

Introduction

This plan provides an updated overview of the 2021 Plan for DER Roadmap Integration Activities in support of the [AESO Distributed Energy Resources \(DER\) Roadmap](#) (*DER Roadmap*).

Based on the priority of these DER integration activities, high and medium priority activities will continue to progress in 2021 and most will be completed or near completion by the end of 2021. The majority of the low priority activities have been scheduled to progress through either the conception phase or the implementation phase in 2021 or beyond.

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 Framework¹. 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.

¹ <https://www.aeso.ca/assets/downloads/Stakeholder-Engagement-Framework-Report-FINAL.pdf>

2021 Plan for DER Roadmap Integration activities

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 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	2021 Q3			2021 Q4			2022 Q1			2022 Q2		
			J	A	S	O	N	D	J	F	M	A	M	J
Stakeholder Engagement	DER Progress Updates Share progress on activities, other interrelated initiatives and address stakeholder questions.				E			E			E			E
Reliability	Data													
	Assess and implement minimum SCADA data trigger level	H	I											
	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	Scheduled for 2023											
	Near term/real time forecast to incorporate meteorological data into DER and variable generation (AESO internal activity)	M	Complete											
	Modelling													
	Energy storage model	H	Progress will be aligned with AESO Energy Storage – see Phase 2 Long-term Implementation activities											
	DER model directly connected at 25 kV bus	H	Complete											
	Assess feeder impedance to be included into DER models	H	Complete											
	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)	H	I											
	Enhance real-time operator's supply/demand requirements and displays (AESO internal activity)	M								C	I			

	Determine DER Trigger on Significant Outage Coordination	H	Complete												
	Technical Interconnection Requirement														
	Voltage and frequency ride-through requirement	H	I												
	Transmission protection and control coordination – Effective Grounding	M	C						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 and Aggregation Evaluate and assess options that encourage DER market participation	M	Progress will be aligned with DER Market Participation												
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 “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 is leveraging existing SCADA data from DFOs and is establishing connectivity with DFOs to enable SCADA data exchange for DER less than 5 MW in 2021 and 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; therefore, it is ranked as a low priority and this activity is planned to start in early 2022

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 is implementing 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 this is evaluated as a low priority activity and it will be re-evaluated in 2023.

Near-term/real-time forecast to incorporate meteorological data into DER and variable generation – The AESO is enhancing near/real forecast by incorporating meteorological data into modelling conducted for DER smaller than 5 MW and variable generation. The activity was completed in June 2021.

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 (ESRs) 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 both transmission connected and distributed connected energy storage, was completed. The EMS energy storage model will be enhanced when the EMS will be upgraded in the near future. The details of the DER Energy Storage model is covered in the Energy Storage Initiative and its scope and timeline will be aligned with appropriate Energy Storage model activity in the [Energy Storage Roadmap](#).

DER power system models directly connected at 25 kV bus – For models of DER to be used in the AESO Central Power System (CPS) model, the AESO has recommended a simplified process for selecting DER models larger than 5 MW by providing generic typical models per DER technology in the AESO Information Document #2010-001R, *Facility Modelling Data* ("ID #2010-001R"), which relates to Section 304.6 of the ISO rules, [Unplanned Transmission Facility Limit Changes](#) and Section 502.15 of the ISO rules, [Reporting Facility Modelling Data](#). For DER smaller than 5 MW, the AESO plans to use static data to build aggregated models. [ID #2010-001R](#) has been updated and posted on AESO website in July 2021.

Assess feeder impedance to be included into DER models – The AESO updated and posted ID #2010-001R in July 2021.

d. Coordinated planning

With increasing DER penetration, AESO's transmission planning will be enhanced with inputs from improved data, forecasting and modelling processes coupled with the Tx/Dx Coordinated Planning framework initiative. Engagement with DFOs, transmission facility owners (TFOs) and industry participants will follow the [Tx/Dx Coordinated Planning framework](#) 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. This activity will continue to progress in 2021 and 2022.

Enhance real-time operator's supply/demand requirements and displays – Enhance real time processes and tools in consideration of available DER SCADA data, forecasting and modelling information. This ensures continued reliable operation of the AIES as DER penetration continues to increase.

Determine DER Trigger on Significant Outage Coordination – Assessed the DER trigger level on significant outage coordination. The outcome of the assessment is to reduce non-significant transmission facility outages being classified as significant transmission facility outages due to DER connecting to the AIES. This resulted in amended ID #2013-003R Outages to clarify the interpretation of “connects” in subsection 3(3)d. The amended [ID #2013-003R](#) was posted on AESO’s website on July 22, 2021

f. Technical interconnection

As more DER 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 plans to publish, in 2021, a series of technical assessment papers to identify the AESO’s recommended implementation approaches to address various technical aspects of integrating DER. Based on a prioritization exercise completed by the AESO in Q1 2021, The remainder of these DER technical interconnection recommendations and other DER implementation activities will continue to progress to completion through 2021 and 2022.

Voltage and frequency ride-through requirement – The AESO, DFOs and TFOs had exploratory discussions relating to frequency and voltage ride-through capability criteria. [An assessment paper](#) on the topic was published on March 31, 2021. AESO is working and supporting the DFOs in implementing AESO recommendations in DFOs’ DER Technical Interconnection Requirements by end of 2021.

Transmission Protection and Control coordination – 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. Assessment paper on Effective Grounding and TOV/TRV is planned to be published in 2021.

Islanding/Anti-islanding, and Restoration coordination – 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 2021.

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 – Once the AESO’s assessment for commissioning and testing requirements are finalized; AESO’s recommendation will be explored with DFOs and TFOs in late 2021/early 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 late 2021.

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. For operating reserve market participation, AESO is proposing to reduce the minimum asset capability requirement from 15 MW to 1MW for Regulating Reserve, from 10 MW to 1 MW for Spinning Reserve and from 5 MW to 1 MW for Supplemental Reserve.

Please refer to the [DER Market Participation](#) for more details related to stakeholder consultation and review.

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. As part of preparing and developing the AMP implementation plan, the AESO will continue to work with DFOs to gather information and feedback to incorporate into the plan.

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

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