

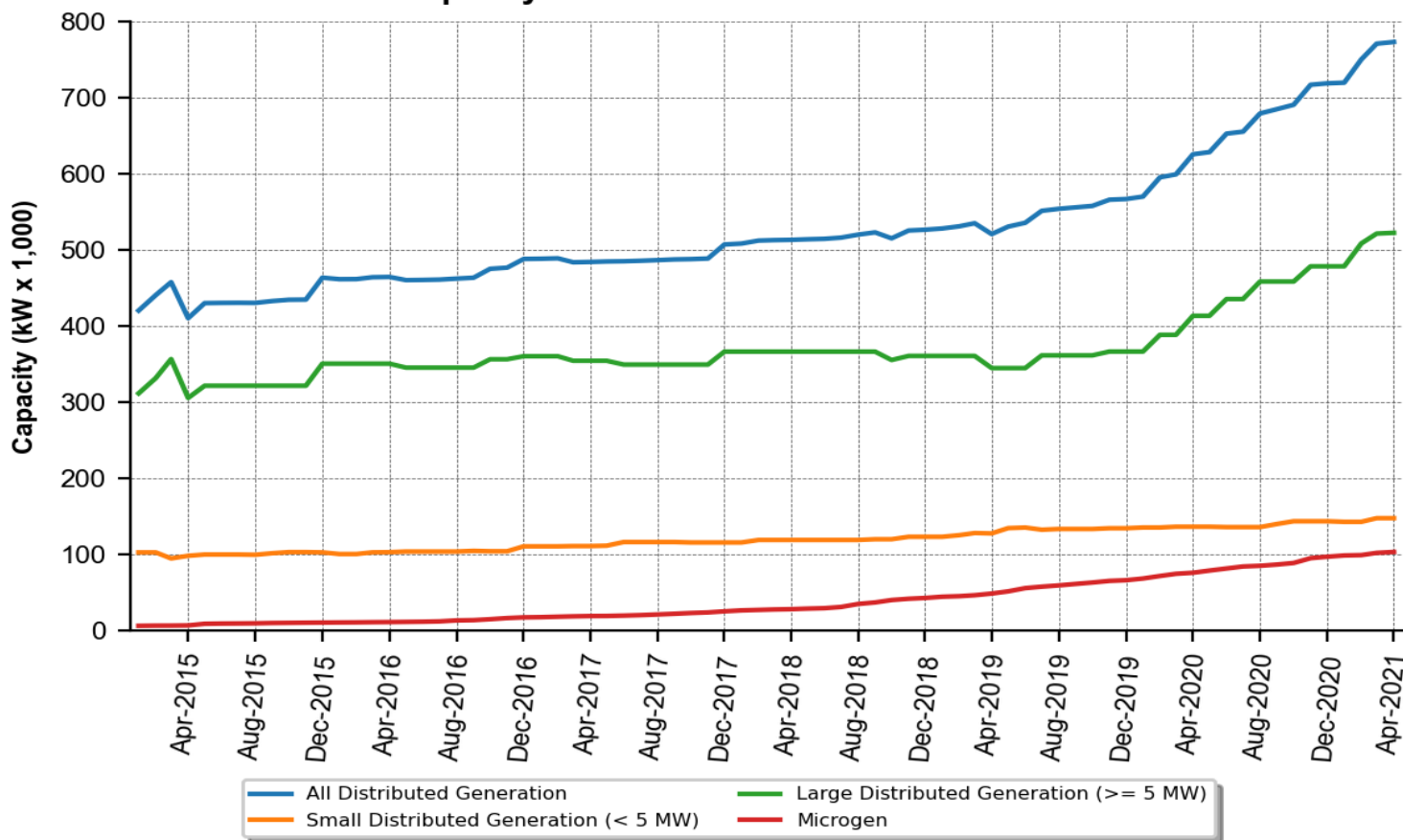
# Distributed Energy Resources Progress Update

June 2, 2021

- Quarterly progress update on AESO DER Roadmap Integration Activities:
  - Update on DER Roadmap integration activities since February 2021 update
    - Updated the schedule based on priority assessment of DER Roadmap Integration Activities
    - Technical Interconnection Requirements
    - DER Static Data Portal
    - Small Distributed Energy Resource (DER) Market Participation Recommendation
  - What's Next?
    - Trigger Point Assessment
- Update on the AESO TxDx Coordinated Planning initiative:
  - Progress of the TxDx coordinated planning initiative

