

Introduction

This plan provides an updated overview of the 2022 Plan for Distributed Energy Resources (DER) Roadmap Integration Activities in support of the *AESO Distributed Energy Resources (DER) Roadmap*¹ (DER Roadmap).

Based on the priority of these DER integration activities, high and medium priority activities will continue to progress in 2022 and most will be completed or near completion by the end of 2022.

For those activities that require stakeholder feedback, the AESO will continue to engage with stakeholders during the conception and development phases (described below), in alignment with the AESO Stakeholder Engagement Framework². In addition, progress updates and information on engagement opportunities will be communicated to stakeholders at the regular DER progress update sessions. The plan below outlines an anticipated timing for the DER Roadmap integration activities and, where applicable, their anticipated stakeholder engagement, while recognizing timelines may change as activities progress and more information becomes available.

The AESO continues to work cross-functionally across the organization to ensure all initiatives which are connected or interrelated will remain coordinated as appropriate.

DER integration process

The following provides a description of the DER integration process:

Analysis (A)

In the analysis phase, the AESO identifies issues resulting from internal analysis, stakeholder feedback, government policy or market design review. This phase is an internal phase for the AESO and there may be initiatives that have not yet progressed to the point of requiring stakeholder input. Such initiatives may not appear on the plan and may be added once initial analysis has been completed or an engagement decision has been reached. In this phase, the AESO may research and define the issue, analyze the implemented solution in other jurisdictions, perform analytics, and seek out expert opinions to determine whether to move forward to the next phase.

Conception (C)

During the conception phase, the AESO will formalize the issue and conduct an options analysis. Input for the options analysis may be gathered through stakeholder engagement, and/or third-party studies. The AESO may develop recommendations and determine necessary stakeholder engagement.

Development (D)

During the development phase, the AESO works with stakeholders to create proposed Independent System Operator (ISO) rules or changes to ISO rules. The proposed drafts are released to stakeholders

¹ [AESO Distributed Energy Resources \(DER\) Roadmap](#)

² <https://www.aeso.ca/assets/downloads/Stakeholder-Engagement-Framework-Report-FINAL.pdf>

for comment and those comments are considered in the development of a proposed ISO rule or Authoritative Documents (AD).

Regulatory (R)

The regulatory phase begins with filing an application for approval of a proposed ISO rule with the Alberta Utilities Commission (AUC) and typically concludes with the issuance of a decision on the application. It may also extend beyond an AUC decision if compliance filings or review and variance applications need to be addressed.

Implementation (I)

The implementation phase includes changes to information technology, business processes, and training and ISO rules. The longest implementation timeline would be for the new ISO rules.

Engagement (E)

The engagement phase may include a range of stakeholder engagement approaches - with the purpose to inform or to collaborate - depending on the topic and issue being considered and the outcomes being sought.

The approach taken and the extent of activity for each phase will be dependent on each DER Roadmap Integration Activity. For example, not all activities will result in new proposed ISO rules or changes to an ISO rule, therefore these activities will not go through development and regulatory phases prior to entering the Implementation phase.

Classification	DER Roadmap Integration Activities	Priority Rank	2022 Q1			2022 Q2			2022 Q3			2022 Q4			
			J	F	M	A	M	J	J	A	S	O	N	D	
Stakeholder Engagement	DER Progress Updates Share progress on activities, other interrelated initiatives and address stakeholder questions.				E			E			E			E	
	Assess and implement minimum SCADA data trigger level	M	I												
Reliability	Forecasting														
	Forecast DER gross generation and gross load separately (AESO internal activity)	L	C			I									
	Geographical forecast of DER sizes at the POD level (AESO internal activity)	L	C			I									
	Modelling														
	Energy storage model	H	Progress will be aligned with AESO Energy Storage – see Phase 2 Long-term Implementation activities												
	Coordinated Planning														
	Enhance Transmission planning process in coordination with Transmission/Distribution (Tx/Dx) coordinated planning framework	H	Progress will be aligned with Tx/Dx Initiative												
	Coordinated Operation														
	Incorporate DER into net demand forecasting process (AESO internal activity)	M	I												
	Technical Interconnection Requirement														
	Voltage and frequency ride-through requirement	H	I												
	Transmission protection and control coordination and Effective Grounding	M	I												
	Islanding and anti-islanding coordination	M	C			I									
	Restoration coordination	L	C												
	Commissioning and testing requirements	L	C			I									
Cybersecurity requirements	L	C			I										
Market Efficiency	Market Participation Evaluate and assess options that encourage DER market participation	M	Progress will be aligned with Energy Storage Rule Amendments and Operating Reserve Market Review .												
Tariff	Tariff Evolve tariff framework that drives effective long-term price signals that encourage efficient use of the Tx and Dx system	M	Progress will be aligned with Bulk and Regional Tariff Design												

DER Roadmap Implementation Phases: Analysis (A), Conception (C), Development (D), Regulatory (R) Implementation (I), Engagement (E) **DER Roadmap Priority Rank:** H= High Priority, M= Medium Priority, L= Low Priority. The completed phases and planned phases outside of this 12-month period are not shown.

