Version 3.0 to Final Blacklines of the Energy Storage ISO Rule Amendments and Definitions

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ISO Rules
Part 100 General
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Section 103.14 Waivers and Variances

~~***The amendments in this draft reflect changes to incorporate storage into the existing version of Section 103.14. A proposed new version of Section 103.14 was posted with ISO Rules Red Tape Administrative Amendments on Jan 17, 2023. These changes will be filed in March 2023. The AESO will reconcile proposed amendments across the two versions based on the outcome of the Commission's process.***~~

Applicability

1 Section 103.14 applies to:

(a) a **market participant**, including:

(i) a **legal owner**;

(ii) an **operator**; and

(iii) a **pool participant**; and

(b) the **ISO**.

Requirements

Applicable ISO rules

2(1) The **ISO** must consider a request for either one or both of a waiver and variance to any requirement in the following:

(a) Section 304.3 of the **ISO rules**, *Wind and Solar Power Ramp Up Management*;

(b) Section 304.9 of the **ISO rules**, *Wind and Solar Aggregated ~~Generating~~ Facility Forecasting*;

(c) any Section in Division 503, *Technical& Operating Requirements* of Part 500, *Facilities* of the **ISO rules**; and

(d) any predecessor document to the **ISO rules** set out in subsections 2(a) through (c).

(2) The **ISO** may either grant, in whole or in part, or deny a request for a waiver or variance submitted in accordance with this Section 103.14.

Grounds for requesting a waiver or variance

3(1) A **market participant** may request either one or both of a waiver and variance to any of the requirements set out in the **ISO rules** or predecessor documents listed in subsection 2.

(2) A **market participant** must provide grounds for requesting a waiver or variance which must be the grounds specified in the applicable **ISO rule** or predecessor documents or, where the grounds are not specified, must include one or more of the following circumstances where compliance with the requirements of the subject **ISO rule**:

(a) is not technically possible or is precluded by technical limitations;

(b) is operationally infeasible;

(c) is operationally unnecessary to achieve the intended purpose or outcome of the **ISO rule**;

(d) cannot be achieved by the required compliance date regardless of good faith efforts by the **market participant** which does not include a failure to appropriately plan;

(e) would pose a safety risk or safety issue;

(f) would conflict with a separate statutory or regulatory requirement that is applicable and cannot be waived or exempted;

(g) would require the incurrence of costs that significantly outweigh the benefits achieved or would result in severe economic hardship;

(h) could be achieved in an alternate timeframe that is reasonable to consider in light of other relevant factors, including upcoming scheduled maintenance, and anticipated facility upgrades;

(i) would have suboptimal results compared with the use of alternate technology that would meet or exceed the objectives of the subject **ISO rule**; and

(j) does not allow for testing the application of technology that was not considered during the development of the requirements.

Criteria for evaluating a request

4 The **ISO** must be satisfied that the grounds provided are sufficient and use one or more of the following criteria to evaluate any request for a waiver or variance:

(a) criteria already specified in the applicable **ISO rule**;

(b) technical feasibility;

(c) operational feasibility and burden;

(d) safety;

(e) economic impacts;

(f) material impacts on a fair, efficient, and openly competitive market;

(g) whether appropriate mitigation measures, mitigation plans, or remediation plans can be or are put in place; and

(h) the **reliability** of the **interconnected electric system**.

Submission of Information

5 A **market participant** must:

(a) make a request for a waiver or variance to the **ISO** in writing in the form the **ISO** specifies;

(b) respond to requests from the **ISO** for additional information or for the submission of a revised request; and

(c) ~~advise~~notify the **ISO** as soon as practicable upon becoming aware of a material change in the facts or circumstances underlying a request.

Evaluation Process

6 The **ISO** must:

(a) acknowledge receipt of a request for a waiver or variance;

(b) request any additional information it requires to complete the evaluation of the request;

(c) provide updates on progress;

(d) provide a written decision to the **market participant**; and

(e) if it denies the request, give reasons.

Content of a waiver or variance

7 The **ISO** must include the effective date in an approved waiver or variance and any of the following as applicable:

(a) expiry date;

(b) mitigation or remediation plans, including milestones;

(c) reporting requirements; and

(d) any other terms and conditions the **ISO** considers necessary.

Ongoing management of a waiver or variance

8(1) A **market participant** must, as soon as ~~reasonably~~ practicable, notify the **ISO** of any material change to the facts or circumstances underlying the approval of a waiver or variance.

(2) A **market participant** may transfer a waiver or variance with the **ISO**'s written consent which consent will not be unreasonably withheld.

(3) The **ISO** may amend or revoke a waiver or variance upon reasonable notice if:

(a) there is a material change to the facts or circumstances underlying the approval of the waiver or variance; or

(b) the **market participant** does not fulfill the terms or conditions of the approval.

Revision History

Date	Description
20xx-xx-xx	
2023-03-31	Updated to align with current AESO drafting principles.
2019-12-11	Initial release.

