

Long Term Adequacy Metrics

May 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.

Summary of Changes since Previous Report

New Generation and Retirements Metric

Projects completed and removed from list:

- Cenovus Christina Lake Phase 1F
- Fortis Brooks DER Solar
- Suncor Fort Hills 1
- Suncor Fort Hills 2

Generation Projects moved to “Active Construction”:

- N/A

Generation projects moved to “Regulatory Approval”:

- Fortis Buffalo Atlee Cluster 1 WAGF
- Fortis Buffalo Atlee Cluster 3 WAGF
- RESC McLaughlin WAGF
- Capital Power Halkirk 2
- Imperial Oil Edmonton 95S Cogen

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

- Cascade Combined Cycle Phase 1
- Cascade Combined Cycle Phase 2
- BluEarth Hand Hills Wind Phase 2
- Pengrowth Cold Lake Area Energy Centre
- FortisAlberta Willesdengreen DER Gas Turbine
- FortisAlberta Taber 83S DER Solar
- FortisAlberta Empress 394S DER Solar
- TransAlta Windrise MPC Wind
- TransCanada Saddlebrook Solar
- Algonquin Willow Ridge Wind
- TransAlta Ardenville Expansion Wind
- ATCO Vilna 777S DER Solar
- FortisAlberta Bullshead 523S DER Solar 1

- FortisAlberta Bullshead 523S DER Solar 2
- Imperial Oil Edmonton 95S Cogen
- FortisAlberta Namaka 428S DER Solar
- ATCO Three Hills 770S DER Solar 1
- ATCO Three Hills 770S DER Solar 2
- ATCO Michichi Creek 802S DER Solar
- E.ON Grizzly Bear Wind Phase 2
- Four Rivers Four Rivers Wind
- Horseshoe Power GP Ltd Gull Lake Cogen

Generation projects that have been removed:

- Gengrowth Dunmore Wind
- Gengrowth Hilda Wind
- Invenergy Kirkcaldy Solar
- Fortis Fort MacLeod DER Solar
- Fortis Taber DER Solar
- TransAlta Ardenville Expansion Wind

Other changes to generation projects:

| Project | Change |
|------------------------------------------|-----------------------------------|
| Joss Wind – Jenner Phase 2 | New ISD of May-2019 from Dec-2018 |
| Joss Wind – Jenner Wind | New ISD of Sep-2019 from Mar-2019 |
| Pteragen – Peace Butte | New ISD of Dec-2019 from Mar-2019 |
| Alberta Wind Energy – Windy Point | New ISD of Sep-2019 from Mar-2019 |
| EDF EN – Red Rock WAGF | New ISD of May-2019 from Dec-2020 |
| EDP Renewables – Sharp Hills Wind | New ISD of Aug-2019 from Jun-2020 |
| BowArk Energy – Queenstown Power Plant | New ISD of Oct-2020 from Nov-2019 |
| Capital Power – Genesee 4 | New ISD of Feb-2020 from Jun-2019 |
| EDF EN – Cypress WAGF | New ISD of Mar-2019 from Dec-2021 |
| Inter Pipeline – Strathcona Cogeneration | New ISD of Aug-2020 from May-2019 |
| Naturener – Wild Rose 2 | New ISD of Sep-2019 from Jul-2019 |
| Kineticor – Peace River Power Generator | New ISD of Sep-2021 from Jan-2020 |

