind  | 100 | Sep-2019 (A) |
| RESC                | McLaughlin Phase 2            | Solar | 40  | Sep-2019 (A) |
| Enterprise          | Prosperity WAGF               | Wind  | 175 | Sep-2019 (A) |
| FortisAlberta       | Namaka 428S DER Solar         | Solar | 25  | Sep-2019 (A) |
| EDF EN              | Hand Hills WAGF               | Wind  | 200 | Oct-2019 (A) |
| BowArk Energy       | Drywood Gas Generator         | Gas   | 38  | Oct-2019 (A) |
| Maxim Power         | Milner Change                 | Gas   | 196 | Oct-2019 (A) |
| Fortis              | West Brooks DER Solar         | Solar | 23  | Oct-2019 (A) |
| RealPart            | Calgary Area Solar            | Solar | 150 | Oct-2019 (A) |
| ATCO                | Rainbow Lake Gas              | Gas   | 79  | Oct-2019 (A) |
| ATCO Power          | Valleyview Gas                | Gas   | 32  | Oct-2019 (A) |
| Alberta Wind Energy | Old Elm & Pothole Creek       | Wind  | 60  | Oct-2019 (A) |
| Suncor              | Schuler Wind                  | Wind  | 80  | Oct-2019 (A) |
| Suncor              | Hand Hills Phase 2            | Wind  | 80  | Oct-2019 (A) |
| Suncor              | Hand Hills Solar              | Solar | 80  | Oct-2019 (A) |

|                |                             |       |      |              |
|----------------|-----------------------------|-------|------|--------------|
| Suncor         | Schuler Solar               | Solar | 80   | Oct-2019 (A) |
| Suncor         | Braconnier Wind             | Wind  | 80   | Oct-2019 (A) |
| Suncor         | Huxley Wind                 | Wind  | 50   | Oct-2019 (A) |
| Fortis         | GP Joule Canada Cluny DG    | Solar | 5    | Oct-2019 (A) |
| Fortis         | Tilley 498S DG Gas          | Gas   | 22   | Nov-2019 (A) |
| FortisAlberta  | Strathmore 151S DER Solar 1 | Solar | 18   | Nov-2019 (A) |
| FortisAlberta  | Strathmore 151S DER Solar 2 | Solar | 22.5 | Nov-2019 (A) |
| Fortis         | Conrad DER Solar 2          | Solar | 22   | Nov-2019 (A) |
| EPCOR          | WSI DG Solar                | Solar | 12   | Nov-2019 (A) |
| Spirit Pine    | Lone Pine WAGF              | Wind  | 173  | Dec-2019 (A) |
| NextEra        | Buffalo Trail Solar         | Solar | 70   | Dec-2019 (A) |
| Sequoia Energy | Schuler WAGF                | Wind  | 100  | Dec-2019 (A) |
| Northland      | Buffalo Trail               | Wind  | 100  | Dec-2019 (A) |
| FortisAlberta  | Brooks 121S DER Solar 1     | Solar | 15   | Dec-2019 (A) |
| FortisAlberta  | Brooks 121S DER Solar 2     | Solar | 15   | Dec-2019 (A) |
| Soventix       | Forestberg Area Solar       | Solar | 40   | Jan-2020 (A) |
| TransAlta      | Garden Plain Wind           | Wind  | 130  | Feb-2020 (A) |
| HEP Capital    | Alderson Solar              | Solar | 100  | Apr-2020 (A) |
| Solar Krafte   | Vauxhall                    | Solar | 150  | Apr-2020 (A) |
| Solar Krafte   | Brooks                      | Solar | 400  | Apr-2020 (A) |
| BowArk Energy  | Lanfine WAGF                | Wind  | 145  | May-2020 (A) |
| Suncor         | Forty Mile Granlea WAGF     | Wind  | 200  | Jun-2020 (A) |
| TransCanada    | Saddlebrook Solar           | Solar | 100  | Jun-2020 (A) |
| Perimeter      | Sunset Solar                | Solar | 60   | Jun-2020 (A) |