ISO Rule
Part 200 Markets
Division 201 General
Section 201.7 Dispatches

~~***The amendments in this draft reflect changes to incorporate storage into the existing version of Section 201.7. A proposed new version of Section 201.7 was posted with ISO Rules Red Tape Administrative Amendments on Jan 17, 2023. These changes will be filed in March 2023. The AESO will reconcile proposed amendments across the two versions based on the outcome of the Commission's process.***~~

Applicability

1 Section 201.7 applies to:

(a) a **pool participant**; and

(b) the **ISO**.

Requirements

Issuing Dispatches

2(1) The **ISO** may issue a **dispatch** to a **pool participant**.

(2) The **ISO** may issue a **dispatch** verbally or electronically.

Requirement to Comply

3(1) A **pool participant** must comply with a **dispatch** it receives subject to any other **ISO rule** or **reliability standard** and the exceptions in subsections 3(2).

(2) A **pool participant** that is a **legal owner** or **operator** of a **pool asset**, must comply with a **dispatch** it receives subject to the following exceptions:

(a) it considers that a real and substantial risk of damage to its **pool asset** could result if it complied with the **dispatch**;

(b) it considers that a real and substantial risk to the safety of its employees or the public could result if it complied with the **dispatch**;

(c) it considers that a real and substantial risk of undue injury to the environment could result if it complied with the **dispatch**;

(d) it has received verbal authorization from the **ISO** to vary the requirements of the **dispatch** during **commissioning** and testing in accordance with any one or all of Section 504.3 of the **ISO rules**, *Coordinating Energization, Commissioning and Ancillary Services Testing*, Section 504.4 of the **ISO rules**, *Coordinating Operational* Testing, Section 505.3 of the **ISO rules**, *Coordinating Synchronization, Commissioning, WECC Testing and Ancillary Services Testing*, and Section 505.4 of the **ISO rules**, *Coordinating Operational Testing*; or

(e) those exceptions set out in subsections 5 and 6 of Section 203.4 of the **ISO rules**, *Delivery Requirements for Energy*~~; or~~.

(f) those exceptions set out in subsection 4 of Section 203.5 of the **ISO rules**, *Consumption Requirements for Bids.*

Report Inability to Acknowledge a Dispatch

4(1) If a **pool participant** is unable to acknowledge a **dispatch** electronically due to an unavailability at its facilities of the Automated Dispatch and Messaging System or other electronic or communication systems, then the **pool participant** must verbally notify the **ISO** of the unavailability immediately after becoming aware of the unavailability and as soon as practicable, must also:

(a) provide the reasons for the unavailability;

(b) provide an estimate of the duration of the unavailability;

(c) provide the details of an action plan to resolve the unavailability; and

(d) notify the **ISO** when the unavailability is over.

(2) A **pool participant** must, if the unavailability is longer than expected, keep the **ISO** updated with current information regarding the expected duration of the unavailability.

Acknowledging Dispatches

5 A **pool participant** must acknowledge receipt of a **dispatch**:

(a) in the case of an automated message and unless the **pool participant** has notified the **ISO** of an unavailability in accordance with subsection 4(1)(a) by responding via the Automated Dispatch and Messaging System within 2 minutes ~~of~~for an intra-Alberta transaction;

(b) in the case of a contract **load shed service** for imports, within the time frame set out in the contract; or

(c) in the case of a voice **dispatch**, by repeating the **dispatch** to the **ISO**.

Revision History

Date	Description
20xx-xx-xx	
2023-03-31	Updated to align with current AESO drafting principles.
2014-07-02	Updated the references in subsection 3(2)(d) to the energization, commissioning and testing sections of the ISO rules; deleted the word “outages” in subsections 4 and 5 and replaced it with “unavailability”.
2013-01-08	Initial Release

ISO Rules
Part 300 System Reliability and Operations
Division 304 Routine Operations
Section 304.3 Wind and Solar Power Ramp Up Management

Applicability

1(1) Subject to subsections 1(2) and 1(3), Section 304.3 applies to:

(a) the **legal owner** of an **aggregated facility** containing wind or solar resources that:

(i) is directly connected to the **interconnected electric system** or to an electric system within the **service area** of the City of Medicine Hat, including an **aggregated facility** containing wind or solar resources situated within an industrial complex that is directly connected to the **interconnected electric system** or to an electric system within the **service area** of the City of Medicine Hat; and

(ii) has a **gross real power** capability greater than or equal to 5 MW;

(b) the **operator** of an **aggregated facility** containing wind or solar resources that:

(i) is directly connected to the **interconnected electric system** or to an electric system within the **service area** of the City of Medicine Hat, including an **aggregated facility** containing wind or solar resources situated within an industrial complex that is directly connected to the **interconnected electric system** or to an electric system within the **service area** of the City of Medicine Hat; and

(ii) has a **gross real power** capability greater than or equal to 5 MW; and

(c) the **ISO**.

(2) The provisions of this Section 304.3 do not apply to the **legal owner** of an **aggregated facility** containing wind or solar resources that was energized and commissioned after April 7, 2017 and that is identified by its **pool asset** description in an exemption list the **ISO** publishes on the AESO website.