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|-----------------------------------------------|-----------------------------------|
| Joss Wind – Northern Lights | New ISD of Nov-2020 from Oct-2019 |
| BowArk Energy – Lanfine WAGF | New ISD of May-2020 from Apr-2020 |
| Fortis – 421S Hays DG PV | New ISD of Jun-2019 from Jul-2018 |
| Fortis – 257S Hull P/V | New ISD of Jun-2019 from Mar-2019 |
| Fortis – 158S Vauxhall DG PV | New ISD of Jun-2019 from Oct-2018 |
| Fortis – Bullshead 523S Solar DER | New ISD of Jul-2019 from Jul-2018 |
| Suncor – Hand Hills | New ISD of Sep-2019 from Oct-2019 |
| Alberta Wind Energy – Old Elm & Pothole Creek | New ISD of Jun-2020 from May-2019 |
| Fortis – Spring Coulee 385S Solar DG | New ISD of Nov-2018 from Dec-2018 |
| BowArk Energy – Drywood Gas Generator | New ISD of Apr-2019 from Dec-2018 |
| Kineticor – Peace River Power Upgrade | New ISD of Sep-2021 from Aug-2018 |
| Fortis – Stavelly 349S DER Solar Part 1 | New ISD of Jul-2018 from Oct-2019 |
| Fortis – Krafte 257S Hull DER Solar | New ISD of Nov-2018 from May-2019 |
| TransCanada – Scoria 318S Cogen | New ISD of Jan-2019 from Sep-2020 |
| ENGIE – Duchess Solar | New ISD of Jun-2020 from Jul-2019 |
| Suncor – Forty Mile Granlea WAGF | New ISD of Sep-2019 from Jan-2019 |
| Capital Power – Halkirk 2 | New ISD of Dec-2020 from Feb-2018 |
| Fortis – Conrad DER Solar | New ISD of Dec-2018 from Apr-2020 |
| Fortis – Vauxhall Solar DER | New ISD of Nov-2018 from Apr-2020 |
| RealPart – Calgary Area Solar | New ISD of Nov-2019 from May-2019 |
| Fortis – Empress DER Solar | New ISD of May-2019 from May-2019 |
| Fortis – Conrad DER Solar 2 | New ISD of Jul-2019 from Jan-2019 |
| NextEra – Buffalo Trail Solar | New ISD of Dec-2019 from Mar-2020 |

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|---------------------------------------------|-----------------------------------|
| EPCOR – WSI DG Solar | New ISD of Jan-2019 from Nov-2020 |
| Eolectric – Welsch Wind | New ISD of Dec-2019 from Mar-2019 |
| Pattern Development – Lanfine South Wind | New ISD of Apr-2020 from Jan-2020 |
| Fortis – Coaldale Cogen DER | New ISD of Feb-2020 from Aug-2020 |
| Capital Power – Whitla Wind Power - Phase 2 | New ISD of Sep-2020 from Jan-2019 |
| FortisAlberta – Strathmore 151S DER Solar 1 | New ISD of Nov-2019 from Sep-2020 |
| FortisAlberta – Strathmore 151S DER Solar 2 | New ISD of Nov-2019 from Mar-2019 |

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 91 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* |
|---------------------|--------------|------|----------------|----------|
| Medicine Hat | CMH 16 | Gas | 43 | May-2018 |
| BluEarth Renewables | Brooks JBS | Gas | 15 | Oct-2018 |
| Total (MW) | | | 58 | |

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

Table 2: Generation Projects with Regulatory Approval

| Sponsor(s) | Project Name | Fuel | Unit Capacity | ISD |
|---------------------|------------------------------|-------|---------------|----------|
| Fortis | Genalta Bellshill | Gas | 5 | Jun-2018 |
| Enbridge | WhiteTail Peaking | Gas | 200 | Oct-2018 |
| NextEra | Heritage Wind | Wind | 291 | Oct-2018 |
| 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 |
| Fortis | Buffalo Atlee Cluster 3 WAGF | Wind | 17 | Mar-2019 |
| Imperial Oil | Edmonton 95S Cogen | Gas | 46.5 | Mar-2019 |
| Maxim Power | HR Milner Expansion Gas | Gas | 90 | May-2019 |
| BluEarth Renewables | Burdett DG PV | Solar | 20 | May-2019 |