|                     |                                 |       |       |              |
|---------------------|---------------------------------|-------|-------|--------------|
| Perimeter           | Claresholm Solar                | Solar | 150   | Jun-2020 (A) |
| ENGIE               | Duchess Solar                   | Solar | 90    | Jun-2020 (A) |
| Archer              | Piikani Solar                   | Solar | 40    | Jun-2020 (A) |
| Invenergy           | Schuler Windfarm                | Wind  | 100   | Jul-2020 (A) |
| EDF EN              | Fort Saskatchewan WAGF          | Wind  | 300   | Aug-2020 (A) |
| Fortis              | 255S Vulcan Faribault Farms P/V | Solar | 13    | Aug-2020 (A) |
| Fortis              | Coaldale 254S DER Solar 3       | Solar | 22    | Aug-2020 (A) |
| Fortis              | Monarch 492S DER Solar          | Solar | 22    | Aug-2020 (A) |
| Fortis              | Stavelly 349S DER Solar         | Solar | 19    | Aug-2020 (A) |
| Pengrowth           | Cold Lake Area Energy Centre    | Gas   | 100   | Aug-2020 (A) |
| Suncor              | Forty Mile WAGF                 | Wind  | 200   | Sep-2020 (A) |
| Pattern Development | Lanfine South Wind              | Wind  | 140   | Sep-2020 (A) |
| BluEarth            | Hand Hills Wind Phase 2         | Wind  | 121.8 | Sep-2020 (A) |
| ACCEL               | Morse River Cogen               | Gas   | 107   | Sep-2020 (A) |
| Algonquin           | Willow Ridge Wind               | Wind  | 180   | Oct-2020 (A) |
| EDP Renewables      | Blue Bridge Solar               | Solar | 150   | Oct-2020 (A) |
| NextEra             | Jensen MPC Wind                 | Wind  | 400   | Oct-2020 (A) |
| Quill               | Rocky Mountain Gas              | Gas   | 295   | Oct-2020 (A) |
| NextEra             | Kitscoty MPC Wind               | Wind  | 90    | Oct-2020 (A) |
| Joss Wind           | Northern Lights                 | Wind  | 400   | Nov-2020 (A) |
| TransAlta           | Red Rock Wind                   | Wind  | 65    | Nov-2020 (A) |
| Northland           | Bow City MPC Solar              | Solar | 400   | Nov-2020 (A) |
| TransAlta           | Windrise MPC Wind               | Wind  | 220   | Nov-2020 (A) |
| TransAlta           | Ardenville Expansion Wind       | Wind  | 40    | Nov-2020 (A) |

|                |                                  |       |     |              |
|----------------|----------------------------------|-------|-----|--------------|
| Solar Krafte   | Rainier                          | Solar | 450 | Nov-2020 (A) |
| ATCO Power     | Hanna Solar                      | Solar | 120 | Nov-2020 (A) |
| NextEra        | Red Deer Battery Energy Storage  | Other | 40  | Dec-2020 (A) |
| NextEra        | Ghost Pine Battery ES System     | Other | 30  | Dec-2020 (A) |
| NextEra        | Red Deer River Solar             | Solar | 150 | Dec-2020 (A) |
| ENMAX          | Taber Wind Farm                  | Wind  | 21  | Dec-2020 (A) |
| Greengate      | Lathom Solar                     | Solar | 120 | Dec-2020 (A) |
| Greengate      | Travers Solar                    | Solar | 400 | Dec-2020 (A) |
| Enterprise     | Bighorn MPC Wind                 | Wind  | 325 | Dec-2020 (A) |
| TransAlta      | Tempest MPC Wind                 | Wind  | 115 | Dec-2020 (A) |
| PBC            | Paul Band Solar                  | Solar | 45  | Dec-2020 (A) |
| Cascade        | Combined Cycle Phase 1           | Gas   | 500 | Jan-2021 (A) |
| E.ON           | Grizzly Bear Wind Phase 2        | Wind  | 30  | Mar-2021 (A) |
| Four Rivers    | Four Rivers Wind                 | Wind  | 450 | Mar-2021 (A) |
| EDF EN         | Red Rock WAGF                    | Wind  | 250 | May-2021 (A) |
| NGCI           | Ermineskin Cree Nation MPC Solar | Solar | 100 | Jun-2021 (A) |
| EDF            | Cypress Wind                     | Wind  | 450 | Jun-2021 (A) |
| EDF            | Bull Trail MPC Wind              | Wind  | 300 | Jun-2021 (A) |
| Indigena Blood | Pe-na-koam Wind                  | Wind  | 200 | Jun-2021 (A) |
| RESC           | Oyen Wind Power Project          | Wind  | 350 | Jun-2021 (A) |
| Suncor         | Base Plant Cogen                 | Gas   | 815 | Jul-2021 (A) |
| Kineticor      | Peace River Power Upgrade        | Gas   | 125 | Sep-2021 (A) |
| Enerfin        | Winnifred MPC Wind               | Wind  | 90  | Dec-2021 (A) |