(3) The provisions of this Section 304.3 do not apply to the **legal owner** of an **aggregated facility** containing wind or solar resources that was energized and commissioned:

(a) prior to April 7, 2017; or

(b) that is included in the exemption list referenced in subsection 1(2) in accordance with a previous technical requirement, technical standard, **ISO rule** or functional specification;

but the **legal owner** of such an existing **aggregated facility** containing wind or solar resources must remain compliant with the ramp up management requirements set out in that previous technical requirement, technical standard, **ISO rule** or functional specification

(4) Notwithstanding subsections 1(2) or 1(3), if any of the **aggregated facilities** containing wind or solar resources described in subsections 1(2) or 1(3) undergoes one or more:

(a) facility additions after April 7, 2017 resulting in an increase in the cumulative **gross real power** capability of the **aggregated facility** containing wind or solar resources by an amount greater than or equal to 5 MW; or

(b) equipment replacements after April 7, 2017 where the equipment replaced has a **gross real power** capability greater than or equal to 5 MW irrespective of whether the cumulative **gross real power** capability of the **aggregated facility** containing wind or solar resources is increased;

then the entire **aggregated facility** containing wind or solar resources will be subject to, and the **legal owner** of the **aggregated facility** containing wind or solar resources must comply with the provisions of

this Section 304.3.

(5) The **ISO** may, notwithstanding subsections 1(2), (3) and (4), require the **legal owner** of an **aggregated facility** containing wind or solar resources to comply with any one or more specific provisions or all of the provisions of this Section 304.3 if the **ISO** determines that such compliance is necessary for the safe and reliable operation of the **interconnected electric system**.

Requirements

Functional Specification

2 The **ISO** must, in accordance and generally consistent with this Section 304.3, approve a written functional specification containing details, work requirements, and specifications for the design, construction, and operation of an **aggregated facility** containing wind or solar resources and associated **transmission facility** connection facilities.

Real Power and Ramp Rate Limitations

3(1) The **legal owner** of an **aggregated facility** containing wind or solar resources must ensure that the facility has the control capability to limit the **real power** output at the **point of connection**, or at the connection to the **electric distribution system**, in accordance with any limits or instructions contained in any **directive**.

(2) The **legal owner** of an **aggregated facility** containing wind or solar resources must ensure that the **real power** control limit referred to in subsection 3(1) is adjustable from the minimum operating output to the **gross real power** capacity at an average resolution of 1 MW.

(3) The **legal owner** of an **aggregated facility** containing wind or solar resources must, when a **real power** control limit is in effect, ensure that the 1-minute average **real power** output does not exceed the **real power** control limit specified in the **directive** referred to in subsection 5(1) by more than 2% of the **gross real power** capability.

(4) The **legal owner** of an **aggregated facility** containing wind or solar resources must ensure that the facility is equipped with **ramp rate** limiting controls that are:

(a) capable of limiting the ramp up of the **real power** of the **aggregated facility** containing wind or solar resources; and

(b) adjustable such that the **ramp rate** does not exceed, in MW per minute, a range from 5% to 20% of the **gross real power** capability.

(5) The **legal owner** of a **aggregated facility** containing wind or solar resources must ensure that the default setting for the ramp **rate** limiting controls referred to in subsection 3(4) is set at 10% of the **gross real power** capability.

(6) The **legal owner** of an **aggregated facility** containing wind or solar resources must ensure that any difference between the **real power** at:

(a) the **point of connection** or the connection to the **electric distribution system** of the **aggregated facility** containing wind or solar resources; and

(b) any **collector buses** of the **aggregated facility** containing wind or solar resources,

is compensated for in the **real power** limiting and **ramp rate** limiting controls.

Calculation of the Alberta System Wind and Solar Power Limit

4 The **ISO** must calculate, at a minimum monitoring interval of every 20 minutes, an Alberta system wind and solar power limit for **aggregated facilities** containing wind or solar resources.

Calculation and implementation of the Wind and Solar Aggregated Facilities Power Limit Pro Rata Share

5(1) The **ISO** must, by means of supervisory control and data acquisition signals, issue **directives** to the **operator** of each **aggregated facility** containing wind or solar resources that includes their power limit pro rata share.

(2) The **ISO** must optimize the pro rata share **directive** described in subsection 5(1), including reallocating any amount that results in an **aggregated facility** containing wind or solar resources exceeding its **maximum capability**.

Methodology Used to Calculate the Alberta System Wind and Solar Power Limit Power Limit Pro Rata Share

6(1) The **ISO** must post to the AESO website the methodology used to calculate the Alberta system wind and solar power limit and the methodology used to calculate the Alberta system power limit pro-rata share for **aggregated facilities** containing wind or solar resources.

(2) The **ISO** must notify **market participants** at least 30 **days** in advance of amendments to the methodologies referenced in 6(1) coming into effect.