- DERs statistics at the end of April 2021

Capacity of Distributed Generation in Alberta



- Since the last update in February 2021, the DER installed capacity in Alberta increased by 49 MW
- The total DER installed capacity at the end of April 2021 reached to 773 MW

- [2021 Plan for DER Roadmap Integration Activities](#)
  - Updated activities and published the latest plan in March 2021
    - To focus AESO's and Stakeholder's efforts and resources on areas that the AESO currently considers to have the most impact on the AIES
    - Prioritization was based on potential probability and impact on the AIES, as well as resources and estimated cost required to complete and implement each DER activity
  - High and medium priority activities will continue to progress in 2021 and most of these activities will be completed or near completion by the end of 2021
  - Low priority activities will continue to progress through either the conception phase or the implementation phase in 2021 or beyond

- Topics
  - Reviewed DER technical interconnection requirements in consultation with DFOs/TFOs
    - DER Voltage/Frequency (V/F) Ride-Through
    - Transmission Protection Coordination and Effective Grounding
    - Islanding and Anti-Islanding
    - Cybersecurity
    - Commissioning and Testing
- Published the [DER Ride-Through Performance Recommendations](#) paper in March 2021, proposing adoption of specific Industry Standards as well as proposed implementation approach for Alberta

- Issue:
  - Potential for widespread DER tripping without ride-through requirement under abnormal conditions
- Survey results from TPEG members in Q1 2020:
  - Majority of the DFOs in Alberta do not have frequency or voltage ride-through requirements in place for DERs
  - Settings are inconsistent across distribution utilities
  - Some DER under-frequency trip settings are less stringent than UFLS requirements, leading to DERs tripping before the UFLS program is activated
- AESO Recommendation:
  - Adoption by DFOs of appropriate industry standards to ensure the continued reliability of the AIES, specifically:
    - IEEE Standard 1547-2018
    - CSA C22.3 NO 9

- During abnormal voltage conditions
  - **Inverter-based DERs** incorporate default settings corresponding with the **supplemental grade** (IEEE 1547 Standard Category II) for voltage tripping and VRT
  - **Machine-based DERs** incorporate default settings corresponding with the **baseline grade** (IEEE 1547 Standard Category I ) for voltage tripping and VRT
- During abnormal frequency conditions
  - **All DERs** on the AIES incorporate the uniform settings for mandatory frequency tripping and FRT as defined in CSA C22.3 No. 9
  - **Inverter-based DERs** shall have the **functional capability** to meet the frequency-droop (frequency/power) requirements defined in IEEE Standard 1547-2018

# DER V/F Ride Through Performance Proposed Implementation Approach

- Existing DERs
  - No recommendation to adopt relevant Industry Standards for existing DERs
- DER projects in the process of being interconnected
  - Recommend DFOs work collaboratively with DER owners to adopt and incorporate the relevant Industry Standards if practical to do so
- New DER projects
  - Recommend DFOs adopt and incorporate relevant Industry Standards when their revised technical interconnection guidelines are published, or by December 31, 2021 at the latest



- Background:
  - Protection coordination between TFOs, DFOs and DER facilities is required for system reliability
- AESO's Assessment and Conclusions:
  - Recommend DFOs continue to lead the protection coordination efforts between TFOs and DERs.
  - Recommended practices and solutions continue to evolve and depend on many factors including generation type, location, substation transformer ratings and other existing DERs
  - Existing practices for connection projects and the existing requirement documents (e.g. ISO rules and DFO's Technical Interconnection Requirements) are adequate
  - The AESO will continue to actively participate in discussions with TFOs and DFOs as recommended practices continue to evolve to ensure the safety and reliability of the AIES for DER connections

- Developed a Data Portal to gather the DER Static Data of Microgenerators in the AIES
- The Data Portal features:
  - Secure interface for DFOs to send DER static data to the AESO
  - Electronic data transfer with data validation
  - Efficient data collection process
  - Audit capability
  - DER data available for both DFOs and the AESO
  - Multiple DER data upload/download options available
- DFOs completed the User Acceptance Testing in March 2021
- DER Data Portal was rolled out for use by DFOs on May 10, 2021

- Small DER Market Participation draft recommendation paper was published in January 2021
  - Written stakeholder comments were received by March 17, 2021
- Next Steps:
  - Changes to voluntary participation in the energy market for source assets between 1-5 MW will be consulted on through the AUC Rule 017 process in co-ordination with other market initiatives.
  - Changes to OR market participation for Small DER will be consulted on through the OR market review process scheduled later this year.