|                   |                             |       |               |              |
|-------------------|-----------------------------|-------|---------------|--------------|
| Sequoia Energy    | Oyen WAGF                   | Wind  | 100           | Dec-2021 (A) |
| Elemental Energy  | WD MPC Wind                 | Wind  | 150           | Dec-2021 (A) |
| Chephren Power    | Gas                         | Gas   | 600           | Dec-2021 (A) |
| Cascade           | Combined Cycle Phase 2      | Gas   | 400           | Jan-2022 (A) |
| FortisAlberta     | Kaybob 3 Cogen              | Gas   | 30            | Feb-2022 (A) |
| GP JOULE          | Kennedy Farm Solar          | Solar | 100           | Feb-2022 (A) |
| AHP Development   | Amisk Hydroelectric Project | Hydro | 330           | Dec-2023 (P) |
| <b>Total (MW)</b> |                             |       | <b>16,363</b> |              |

\* - (P): Power Plant application filed with AUC, (A): AESO application in process, (C): Corporate announcement

**Table 4: Generation Projects that have Announced to be Retired**

| Sponsor(s)        | Project Name   | Fuel    | Unit Capacity | Retire Date | Status  |
|-------------------|----------------|---------|---------------|-------------|---------|
| Transalta         | Sundance 1     | Coal    | 280           | Jan-2018    | Retired |
| Transalta         | Sundance 2     | Coal    | 280           | Jul-2018    | Retired |
| Valley Power      | Drayton Valley | Biomass | 11            | Sept-2018   | Retired |
| <b>Total (MW)</b> |                |         | <b>571</b>    |             |         |

## Federal Coal Compliance Schedule

In 2012, the federal government approved the *Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations*. The regulation requires that coal-fired generation units meet a GHG emissions intensity target once it reaches end of life. The AESO has adopted the federal compliance dates as retirement dates to evaluate metrics included in this report. The decision to retire a coal unit could also be impacted by several potential drivers, including the economics of plant operations, contractual agreements, and provincial and federal legislation.

The recent Climate Leadership Plan announced by the Alberta provincial government has not impacted assumptions on retirements in this report. Announcements from the government will continue to be assessed as they are released.

**Table 5: Federal Coal Compliance Schedule**

| Sponsor(s)        | Project Name   | Fuel | Unit Capacity | In Service Date | Federal Compliance Date <sup>1</sup> |
|-------------------|----------------|------|---------------|-----------------|--------------------------------------|
| ATCO              | Battle River 3 | Coal | 149           | 1969            | Dec-2019                             |
| Maxim             | HR Milner      | Coal | 144           | 1972            | Dec-2019                             |
| <b>Total (MW)</b> |                |      | <b>869</b>    |                 |                                      |