Revision History

Date	Description
20xx-xx-xx	
2021-03-19	Completed administrative amendments to align with red tape reduction goals and ISO drafting principles; corrected typographical errors; and simplified provisions. Consolidated sections 3(4), 3(5), 5(2), 6(1) and 6(3). Removed subsection 3(4), 3(5), 4 and 6(2). .
2019-12-11	Removed duplication with new Section 103.14, *Waivers and Variances*; standardized functional specifications language; capitalized references to “Section”
2018-09-01	Revised the applicability section to include solar aggregated generating facilities and to apply to an aggregated generating facility that has a gross real power capability equal to or greater than 5 MW; added real power and ramp rate limitations requirements; revised the requirement to issue a power limit pro rata share from when a predetermined criterion is met to at the start of each monitoring interval; removed the methodologies used to calculate the Alberta system wind power limit and pro rata share; added subsection 7; revised subsection 4 to allow the energy market merit order provisions of the ISO rules and pro rata share to occur concurrently; and administrative amendments.
2015-04-01	Rule references have been updated in subsection 5(1)(a)

2015-04-01	The words “or dispatch” were added in subsection 5(1)(b).
2013-01-08	Previously defined terms have been un-defined and the words have been un-bolded.
2011-12-01	Initial release.

ISO ~~Rules~~Rule
Part 300 System Reliability and Operations
Division 304 Routine Operations
Section 304.9 Wind and Solar Aggregated Facility Forecasting

~~***The amendments in this draft reflect changes to incorporate storage into the existing version of Section 304.9. A proposed new version of Section 304.9 was posted with ISO Rules Red Tape Administrative Amendments on Jan 17, 2023. These changes will be filed in March 2023. The AESO will reconcile proposed amendments across the two versions based on the outcome of the Commission's process.***~~

Applicability

1 Section 304.9 applies to:

(a) the **legal owner** of an **aggregated facility** containing wind or solar resources that is connected to:

(i) the **interconnected electric system**;
(ii) an electric system within the service area of the City of Medicine Hat, including ~~an~~ **aggregated facility** situated within an industrial complex that is directly connected to the **interconnected electric system**; or
(iii) an electric system within the service area of the City of Medicine Hat and that has a **gross real power** capability greater than or equal to 5 MW; and

(b) the **ISO**.

Requirements

Functional Specification

2 The **ISO** must, in accordance and generally consistent with this Section 304.9, approve a written functional specification containing details, work requirements, and specifications for the design, construction, and operation of an **aggregated facility** containing wind or solar resources and any associated **transmission facility** connection facilities.

Successor to Prior Requirements and Compliance Timeframe

3 The provisions of this Section 304.9 succeed all previous forecasting requirements for **aggregated facilities** containing wind or solar resources, whether in an **ISO rule** or other document, and those requirements will no longer be in force and effect as of September 1, 2018.

Meteorological Data Collection Equipment and Availability Requirements

4(1) The **legal owner** of an **aggregated facility** containing wind or solar resources must ensure that the facility is equipped with meteorological data collection equipment and related devices that are installed and maintained in accordance with the provisions of subsections 4 and 5.

(2) The **legal owner** of an **aggregated facility** containing wind resources must ensure that it is equipped with ~~2 sets~~one set of instruments for each meteorological parameter in accordance with the requirements in Table 1.

(3) The **legal owner** of an **aggregated facility** containing solar resources must ensure that the facility is equipped with meteorological data collection equipment and related devices in accordance with the following:

(a) one set of instruments for each meteorological parameter in accordance with the requirements in Table 1 per 49 square kilometers of surface area within the facility;

(b) each set of instruments, if required by subsection 4(3)(a), must be less than 8 kilometers apart;

and

(c) measurements must be taken at not less than 2 meters and not greater than 10 meters above ground, except where otherwise noted in Table 1.

(4) The **legal owner** of an **aggregated facility** containing wind or solar resources must ensure that the meteorological data collection equipment and related devices described in subsections 4(2) and 4(3) take measurements of instantaneous values at intervals of 15 **seconds** or less.

(5) The **legal owner** of an **aggregated facility** containing wind or solar resources must measure, collect and submit to the **ISO** the meteorological data in Table 1.

(6) The **legal owner** of an **aggregated facility** containing wind or solar resources must determine, at 30 minute intervals, and submit to the **ISO**, the **gross real power capability** with a precision to the nearest 2.0 MW.

(7) The **legal owner** of an **aggregated facility** containing wind or solar resources must determine and submit to the **ISO**, the following data:

(a) any real power limits in MW, with a precision for instantaneous measurements to the nearest 0.1 MW; and

(b) actual net to grid real power production in MW, with a precision for instantaneous measurements to the nearest 0.1 MW.

Data Transfer Technical Specification

5(1) The **legal owner** of an **aggregated facility** containing wind or solar resources must submit to the **ISO** the data specified in subsection 4(5) using one **minute** average data.

(2) The **legal owner** of an **aggregated facility** containing wind or solar resources must submit to the **ISO** the data specified in subsection 4 in the method and format the **ISO** specifies.

(3) The **legal owner** of an **aggregated** facility containing wind or solar resources must ensure that its meteorological data collection equipment and related devices including its data transfer equipment is designed and maintained with an availability of 98.0% in accordance with Table 1 and a mean time to repair of 48 hours or less.

(4) The **legal owner** of an **aggregated facility** containing wind or solar resources must keep 7 **days** of back up data for any data that has been submitted in accordance with this subsection 5 and must provide it to the **ISO** upon request within 30 **days**.