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|---------------------|-------------------------------|---------|------|----------|
| BluEarth Renewables | Yellow Lake DG PV | Solar | 19 | 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 |
| Naturener | Wild Rose 1 | Wind | 218 | Jul-2019 |
| BluEarth Renewables | Hand Hills Wind Farm | Wind | 80 | Sep-2019 |
| E.ON | Grizzly Bear | Wind | 120 | Sep-2019 |
| Suncor | Hand Hills | Wind | 80 | Sep-2019 |
| ATCO | Three Hills 770S DER Solar 1 | Solar | 25 | Sep-2019 |
| Joss Wind | Jenner Wind | Wind | 120 | Sep-2019 |
| Alberta Wind Energy | Windy Point | Wind | 50.4 | Sep-2019 |
| Naturener | Wild Rose 2 | Wind | 192 | Sep-2019 |
| Mustus Energy | Mustus Biomass | Biomass | 41 | Sep-2019 |
| ATCO | Heartland Power Station 1 | Gas | 510 | Nov-2019 |
| Enel | Castle Rock Ridge - Phase 2** | Wind | 30.6 | Nov-2019 |
| Pteragen | Peace Butte | Wind | 120 | Dec-2019 |
| RESC | McLaughlin WAGF | Wind | 47 | Dec-2019 |
| Eolectric | Welsch Wind | Wind | 69 | Dec-2019 |
| Fortis | Coaldale Cogen DER | Gas | 6 | Feb-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 |

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|-------------------|-----------------------------------|-------|--------------|----------|
| Inter Pipeline | Strathcona Cogeneration | Gas | 96 | Aug-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 |
| 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 | TBD |
| Altagas | Kent Generation-Phase 1 | Gas | 100 | TBD |
| Enmax | Bonnybrook | Gas | 168 | TBD |
| TransCanada | Saddlebrook | Gas | 350 | TBD |
| TransAlta | Sundance 7 | Gas | 850 | TBD |
| Syncrude | Mildred Lake (Base Plant)-Phase 1 | Gas | 85 | TBD |
| PetroChina | Mackay-Phase 1 | Gas | 85 | TBD |
| Maxim Power | Milner 2 Phase 1 | Gas | 260 | TBD |
| Maxim Power | Milner 2 Phase 2 | Gas | 260 | TBD |
| Nexen | Long Lake South | Gas | 85 | TBD |
| Imperial Oil | Kearl - Phase 2 | Gas | 100 | TBD |
| Imperial Oil | Kearl - Phase 3 | Gas | 35 | TBD |
| Kronos Solar | Oyen Solar Park | Solar | 10 | TBD |
| NAT3 | Jenner DG | Gas | 20 | TBD |
| Total (MW) | | | 7,726 | |

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 |
|----------------|---------------------------------|-------|---------------|--------------|
| Fortis | 255S Vulcan Faribault Farms P/V | Solar | 13 | Jul-2018 (A) |
| Fortis | Tilley 498S DG Gas | Gas | 22 | Jul-2018 (A) |
| Fortis | Coaldale 254S DG Gas Part 1 | Gas | 11 | Jul-2018 (A) |
| Fortis | Coaldale 254S DG Gas Part 2 | Solar | 11 | Jul-2018 (A) |
| Fortis | Monarch 492S DG Gas Part 1 | Gas | 11 | Jul-2018 (A) |
| Fortis | Monarch 492S DG Gas Part 2 | Solar | 11 | Jul-2018 (A) |
| Fortis | Stavelly 349S DER Solar Part 1 | Gas | 10 | Jul-2018 (A) |
| Fortis | Stavelly 349S DER Solar Part 2 | Solar | 9 | Jul-2018 (A) |
| NextEra | Ghost Pine Battery ES System | Other | 30 | Sep-2018 (A) |
| Fortis | Gleichen DG Solar | Solar | 17 | Oct-2018 (A) |
| Fortis | GP Joule Canada Cluny DG | Solar | 5 | Oct-2018 (A) |
| Fortis | Burdett 368S DG P/V | Solar | 10 | Oct-2018 (A) |
| Fortis | Spring Coulee 385S Solar DG | Solar | 29 | Nov-2018 (A) |
| Fortis | Stirling 67S DG P/V | Solar | 17 | Nov-2018 (A) |
| Fortis | Krafte 257S Hull DER Solar | Solar | 25 | Nov-2018 (A) |
| Fortis | Vauxhall Solar DER | Solar | 22 | Nov-2018 (A) |
| Fortis | Namaka DER Solar | Solar | 20 | Nov-2018 (A) |
| NextEra | Red Deer Battery Energy Storage | Other | 40 | Dec-2018 (A) |
| Fortis | Warner 344S DER Solar | Solar | 20 | Dec-2018 (A) |
| Fortis | Conrad DER Solar | Solar | 23 | Dec-2018 (A) |
| Sequoia Energy | Oyen WAGF | Wind | 100 | Dec-2018 (A) |