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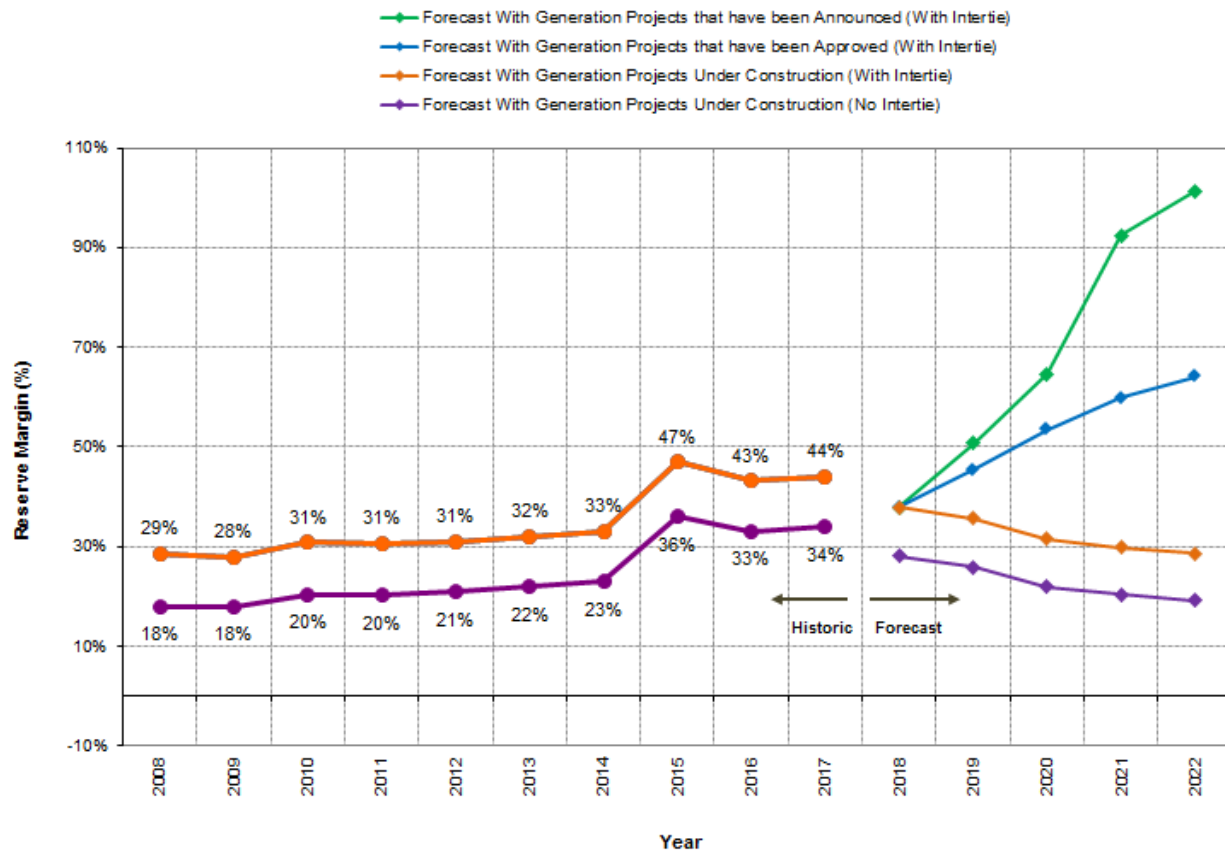
<sup>1</sup> Federal Compliance Dates are based upon the applicable provisions of the Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations, as set forth in the Canada Gazette Vol. 146, No.19.

## Reserve Margin Metric

The Reserve Margin Metric, shown in Figure 1, presents a comparison of generation supply and demand in Alberta. It is a calculation of the firm generation capacity at the time of system peak that is in excess of the system annual peak demand, expressed as a percentage of the system peak. Information on the annual peak demand within the reserve margin can be found on the AESO's [Forecasting](#) web page. Firm generation is defined as installed and future generation capacity, adjusting for seasonal hydro capacity and behind-the-fence demand and generation, and excludes wind and solar capacity. Three forecast reserve margins are presented, each with different future supply additions. The supply additions correspond to the stage of the generation projects in the New Generation Projects and Retirements Metric. The metric is graphed with and without intertie capacity in one reserve margin since full import capability may not always be available at the time of system peak demand.

Capacity from Sundance 1 and 2 has been excluded from the 2011 and 2012 reserve margin. They returned to service in late 2013.