Notification of Unavailability, Suspected Failure or Data Error

6(1) The **legal owner** of an **aggregated facility** containing wind or solar resources must, if any component in the meteorological data collection equipment and related devices~~,~~ including data transfer equipment~~,~~ becomes unavailable due to an unplanned event, is suspected to have failed, or is suspected to be providing erroneous data, notify the **ISO** as soon as practicable, in writing, after identifying the unavailability, suspected failure~~,~~ or data error.

(2) The **legal owner** of an **aggregated facility** containing wind or solar resources must provide the **ISO** as soon as practicable, in writing:

(a) a description of the cause of any unavailability, suspected failure~~,~~ or data error reported pursuant to subsection 6(1); and

(b) in the event of an equipment failure:

(i) a plan acceptable to the **ISO** to repair the failed equipment, including testing; and

(ii) the expected date when the equipment will be repaired and the required measurements will be restored.

(3) The **legal owner** of an **aggregated facility** containing wind or solar resources must, if an equipment failure described in subsection 6(2) is not repaired and required measurements are not restored by the expected date, notify the **ISO** as soon as practicable, in writing, of the revised date and the reason the component in the equipment was not repaired by the expected date.

(4) The **legal owner** of an **aggregated facility** containing wind or solar resources must notify the **ISO** as soon as practicable~~,~~ in writing~~,~~ after an equipment failure described in subsection 6(2) is repaired and the required measurements are restored.

Exceptions

7 The **legal owner** of an **aggregated facility** containing wind or solar resources is, notwithstanding subsections 4 and 5, not required to comply with the requirements of this Section 304.9 relating to meteorological data collection equipment and related devices including data transfer equipment when:

(a) such equipment is being repaired or replaced in accordance with a plan acceptable to the **ISO** under subsection 6; and

(b) the **legal owner** is using reasonable efforts to complete such repair or replacement in accordance with that plan.

Pre-Commissioning Facility Data and Records Requirements

8(1) The **legal owner** of an **aggregated facility** containing wind resources must provide to the **ISO** the pre-**commissioning** data and records referred to in this subsection 8 in a method and format the **ISO** specifies.

(2) The **legal owner** of an **aggregated facility** containing solar resources must provide to the **ISO,** in a method and format the **ISO** specifies, either:

(a) the pre-**commissioning** data and records referred to in this subsection 8; or

(b) an industry standard model that is approved by the **ISO**.

(3) The **legal owner** of an **aggregated facility** containing wind or solar resources must, subject to the provisions of this subsection 8, retain and provide~~,~~ within 60 **days** of the **ISO**'s written request~~,~~ the following averaged meteorological data and records at 10 ~~-~~minute intervals or less, covering the 2 calendar years prior to the **commissioning** of the **aggregated facility**:

(a) details on the height of the measurements;

(b) wind speed;

(c) wind direction;

(d) temperature;

(e) barometric pressure; and

(f) for **aggregated facilities** containing solar resources only, global horizontal irradiance.

(4) The **legal owner** of an **aggregated facility** containing wind resources must, in response to a request by the **ISO** under subsection 8(3), provide the following facility data:

(a) meteorological tower data collection height in m, with a precision for instantaneous measurements to the nearest 1 m;

(b) turbine model name;

(c) turbine model capacity in MW, with a precision to the nearest 0.1 MW;

(d) turbine wind speed cut-in in m/s, with a precision to the nearest 0.1 m/s;

(e) turbine wind speed cut-out in m/s, with a precision to the nearest 0.1 m/s;

(f) turbine temperature cut-out lower in degrees Celsius (°C), with a precision for instantaneous measurements to the nearest 1 °C with an indicator to confirm that the numbers are ambient temperature within the rotor or air temperature;

(g) turbine temperature cut-out upper in degrees Celsius (°C), with a precision for instantaneous measurements to the nearest 1 °C with an indicator to confirm that the numbers are ambient temperature within the rotor or air temperature;

(h) site latitude and longitude in degrees; and

(i) turbine power curves.

(5) The **legal owner** of an **aggregated facility** containing solar resources must~~,~~ in response to a request by the **ISO** under subsection 8(3), provide the following solar array data and records, including:

(a) site latitude and longitude in degrees;

(b) direct current ~~-~~**real power** rating;

(c) alternating current **real power** rating;

(d) inverter manufacturer and model;

(e) mounting height from ground in ~~meters (~~m~~);~~;

(f) tilt angle or range of tilt angles to horizontal plane in degrees;

(g) azimuth angle in degrees;

(h) alternating current **real power** capacity per **solar array** in MW;

(i) mounting type, tracking (fixed, single or dual axis); and

(j) module type (crystalline, thin-film etc.).

Revision History

Date	Description
20xx-xx-xx	
2023-03-31	Updated to align with current AESO drafting principles.
2019-12-11	"Removed duplication with new Section 103.14, Waivers and Variances; standardized functional specifications language; capitalized references to "Section"."

2018-09-01	Initial release.