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|-------------------|--------------------------------|-------------|------|--------------|
| Fortis | Enchant 447S DER Solar | Solar | 74 | Dec-2018 (A) |
| Fortis | West Brooks DER Solar | Solar | 23 | Dec-2018 (A) |
| FortisAlberta | Willesdengreen DER Gas Turbine | Gas Turbine | 10 | Dec-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) |
| Horseshoe Power | Gull Lake Cogen | Gas | 6 | Jan-2019 (P) |
| EPCOR | WSI DG Solar | Solar | 12 | Jan-2019 (A) |
| Fortis | Hays 421S DER Solar | Solar | 10 | Jan-2019 (A) |
| TransCanada | Scoria 318S Cogen | Gas | 46 | Jan-2019 (A) |
| Archer | Piikani Solar | Solar | 40 | Jan-2019 (A) |
| Enterprise | Prosperity WAGF | Wind | 175 | Mar-2019 (A) |
| EDF EN | Cypress WAGF | Wind | 250 | Mar-2019 (A) |
| ATCO | Coronation 802S Solar DG | Solar | 10 | Mar-2019 (A) |
| ATCO | Vilna 777S DER Solar | Solar | 22.7 | Mar-2019 (A) |
| FortisAlberta | Bullshead 523S DER Solar 1 | Solar | 20 | Mar-2019 (A) |
| Enterprise | Bighorn WAGF | Wind | 325 | 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) |
| Kronos Solar | Heisler Solar Park | Solar | 20 | Mar-2019 (P) |

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|---------------|-------------------------------|-------|------|--------------|
| Kronos Solar | Veteran Solar Park | Solar | 10 | Mar-2019 (P) |
| BowArk Energy | Drywood Gas Generator | Gas | 38 | 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) |
| Keyera | West Pembina 359S Gas Turbine | Gas | 12 | May-2019 (A) |
| EDF EN | Red Rock WAGF | Wind | 250 | May-2019 (A) |
| Suncor | Forty Mile WAGF | Wind | 200 | Jun-2019 (A) |
| Suncor | Forty Mile P/V | Solar | 80 | Jun-2019 (A) |
| Enel | Riverview Wind Farm** | Wind | 115 | Jun-2019 (A) |
| Fortis | 257S Hull P/V | Solar | 16 | Jun-2019 (A) |
| RESC | Forty Mile WAGF | Wind | 400 | Jun-2019 (A) |
| RESC | Oyen Wind Power Project | Wind | 350 | Jun-2019 (A) |