**Figure 1: Alberta Interconnected Electric System (AIES) Reserve Margin, 2008 – 2022**

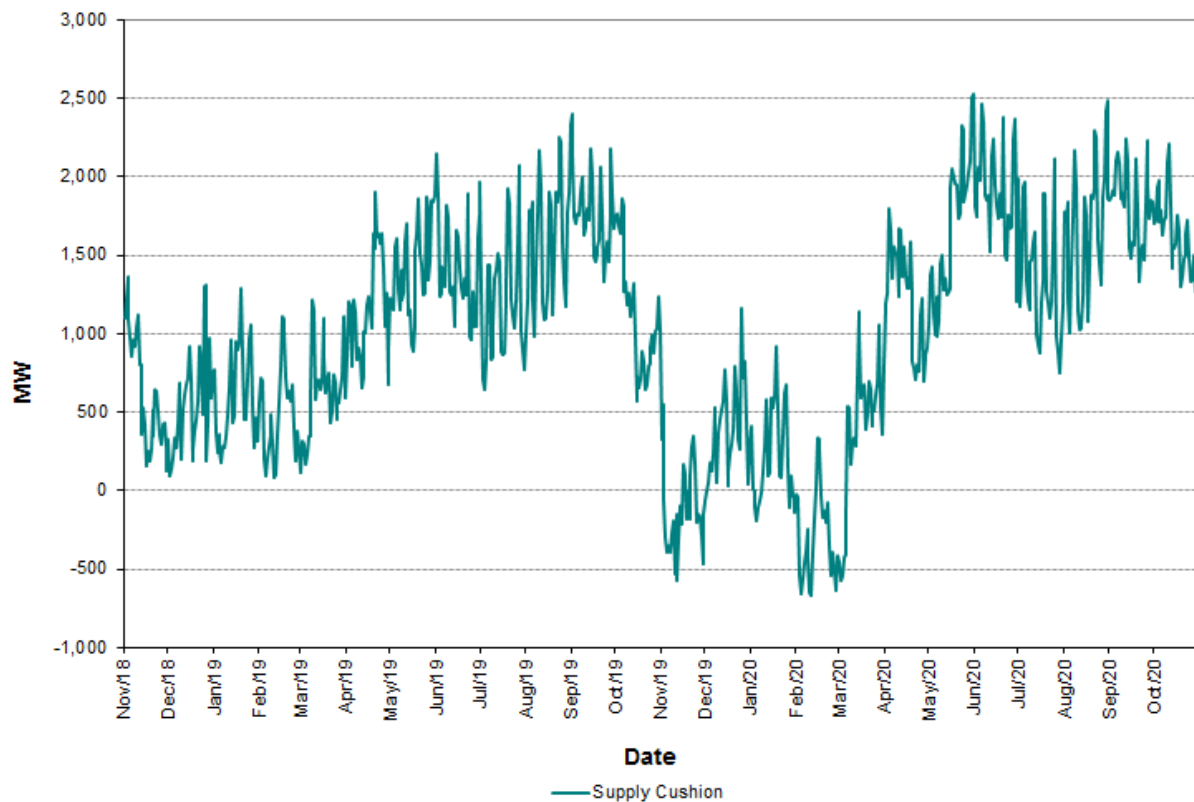




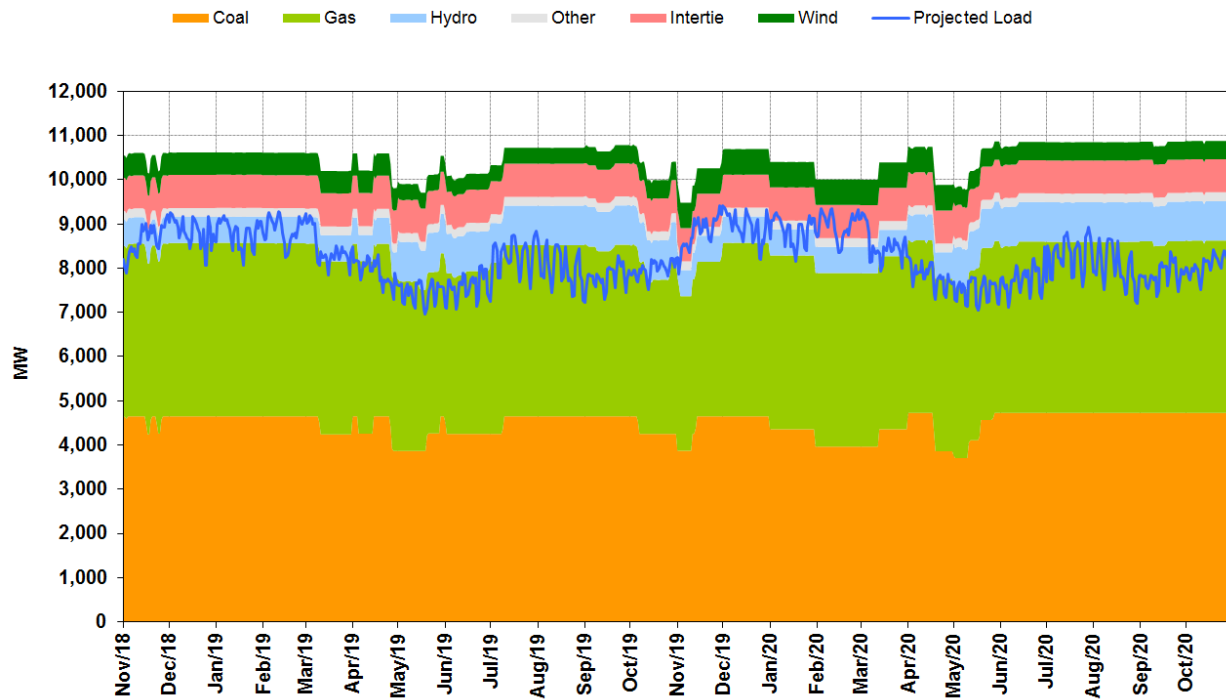
## Supply Cushion Metric

The Supply Cushion Metric provides visibility of the Alberta Interconnected Electric System’s ability to meet peak demand on a daily basis. The supply cushion is the difference between the daily available firm supply minus daily peak demand. Only existing generation and generation under construction are used within the metric. The supply cushion refines the reserve margin calculation by using daily system peak rather than annual and incorporates planned outages. Figure 2 presents the estimated daily supply cushion for the next two years. Figure 3 presents daily peak demand and firm supply by fuel type, as well as interties, wind and solar which are not included in the supply cushion calculation due to the intermittent or uncertain nature of the supply. When the supply cushion is negative in Figure 2, there is an increased level of reliance on interties and wind, as indicated in Figure 3.

**Figure 2: Alberta Interconnected Electric System (AIES) Daily Supply Cushion, Nov 1, 2018 to Oct 31, 2020**



**Figure 3: Alberta Interconnected Electric System (AIES) Daily Peak Demand and Available Supply, Nov 1, 2018 to Oct 31, 2020**



Outage information as of Oct 17th, 2018

## Two Year Probability of Supply Adequacy Shortfall Metric

The Two Year Probability of Supply Adequacy Shortfall Metric is a probabilistic assessment of encountering a supply shortfall over the next two years. It builds on the Supply Cushion Metric by incorporating the probability of wind production, forced generation outages and generation derates into the calculation of hourly firm supply. The calculation estimates, on a probabilistic basis, how much load may go without supply over the next two year period. Based on extensive consultation with stakeholders, when this unserved energy exceeds 1,600 MWh in any two year period (equivalent to one hour 800 MW shortfall in each of the two years), the AESO may take certain actions to bridge the temporary supply adequacy gap while maintaining investor confidence in the market. The total energy not served shown in Table 6 does not reach the threshold.

**Table 6: Two Year Probability of Supply Adequacy Shortfall, Nov 1, 2018 to Oct 31, 2020**

| Worst Shortfall Hour (MW) | # of Hours in Shortfall | Total Energy Not Served (MWh) |
|---------------------------|-------------------------|-------------------------------|
| 57                        | 1                       | 142                           |

*Note: Values are rounded and represent average outputs*