Table 1
Meteorological Data Requirements for Aggregated Facility Containing Wind or Solar Resources

Meteorological Data Requirements for Aggregated Facility containing Wind Resources						
Measurement Type	**Units**	**Precision**	**Range**	**Accuracy**	**Height of Instrument**	
					Set-1	**~~Set-2~~**
Wind Speed	Meters/Second (m/s)	0.1 m/s	0 to 50	±1m/s	At Hub Height	~~At 35 Meters~~
Wind Direction	Degrees from True North	1 degree	0 to 360	±5°	At Hub Height	~~At 35 Meters~~
Barometric Pressure	HectoPascals (hPa)	1 hPa	800 to 1000	±1.0 hPa at -20 to 50°C; and ±1.5 hPa at below -20°C	At Convenient location	~~At Convenient location~~
Ambient Temperature	Degrees Celsius (°C)	0.1° C	-50 to +50	±0.2°C	At Hub Height	~~At 35 Meters~~
Dewpoint	Degrees Celsius (°C)	0.1° C	-50 to +50	±0.2°C	At Convenient location	~~At Convenient location~~
Relative Humidity	Percentage (%)	1.00%	0 to 100 %	±2%	At Convenient location	~~At Convenient location~~
Ice-up Parameter Measured with an Icing Sensor	Scale 0.0 to1.0	0.1	0 to 1	n/a	At Convenient location	~~At Convenient location~~
Precipitation	Millimeters/minute (mm/min)	0.1	0 to11	2% up to 0.417 mm/mon 3% over 0.417 mm/min	At Convenient location	~~At Convenient location~~

Meteorological Data Requirements for Aggregated Facility containing Solar Resources						
Measurement Type	**Units**	**Precision**	**Range**	**Accuracy**	**Height of Instrument**	
					Set-1 per 49 km^2	**Set-2 for each subsequent 49 km^2**
Wind Speed	Meters/Second (m/s)	0.1 m/s	0 to 50	±1m/s	Between 2-10 meters	Between 2-10 meters
Wind Direction	Degrees from True North	1 degree	0 to 360	±5°	Between 2-10 meters	Between 2-10 meters
Barometric Pressure	HectoPascals (hPa)	1 hPa	800 to 1000	±1.0 hPa at -20 to 50°C; and ±1.5 hPa at below -20°C	Between 2-10 meters	Between 2-10 meters

Ambient Temperature	Degree Celsius (°C)	0.1° C	-50 to +50	±0.2°C	Between 2-10 meters	Between 2-10 meters
Dewpoint	Degrees Celsius (°C)	0.1° C	-50 to +50	±0.2°C	Between 2-10 meters	Between 2-10 meters
Relative Humidity	Percentage (%)	1.00%	0 to 100 %	±2%	Between 2-10 meters	Between 2-10 meters
Precipitation	Millimeters/minute (mm/min)	0.1	0 to11	2% up to 0.417 mm/mon 3% over 0.417 mm/min	Between 2-10 meters	Between 2-10 meters
Back panel Temperature	Degree Celsius (°C)	0.1° C	-50 to +50	±0.15°C at -27 to +50°C; and ±0.2°C at below -27°C	Between 2-10 meters	Between 2-10 meters
Global Horizontal Irradiance	Watts/Square Meter (W/m^2)	0.1	0 to 4000	±3%	Between 2-10 meters	Between 2-10 meters
Diffused Horizontal Irradiance	Watts/Square Meter (W/m^2)	0.1	0 to 4000	±3%	Between 2-10 meters	Between 2-10 meters
Direct Normal Irradiance[1]	Watts/Square Meter (W/m^2)	0.1	0 to 2000	±3%	Between 2-10 meters	Between 2-10 meters

[1] The requirement to provide this parameter will be determined by the AESO based on solar technology used in the project.

ISO Rules
Part 500 Facilities
Division 503 Technical & Operating Requirements
Section 503.1 Functional Specification & Legacy Treatment

Applicability

1 Section 503.1 applies to:

(a) a **legal owner** of a **generating unit**, **aggregated facility**, or **energy storage resource** that is directly connected to the **transmission system**, or to **transmission facilities** within the City of Medicine Hat; and

(b) a **legal owner** of a **bulk transmission line**;

(c) the **ISO**.

Requirements

Functional Specification

2(1) The **ISO** must, approve a functional specification containing details, work requirements, and specifications for the design, construction, and operation of a project and any associated **transmission system** connection facilities.

(2) The functional specification referred to in subsection 2(1) must be generally consistent with the provisions of Division 503 of the **ISO rules**, as applicable, but may contain material variance the **ISO** approves based upon its analysis of any one or more of the technical, economic, safety, operational and reliability requirements of the interconnected electric system related to the specific facility.

Legacy Treatment

3 A **legal owner** must, unless otherwise specifically stated in an **ISO rule** within Division 503 of the **ISO rules**, remain compliant with the applicable predecessor document to an **ISO rule** within Division 503 if the **legal owner**'s facility received either of the following prior to the effective date of an **ISO rule** within Division 503:

(a) a first version of the final functional specification issued by the **ISO**; or

(b) approval for the construction and operation of the facility from the relevant regulatory authority with jurisdiction.