DER Roadmap Integration activities

As activities are completed, they will be marked as complete in the above schedule. After being posted, the next update will have all completed line items in the above schedule deleted. These completed activities will continue to undergo periodic monitoring and trigger-point assessment reviews twice a year to determine the next level of risk management to be implemented in support of the continued growth of DER volumes and spread.

1. Stakeholder engagement

a. DER progress update

At quarterly intervals, the AESO will share progress on the DER Roadmap integration activities, provide an update on interrelated initiatives, as well as address stakeholder questions.

2. Reliability

Following are reliability-related DER Roadmap integration activities that the AESO is progressing to ensure continued reliability of the Alberta Interconnected Electrical System (AIES), the pace of which is driven by areas experiencing increasing DER growth.

a. Data

Accurate knowledge of DER volumes, locations, resource types, and site characteristics is critical to reliably integrate higher volumes of DER into the AIES.

SCADA Data (DER less than 5 MW) – The AESO presently does not receive SCADA data for DER smaller than 5 MW. Expanding the AESO Control Centre’s real time visibility of DER smaller than 5 MW was explored by the AESO with Distributed Facility Owners (DFOs). The conclusion of the discussion is that the AESO will continue to maintain 5 MW minimum SCADA data trigger. For DER less than 5 MW, the AESO plans to leverage existing SCADA data from DFOs and is discussing establishing connectivity with DFOs to enable SCADA data exchange for DER less than 5 MW in 2022.

b. Forecasting

Increased knowledge of DER data will enhance the AESO’s forecasting processes, from long term to real time. In addition, these forecasting processes will be enhanced to explicitly forecast DER growth and penetration.

Forecast of DER gross generation and gross load separately and incorporate hourly variability

In the AESO’s current near-term/real time forecast (which supports AESO’s real time operation), DER smaller than 5 MW is embedded as part of the net load forecast (i.e., gross load minus DER generation). The AESO plans to establish a process to estimate gross load and gross generation of DER less than 5 MW for solar to understand the impact on the AESO’s net load forecast. Based on the current DER penetration for DER less than 5 MW, this work will add marginal benefit to understanding net load variability. The AESO will continue to monitor DER growth to determine when completion of this work will be beneficial.

Geographical forecast of DER sizes at the POD level

For DER less than 5 MW, the AESO plans to establish a process to forecast rooftop solar at the point-of-delivery (POD) level for the near-term/real time forecast. In 2021, the AESO implemented new planning area-level forecasting with embedded DER generation that will increase the accuracy of operations processes. Further enhancement down to the POD level will provide marginal benefit while requiring capital and significant resource to implement. Hence, the AESO will monitor DER growth to determine when enhancement down to the POD level will be beneficial.

c. Modelling

DER models need to be adequately captured in AESO's power system models, which will be used in numerous planning and operating processes that support the reliability of the AIES.

Energy storage model – DER Energy storage resources need to be modelled in AESO's Central Power System (CPS) and real-time Energy Management System (EMS) to support various AESO planning and operation functions. In 2020, CPS and EMS energy storage modelling work, which covers transmission connected and distributed connected energy storage, was completed. The EMS energy storage model will be enhanced as part of the Energy Storage long-term implementation initiative, currently in its initiation phase. The details of the DER Energy Storage model are covered under this initiative, and its scope and timeline will be developed as part of the *Energy Storage Roadmap*³.

d. Coordinated planning transmission

With increasing DER penetration, AESO's transmission planning will be enhanced with inputs from improved data, forecasting and modelling processes coupled with the Transmission and Distribution Coordinated Planning framework initiative (Tx/Dx Coordinated Planning framework initiative)⁴. Engagement with DFOs, transmission facility owners (TFOs) and industry participants will follow the Tx/Dx Coordinated Planning framework⁵ initiative timeline.

e. Coordinated operation

Incorporate DER into net demand forecasting process – Enhance AESO's net demand forecasting by incorporating wind and solar variability in the net demand for renewable DER larger than 5 MW and incorporate DFO SCADA data and static data for DER smaller than 5 MW. Net demand forecasting for renewable DER larger than 5MW have been completed. Net demand forecasting for DER less than 5 MW is scheduled to be completed following completion of assessment for **Forecast of DER gross generation and gross load separately and incorporate hourly variability**.