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|------------------|-------------------------------|-------|-------|--------------|
| Irma | Wainwright Wind Project | Wind | 90 | Jul-2019 (A) |
| Greengate Power | Wheatland Wind | Wind | 120 | Jul-2019 (A) |
| Greengate Power | Stirling Wind | Wind | 115 | Jul-2019 (A) |
| Invenergy | Schuler Windfarm | Wind | 100 | Jul-2019 (A) |
| Imperial Oil | Aspen SAGD Project | Gas | 30 | Jul-2019 (A) |
| Fortis | Bullshead 523S Solar DER | Solar | 18 | Jul-2019 (A) |
| NextEra | Red Deer River Solar | Solar | 150 | Jul-2019 (A) |
| Fortis | Conrad DER Solar 2 | Solar | 22 | Jul-2019 (A) |
| Fortis | Jenner 275S DER | Gas | 24 | Jul-2019 (A) |
| Fortis | Carseland Solar | Solar | 12 | Jul-2019 (A) |
| Greengate Power | Paintearth Wind Farm | Wind | 150 | Jul-2019 (A) |
| Renewable Energy | Rattlesnake Wind | Wind | 100 | Jul-2019 (A) |
| EDP Renewables | Sharp Hills Wind** | Wind | 300 | Aug-2019 (A) |
| Fortis | Brooks DER Solar | Solar | 22 | Aug-2019 (A) |
| Capital Power | Whitla Wind Power - Phase 1** | Wind | 201.6 | Sep-2019 (A) |
| TransAlta | Garden Plain Wind | Wind | 130 | Sep-2019 (A) |
| Altagas | Glenridge Wind | Wind | 150 | Sep-2019 (A) |
| Acciona Energy | Glenwood Area Wind | Wind | 120 | Sep-2019 (A) |
| Suncor | Forty Mile Granlea WAGF | Wind | 200 | Sep-2019 (A) |
| ATCO | Kneehill | Solar | 25 | Sep-2019 (P) |
| ATCO | Three Hills 770S DER Solar 2 | Solar | 25 | Sep-2019 (A) |
| ATCO | Michichi Creek 802S DER Solar | Solar | 25 | 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) |
| TransAlta | Cowley Ridge 1 Wind | Wind | 21 | Sep-2019 (A) |
| FortisAlberta | Namaka 428S DER Solar | Solar | 25 | Sep-2019 (A) |
| EDF EN | Hand Hills WAGF | Wind | 200 | Oct-2019 (A) |
| ENMAX | Taber Wind Farm | Wind | 21 | Oct-2019 (A) |
| FortisAlberta | Bullshead 523S DER Solar 2 | Solar | 20 | Oct-2019 (A) |
| Suncor | Hand Hills Solar | Solar | 80 | Oct-2019 (A) |
| Suncor | Schuler Solar | Solar | 80 | Oct-2019 (A) |
| Suncor | Schuler Wind | Wind | 80 | Oct-2019 (A) |
| Suncor | Hand Hills Phase 2 | Wind | 80 | Oct-2019 (A) |
| Suncor | Braconnier Wind | Wind | 80 | Oct-2019 (A) |
| Suncor | Huxley Wind | Wind | 50 | Oct-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) |
| RealPart | Calgary Area Solar | Solar | 150 | 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) |
| Soventix | Forestberg Area Solar | Solar | 40 | Jan-2020 (A) |
| Turning Point Gen | Canyon Creek PHES | Other | 125 | Jan-2020 (A) |
| Pengrowth | Cold Lake Area Energy Centre | Gas | 100 | Mar-2020 (A) |
| Aira | Forty Mile Wind | Wind | 125 | Mar-2020 (A) |
| Solar Krafte | Vauxhall | Solar | 150 | Apr-2020 (A) |

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|---------------------|-----------------------------|-------|-------|--------------|
| Solar Krafte | Brooks | Solar | 400 | Apr-2020 (A) |
| HEP Capital | Alderson Solar | Solar | 100 | Apr-2020 (A) |
| Pattern Development | Lanfine South Wind | Wind | 140.4 | Apr-2020 (A) |
| BowArk Energy | Lanfine WAGF | Wind | 145 | May-2020 (A) |
| Four Rivers | Four Rivers Wind | Wind | 450 | May-2020 (A) |
| E.ON | Grizzly Bear Wind Phase 2 | Wind | 30 | May-2020 (A) |
| TransCanada | Saddlebrook Solar | Solar | 100 | Jun-2020 (A) |
| Alberta Wind Energy | Old Elm & Pothole Creek | Wind | 60 | Jun-2020 (A) |
| Perimeter | Sunset Solar | Solar | 250 | Jun-2020 (A) |
| Perimeter | Claresholm Solar | Solar | 150 | Jun-2020 (A) |
| ENGIE | Duchess Solar | Solar | 90 | Jun-2020 (A) |
| EDF EN | Fort Saskatchewan WAGF | Wind | 300 | Aug-2020 (A) |
| Capital Power | Whitla Wind Power - Phase 2 | Wind | 97.2 | Sep-2020 (A) |
| City of Calgary | Bonnybrook Cogen Expansion | Gas | 10 | Sep-2020 (P) |
| Algonquin | Willow Ridge Wind | Wind | 180 | Oct-2020 (A) |
| TransAlta | Ardenville Expansion Wind | Wind | 40 | Oct-2020 (A) |
| Joss Wind | Northern Lights | Wind | 400 | Nov-2020 (A) |
| TransAlta | Red Rock Wind | Wind | 65 | Nov-2020 (A) |
| TransAlta | Windrise MPC Wind | Wind | 220 | Nov-2020 (A) |
| Solar Krafte | Rainier | Solar | 450 | Nov-2020 (A) |
| Greengate | Lathom Solar | Solar | 120 | Dec-2020 (A) |
| Greengate | Travers Solar | Solar | 400 | Dec-2020 (A) |
| Suncor | Forty Mile Granlea Solar | Solar | 100 | Dec-2020 (A) |
| BluEarth | Hand Hills Wind Phase 2 | Wind | 121.8 | Dec-2020 (A) |