Modifications to Generating Units, Aggregated Facilities and Energy Storage Resources

4(1) A **legal owner** of a **generating unit**, **aggregated facility**, or **energy storage resource** must, notwithstanding subsection 3, comply with the applicable requirements of Division 503 of the **ISO rules** if the **legal owner**'s facility or resource, or any supporting systems, undergoes an addition or upgrade.

(2) The **legal owner** of an **aggregated facility** that was energized and commissioned prior to April 7, 2017 must, notwithstanding subsection 4(1), comply with the applicable requirements of Division 503 of the **ISO rules** only if the **legal owner** replaces existing equipment where the equipment replaced has **a gross real power** capability equal to or greater than 5 MW, irrespective of whether the cumulative **gross real power** capability of the **aggregated facility** is increased.

(3) This subsection 4(1) does not apply to identical or similar replacements, or maintenance-related activities.

Modifications to Transmission Facilities

5 A **legal owner** of an existing **bulk transmission line** that is extending, tapping, or adding to the **bulk transmission line**:

(a) must, if the project circuit length will be greater than or equal to 1,500 meters, comply with the applicable requirements of Division 503 of the **ISO rules**; or

(b) must, if the project circuit length will be less than 1,500 meters, comply with the:

(i) applicable technical specification and design requirements for the **bulk transmission line** in effect as of the original date of the commencement of the design of the bulk transmission line; and

(ii) specifications set out in the most recently published edition of the *Alberta Electrical Utility Code.*

Authority to Require Compliance

6 The **ISO** may, notwithstanding subsection 3, require a **legal owner** to comply with any provision of Division 503 if the **ISO** determines that such compliance is necessary for the safe and reliable operation of the **interconnected electric system**.

Revision History

Date	Description
20XX-XX-XX	

Existing	Final	Blackline of Version 3.0 to Final	Blackline of Existing to Final
"allowable dispatch variance" means: (i) for each generating **source asset**, other than a wind or solar **aggregated generating facility**, as measured from the **dispatch** quantity: (a) plus or minus five (5) MW for a generating **source asset** with a **maximum capability** of two hundred (200) MW or less; or (b) plus or minus ten (10) MW for a generating **source asset** with a **maximum capability** of greater than two hundred (200) MW; (ii) for each wind or solar **aggregated generating facility** with a **maximum capability** of two hundred (200) MW or less: (a) five (5) MW greater than the **dispatch** quantity and five (5) MW less than the potential **real power** capability, if the potential **real power** capability is	**"allowable dispatch variance"** means: (i) for a **source asset** that is **controllable**, as measured from the **dispatch** quantity: (a) plus or minus 5 MW for a **source asset** with a **maximum capability** of 200 MW or less; or (b) plus or minus 10 MW for a **source asset**, with a **maximum capability** of greater than 200 MW; (ii) for a **source asset** that is **non-controllable** with a **maximum capability** of 200MW or less: (a) 5 MW greater than the **dispatch** quantity and 5 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 5 MW from the **dispatch** quantity, if the potential	**"allowable dispatch variance"** means: (i) for a **source asset** that is **controllable**, as measured from the **dispatch** quantity: (a) plus or minus 5 MW for a **source asset** with a **maximum capability** of 200 MW or less; or (b) plus or minus 10 MW for a **source asset**, with a **maximum capability** of greater than 200 MW; (ii) for a ~~each~~ **source asset** that is **non-controllable** with a **maximum capability** of 200MW or less: (a) 5 MW greater than the **dispatch** quantity and 5 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 5 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or	**"allowable dispatch variance"** means: (i) for ~~each generating~~a **source asset**~~, other than a wind or solar **aggregated generating facility**~~ that is **controllable**, as measured from the **dispatch** quantity: (a) plus or minus ~~five (~~5~~)~~ MW for a ~~generating~~ **source asset** with a **maximum capability** of ~~two hundred (~~200~~)~~ MW or less; or (b) plus or minus ~~ten (~~10~~)~~ MW for a ~~generating~~ **source asset**, with a **maximum capability** of greater than ~~two hundred (~~200~~)~~ MW; (ii) for a ~~each wind or solar **aggregated generating facility**~~**source asset** that is **non-controllable** with a **maximum capability** of ~~two hundred (200) MW~~200MW or less: (a) ~~five (~~5~~)~~ MW greater than the **dispatch** quantity and ~~five (~~5~~)~~ MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus ~~five (~~5~~)~~ MW from the **dispatch** quantity, if the potential **real power** capability is

