Information Document
Technical and Operating Requirements for Facilities Containing Energy Storage Resources ID #2016-001R

Information documents are not authoritative. Information documents are for information purposes only and are intended to provide guidance. In the event of any discrepancy between an information document and any authoritative document(s)[1] in effect, the authoritative document(s) governs.

1 Purpose

This information document relates to the following authoritative documents:

- Section 503.2 – *Maximum Authorized Real Power and Maximum Authorized Charging Power* ("Section 503.2");
- Section 503.3 – *Reactive Power* ("Section 503.3");
- Section 503.9 – *Auxiliary Systems* ("Section 503.9"); and
- Section 503.13 – *Synchrophasor Measurement System* ("Section 503.13").

The purpose of this information document is to provide additional guidance that may be of interest to the legal owners and operators of facilities containing energy storage resources (ESRs) in Alberta.

2 Background

Division 503 of the AESO ISO rules sets out the minimum technical and operating requirements for facilities connecting to the transmission system, including facilities containing ESRs. ESRs encompass all storage technologies including battery energy storage. The sections below provide guidance on specific areas of technical rules in relation to energy storage resources and facilities.

The applicable sections within Division 503 of the AESO ISO rules require the legal owner of a facility containing ESRs to determine various parameters associated with the facility, including, but not limited to, maximum authorized charging power and maximum authorized real power. During the connection process of a project for a facility containing ESRs, the AESO may request these parameters and other information from the legal owner for use in the connection process, including preparing the functional specification and studies.

3 Maximum Authorized Charging Power, Maximum Authorized Real Power and Reactive Power Requirements (Sections 503.2 and 503.3)

The examples below relate to Section 503.2 and Section 503.3, and are intended to provide guidance on the relationship between the maximum authorized real power, maximum authorized charging power and reactive power requirements for a facility containing ESRs.

> **Example 1:** Where the legal owner of a facility containing ESRs has determined that the facility will have a maximum authorized charging power and maximum authorized real power of 100 MW, the following reactive power capabilities for the facility containing ESRs would meet the minimum reactive power requirements under Section 503.3:
>
> (a) over-excited reactive power obligation (0.90 power factor) = 48.4 MVAr;
>
> (b) under-excited reactive power obligation (0.95 power factor) = 32.9 MVAr; and
>
> (c) MVA rating at this value = 111.1 MVA.

[1] "Authoritative documents" is the general name given by the AESO to categories of documents made by the AESO under the authority of the *Electric Utilities Act* and regulations, and that contain binding legal requirements for either market participants or the AESO, or both. Authoritative documents include: the ISO rules, the reliability standards, and the ISO tariff.

Example 2: Some facilities containing ESRs may have a lower maximum authorized charging power rate when compared to the maximum authorized real power rate for the facility.

Where the legal owner of a facility containing ESRs has determined that the facility will have a maximum authorized charging power of 40 MW, while still having a maximum authorized real power of 100 MW, the following reactive power capabilities for the facility containing ESRs would meet the minimum reactive power requirements under Section 503.3, while charging the facility:

(a) over-excited reactive power obligation (0.90 power factor) = 19.4 MVAr; and

(b) under-excited reactive power obligation (0.95 power factor) = 13.1 MVAr.

The relationship between maximum authorized charging power, maximum authorized real power and reactive power is illustrated in Figure 1, below.