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|-------------------|-----------------------------|----------------|---------------|--------------|
| Cascade | Combined Cycle Phase 2 | Combined Cycle | 500 | Jan-2021 (A) |
| Suncor | Cogen Project | Gas | 700 | Jul-2021 (A) |
| Kineticor | Peace River Power Upgrade | Gas | 125 | Sep-2021 (A) |
| Cascade | Combined Cycle Phase 1 | Gas | 400 | Jan-2022 (A) |
| AHP Development | Amisk Hydroelectric Project | Hydro | 330 | Dec-2023 (C) |
| Total (MW) | | | 14,374 | |

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

** - 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 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 |
| Total (MW) | | | 280 | | |

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 ¹ |
|-------------------|----------------|------|---------------|-----------------|--------------------------------------|
| ATCO | Battle River 3 | Coal | 149 | 1969 | Dec-2019 |
| Maxim | HR Milner | Coal | 144 | 1972 | Dec-2019 |
| TransAlta | Sundance 2 | Coal | 280 | 1973 | Dec-2021 ^{2,3} |
| Total (MW) | | | 869 | | |

¹ 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.

² Federal regulations stipulate that all coal plants built before 1975 must cease to operate on coal by the end of 2019, which includes Sundance Units 1 and 2. Given that Sundance Unit 1 will be shut down two years early, TransAlta intends to apply to the federal Minister of Environment to extend the life of Sundance Unit 2 from 2019 to 2021. <http://www.transalta.com/newsroom/news-releases/transalta-board-approves-plan-for-accelerating-transition-to-clean-power-in-alberta/>

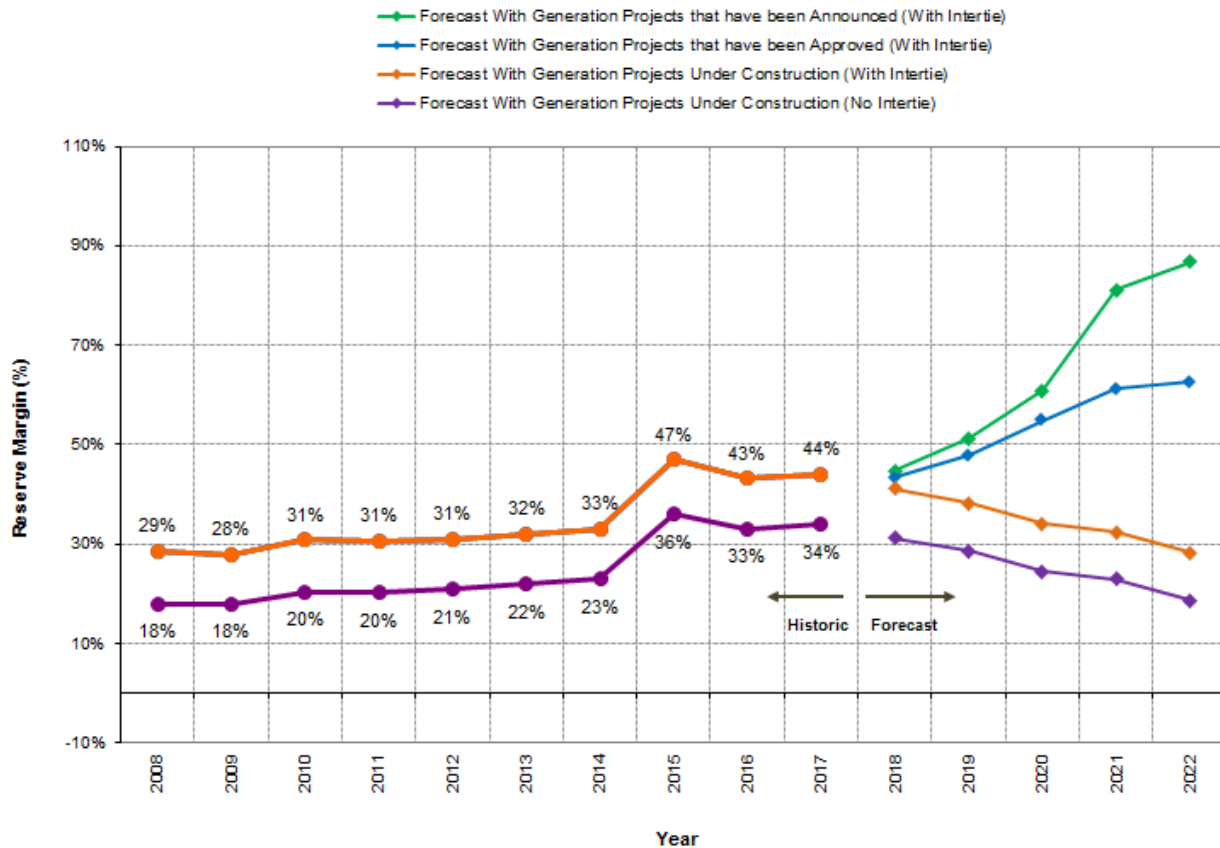
³ After June 30, 2015, a unit that is permanently shut down ahead of its end-of-useful- life date may swap any leftover time to its useful life to one or many other unit(s) provided that all units have the same owner, are in the same province and the total potential electricity production over the period being swapped is equivalent. <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/regulations/coal-fired-electricity-generation.html>