³ <https://www.aeso.ca/grid/grid-related-initiatives/energy-storage/>

⁴ <https://www.aeso.ca/grid/grid-related-initiatives/transmission-distribution-tx-dx-coordinated-planning-framework/#:~:text=The%20Tx%2FDx%20Framework%20will,impacts%20on%20end%2Duse%20customers.>

⁵ <https://www.aeso.ca/grid/grid-related-initiatives/transmission-distribution-tx-dx-coordinated-planning-framework/>

f. Technical interconnection

As more DERs are connecting and supplying energy, they may impact the reliability of the AIES. The AESO explored appropriate technical interconnection recommendations with input from DFOs and TFOs via the DER Technical Performance Exploration Group (TPEG). Based on feedback received from TPEG, the AESO will publish a series of technical assessment papers to identify the AESO's recommended implementation approaches to address various technical aspects of integrating DERs.

Voltage and frequency ride-through requirement: An assessment paper on the topic was published on March 31, 2021, based on AESO, DFOs and TFOs discussion⁶. As a result of further feedback from Original Equipment Manufacturers (OEMs) as well as updates from the industry, the AESO proposed a two-tier implementation approach, where DER ≥ 150 kW will continue to meet the December 2021 implementation timeline, while DER < 150 kW will meet Dec 2022 implementation timeline in consideration of delayed release of UL 1741 SB. The proposed two-tier implementation approach was aligned with TFOs/DFOs and was welcomed by the DER proponents. The AESO will publish an updated assessment paper in Q2 2022 to reflect the two-tier implementation approach.

Transmission Protection and Control coordination and Effective Grounding: The AESO, DFOs and TFOs had exploratory discussion relating to Transmission Protection and Control coordination as well as effective grounding and TOV/TRV with increasing DER. An assessment paper on Effective Grounding and TOV/TRV was published on March 31, 2022⁷.

Islanding/Anti-islanding: The AESO, DFOs and TFOs had exploratory discussion relating to Islanding/Anti-island and Restoration coordination. An Anti-Islanding screening and study guideline is planned to be published in Q2 2022.

Restoration coordination: Based on the current DER penetration, this work is rated as low priority. Therefore, this activity is rescheduled to start in 2022.

Commissioning and Testing requirement: AESO had discussions with DFOs/TFO on DER Commissioning/Testing requirement in November 2021. The AESO will publish an assessment paper on the topic in Q2 2022.

Cybersecurity requirements: The AESO and DFOs may have exploratory discussion whether a foundational cybersecurity guideline would be beneficial for transferring DER SCADA data to the AESO in 2022.

⁶ <https://www.aeso.ca/grid/grid-related-initiatives/distributed-energy-resources/der-roadmap-integration-papers/>

⁷ <https://www.aeso.ca/grid/grid-related-initiatives/distributed-energy-resources/der-roadmap-integration-papers/>

3. Market

This activity is designed to facilitate DER integration and access to the energy and ancillary services markets by removing unnecessary barriers and ensuring a fair, efficient, and openly competitive (FEOC) market. For energy market participation, the AESO is maintaining the current offer requirement size threshold of 5MW or greater and is proposing voluntary participation in the energy market for source assets of 1 MW or greater and less than 5MW. Voluntary Market Participation and its associated rule changes will be filed with the Energy Storage Rule Amendments. Please refer to Energy Storage Rule Amendments⁸ for related schedule.

For operating reserve market participation, AESO is proposing to reduce the minimum asset capability requirement from 15 MW to 1MW for Regulating Reserve, from 10MW to 1 MW for Spinning Reserve and from 5MW to 1MW for Supplemental Reserve. Changes to Operating Reserve minimum asset capability requirements will be aligned with the ongoing Operating Reserve Market Review⁹.

4. Tariff

The AUC also approved the implementation of the Adjusted Metering Practice (AMP) without legacy treatment and the AUC has directed the AESO to submit an implementation plan that addresses the timing and costs of implementing the AMP. On Dec. 10, 2021, the AESO submitted its Implementation Plan Application to the AUC for approval. The application is currently going through the AUC regulatory process.

In addition, the AUC made a decision on DCG Credit Module for Fortis's 2022 Phase II Distribution Tariff Application (AUC 26090 – Decision)¹⁰. The AUC has determined that the existing distribution-connected generation credit mechanism within DFO's respective tariffs will be discontinued.

Please refer to *Bulk Regional Tariff Design*¹¹ for more details on the stakeholder engagement on bulk and regional cost recover that may impact the future calculation of the Rate DTS tariff.

⁸ <https://www.aeso.ca/stakeholder-engagement/rules-standards-and-tariff/energy-storage-rule-amendments/>

⁹ <https://www.aeso.ca/stakeholder-engagement/rules-standards-and-tariff/operating-reserve-market-review/>

¹⁰ <https://efiling-webapi.auc.ab.ca/Document/Get/700505>

¹¹ <https://www.aeso.ca/stakeholder-engagement/rules-standards-and-tariff/bulk-and-regional-tariff-design/>