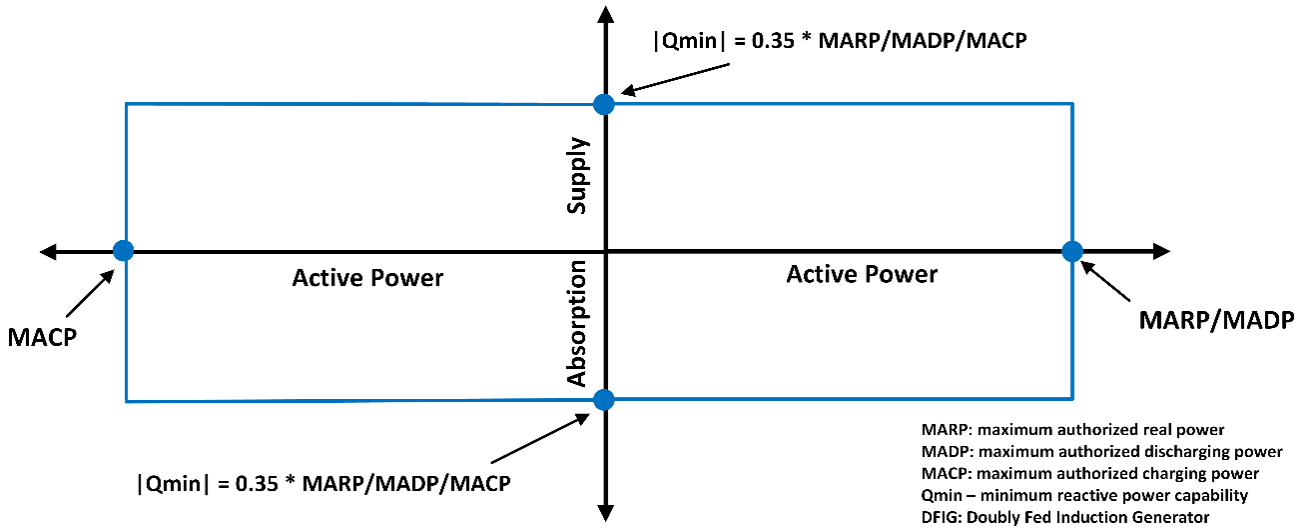

Figure 1 – Reactive Power Capability (extracted from 2024 AESO IBR requirements paper)

Example 3: Where the legal owner of a generating facility is considering the addition of a facility containing ESRs such that the two facilities would share a common point of connection, and where there is excess reactive power available from the generating facility, the excess reactive power may be used to supplement the reactive power capability of a facility containing ESRs, in accordance with subsection 4(4) of Section 503..3

Where the generating facility is a wind aggregated facility rated at 100 MW that has an existing static reactive power device, the reactive power capability of the wind aggregated facility (would be similar to the reactive power capability described in Example 1 above:

(a) over-excited reactive power obligation (0.90 power factor) = 48.4 MVAr; and

(b) under-excited reactive power obligation (0.95 power factor) = 32.9 MVAr.

If a facility containing ESRs is added to the existing wind aggregated facility, such that the two facilities share a common point of connection, and the facility containing ESRs is rated at 10 MW for both the maximum authorized real power and the maximum authorized charging power, the following reactive power capabilities for the facility containing ESRs would meet the reactive power requirements Section 503.3:

(a) over-excited reactive power obligation (0.90 power factor) = 4.8 MVAr; and

(b) under-excited reactive power obligation (0.95 power factor) = 3.3 MVAr.

However, the facility containing battery ESRs would not be required to have reactive power capability if the existing static reactive power device at the wind aggregated facility had additional reactive power capability totaling at least:

(a) over-excited reactive power obligation (0.90 power factor) = 53.2 MVAr; and

(b) under-excited reactive power obligation (0.95 power factor) = 36.2 MVAr.

4 Auxiliary Systems (Section 503.9)

Just as a complex may contain more than one generating unit, a complex may also contain more than one energy storage resource or facility containing ESRs. Section 503.9 relates to the auxiliary systems of a facility that is located in a complex with more than one facility or resource.

In general, for battery ESRs, where the various battery cells, inverters, and other components in a complex operate cohesively under a single governor system and voltage regulating system, the complex is considered to be composed of a single aggregated facility containing ESRs.

For battery ESRs where the operation of the various battery cells, inverters, and other components in a complex is controlled by separate governor systems and voltage regulating systems, the complex is considered to be composed of multiple ESRs.

Section 503.9 includes requirements to prevent the loss of multiple ESRs because of a single point of failure of an auxiliary system, such as a common power supply to pumps for flow batteries.

The AESO recognizes that there may be times when the facilities containing ESRs are located within a complex operated with a single point of failure of an auxiliary system. When operating with a single point of failure of an auxiliary system for multiple battery energy storage facilities, the AESO requires notification in accordance with subsection 2(7) of Section 503.18.

5 Synchrophasor Measurement System Requirements (Section 503.13)

The technical requirements for synchrophasor measurement systems are set out in Section 503.13 of the ISO rules, *Synchrophasor Measurement Unit Technical Requirements* (“Section 503.13”). In addition, the AESO specifies the sample rate and other required configuration parameters for synchrophasor measurement systems in a project’s functional specification document.

Revision History

Posting Date	Description of Changes
2024-04-12	Amendments to align with Energy Storage ISO Rule amendments and new definitions. Replaced Figure 1 and deleted an outdated section on battery energy storage.
2020-06-22	Addition of subsection 5 regarding synchrophasor measurement system requirements.
2017-05-11	Addition of section 4
2016-04-25	Initial release