Existing	Final	Blackline of Version 3.0 to Final	Blackline of Existing to Final
less than the **dispatch** quantity; or (b) plus or minus five (5) MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; and (iii) for each wind or solar **aggregated generating facility** with a **maximum capability** of greater than two hundred (200) MW: (a) ten (10) MW greater than the **dispatch** quantity and ten (10) MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus ten (10) MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity.	**real power** capability is greater than or equal to the **dispatch** quantity; (iii) for a **source asset** that is **non-controllable** with a **maximum capability** of greater than 200 MW: (a) 10 MW greater than the **dispatch** quantity and 10 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 10 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; (iv) for a **source asset** that is **partially-controllable** with a **maximum capability** of 200 MW or less, when the **source asset** is dispatched within the variable energy resource quantity:	equal to the **dispatch** quantity; (iii) for a **source asset** that is **non-controllable** with a **maximum capability** of greater than 200 MW: (a) 10 MW greater than the **dispatch** quantity and 10 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 10 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; (iv) for a **source asset** that is **partially-controllable** with a **maximum capability** of 200 MW or less, when the **source asset** is dispatched within the variable energy resource quantity: (a) 5 MW greater ~~than the **dispatch** quantity~~ and 5 MW less than the potential **real power** capability, if the	greater than or equal to the **dispatch** quantity; ~~and~~ (iii) for ~~each wind or solar **aggregated generating facility**~~a **source asset** that is **non-controllable** with a **maximum capability** of greater than ~~two hundred (~~200~~)~~ MW: (a) ~~ten (~~10~~)~~ MW greater than the **dispatch** quantity and ~~ten (~~10~~)~~ MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus ~~ten (~~10~~)~~ MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity~~.~~; "(iv) for a **source asset** that is **partially-controllable** with a **maximum capability** of 200 MW or less, when the **source asset** is dispatched within the variable energy resource quantity: (a) 5 MW greater and 5 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or

Existing	Final	Blackline of Version 3.0 to Final	Blackline of Existing to Final
	(a) 5 MW greater and 5 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 5 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; (v) for a **source asset** that is **partially-controllable** with a **maximum capability** greater than 200 MW, when the **source asset** is dispatched within the **variable energy resource quantity**: (a) 10 MW greater and 10 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 5 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity;	potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 5 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; (v) for a **source asset** that is **partially-controllable** with a **maximum capability** greater than 200 MW, when the **source asset** is dispatched within the **variable energy resource quantity**: (a) 10 MW greater ~~than the **dispatch** quantity~~ and 10 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (b) plus or minus 10 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity;	(b) plus or minus 5 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; (v) for a **source asset** that is **partially-controllable** with a **maximum capability** greater than 200 MW, when the **source asset** is dispatched within the **variable energy resource quantity**: (c) 10 MW greater 10 MW less than the potential **real power** capability, if the potential **real power** capability is less than the **dispatch** quantity; or (d) plus or minus 10 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; (vi) for a **source asset** that is **partially-controllable,** when the **source asset** is dispatched outside the **variable energy resource quantity**: (a) plus or minus 5 MW of the **dispatch** quantity less the dispatched variable energy resource quantity, plus the potential **real power** capability

Existing	Final	Blackline of Version 3.0 to Final	Blackline of Existing to Final
	(b) plus or minus 10 MW from the **dispatch** quantity, if the potential **real power** capability is greater than or equal to the **dispatch** quantity; (vi) for a **source asset** that is **partially-controllable,** when the **source asset** is dispatched outside the **variable energy resource quantity**: (a) plus or minus 5 MW from the **dispatch** quantity less the dispatched variable energy resource quantity, plus the potential **real power** capability for a **source asset** with a **maximum capability** of 200 MW or less; or (b) plus or minus 10 MW from the **dispatch** quantity less the dispatched variable energy resource quantity, plus the potential **real power** capability for a **source**	(vi) for a **source asset** that is **partially-controllable,** when the **source asset** is dispatched outside the **variable energy resource quantity**: (a) plus or minus 5 MW from the **dispatch** quantity less the dispatched variable energy resource quantity, plus the potential **real power** capability for a **source asset** with a **maximum capability** of 200 MW or less; or (b) plus or minus 10 MW from the **dispatch** quantity less the dispatched variable energy resource quantity, plus the potential **real power** capability for a **source asset** with a **maximum capability** of greater than 200 MW.	for a **source asset** with a **maximum capability** of 200 MW or less; or (b) plus or minus 10 MW of the **dispatch** quantity less the dispatched variable energy resource quantity, plus the potential **real power** capability for a **source asset** with a **maximum capability** of greater than 200 MW.

Existing	Final	Blackline of Version 3.0 to Final	Blackline of Existing to Final
	asset with a **maximum capability** of greater than 200 MW.		
"point of supply" means the point at which electricity is transferred to **transmission facilities** from facilities owned by a **market participant** receiving **system access service** under the **ISO tariff**, including a **generating unit**, **aggregated generating facility** or an **electric distribution system**.	**"point of supply"** means the point at which electric energy is transferred to a **transmission facility** from a facility owned by a **market participant** receiving **system access service** under the **ISO tariff** including a **generating unit**, **aggregated facility, energy storage resource,** or **electric distribution system**.	**"point of supply"** means the point at which electric energy is transferred to a **transmission facility** from a facility owned by a **market participant** receiving **system access service** under the **ISO tariff** including a **generating unit**, **aggregated facility**~~-~~**, energy storage resource,** or **electric distribution system**.	~~"~~**"**~~"~~**point of supply**~~"~~**"** means the point at which ~~electricity~~ electric energy is transferred to a **transmission** ~~**facilities**~~**facility** from ~~facilities~~a facility owned by a **market participant** receiving **system access service** under the **ISO tariff**~~,~~ including a **generating unit**, **aggregated** ~~**generating**~~ **facility**~~-~~**, energy storage resource,** or ~~an~~ **electric distribution system**.