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, May 1, 2018 to Apr 30, 2020

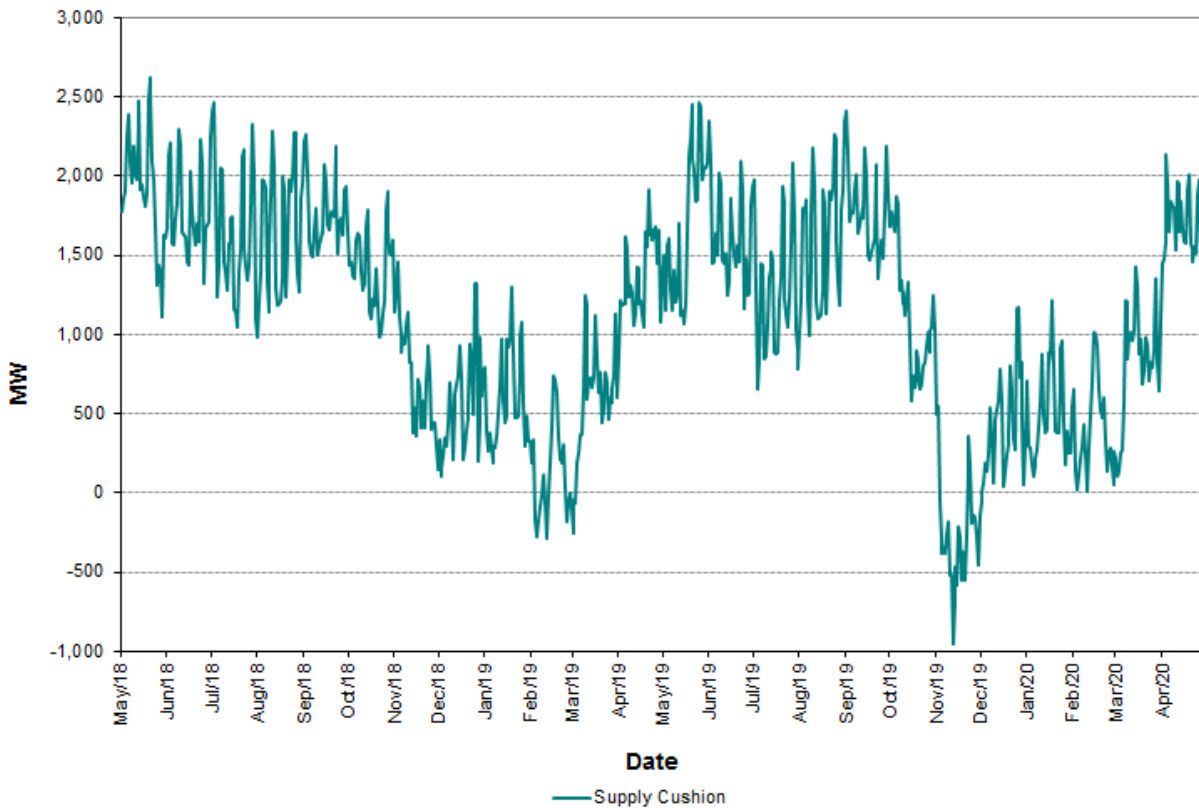
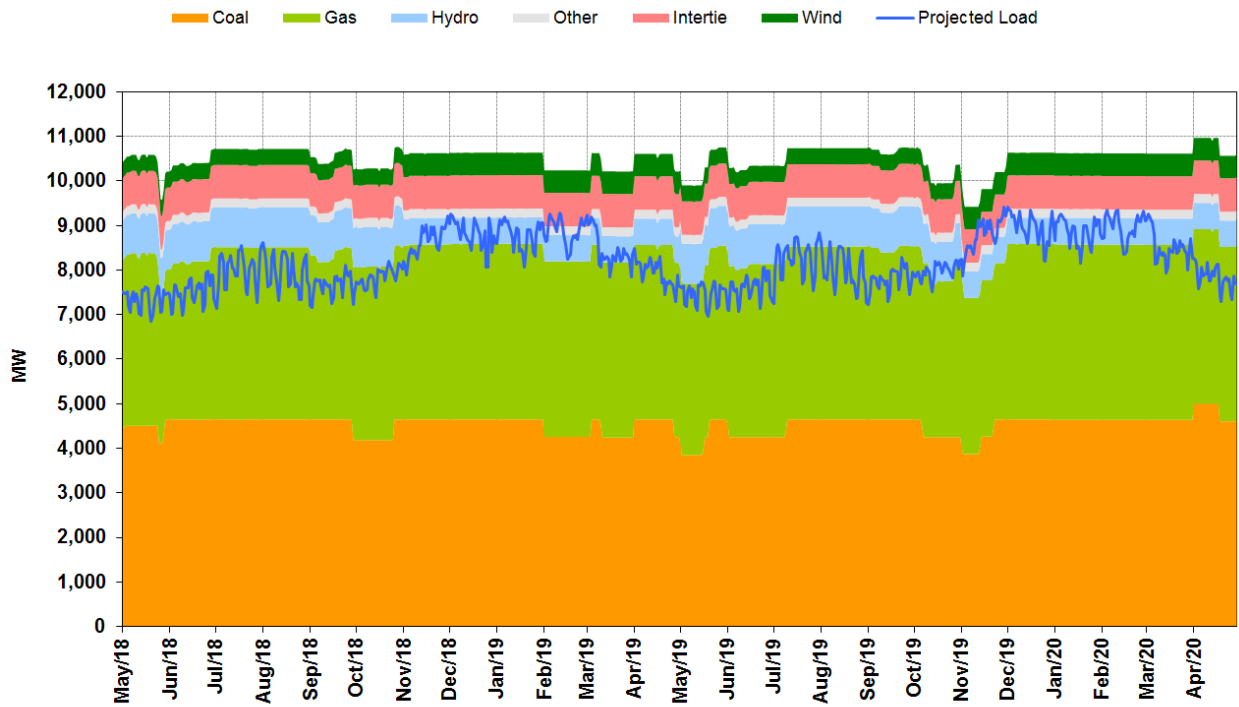


Figure 3: Alberta Interconnected Electric System (AIES) Daily Peak Demand and Available Supply, May 1, 2018 to Apr 30, 2020



Outage information as of Apr 26, 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, May 1, 2018 to Apr 30, 2020

| Worst Shortfall Hour (MW) | # of Hours in Shortfall | Total Energy Not Served (MWh) |
|---------------------------|-------------------------|-------------------------------|
| 46 | 1 | 91 |

Note: Values are rounded and represent average outputs