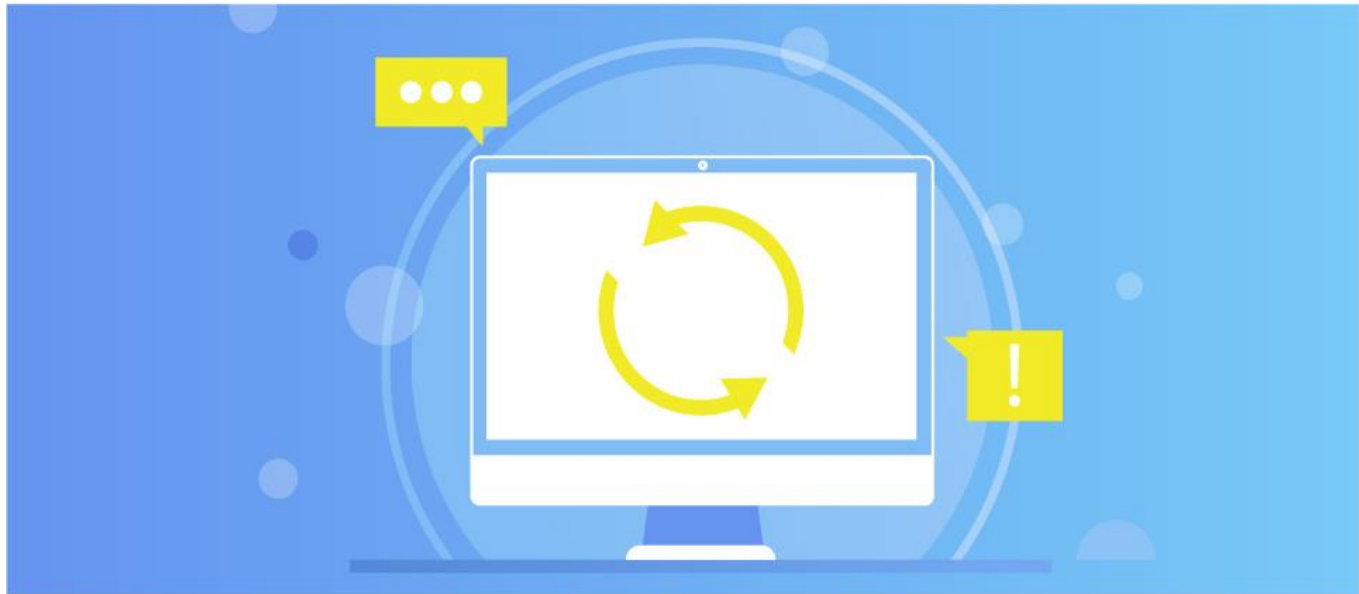
# Progress Updates on Tx/Dx Coordinated Planning Initiative

- The AESO commenced the Tx/Dx Coordinated Planning Framework initiative in 2020
  - <https://www.aeso.ca/grid/grid-related-initiatives/transmission-distribution-tx-dx-coordinated-planning-framework/>
- Drivers for the initiative
  - The increased complexity of AIES planning and operation, together with overall AIES infrastructure costs to end-use customers, has resulted in longer timelines and additional informational requirements for DFO-driven SASRs
  - As progressive growth of DERs within the distribution networks impacts energy flows in both directions, there is increased value in coordinated planning between the AESO and DFOs for end-use customers
  - The proliferation of DERs, increase in variable generation, and corresponding increase in variable power flows at the Tx/Dx interface are driving the need for proactive coordination between the distribution and transmission systems

- Targeted engagement - TFOs, DFOs and ratepayer groups
- Key focus areas
  - Developed a [Decision-Making Framework](#) (DMF) for responding to a DFO's system access service request. DMF was posted on the AESO's website in the new "DFO Connection Projects" page on March 31, 2021
  - [Updated DDR Guideline](#) provides a clear direction for DFOs; Updated DDR Guideline was posted on March 31, 2021
  - Continue to explore areas for improved coordination
    - DFO Connection Process improvements
    - Generation integration capability assessment and alignment with DFO hosting capability
    - Coordination of AESO system planning with DFO/TFO planning
    - Evaluation of probabilistic planning

- Publish AESO DER Roadmap Integration papers in 2021
  - Effective Grounding Guideline
  - DER Anti-Islanding Screening and Study Guideline
- Assess trigger point assessment for DER activities
  - The AESO will develop a process to assess trigger points for DER activities in 2021
  - Trigger-points will be used to continuously evaluate whether additional controls and improvements to AESO processes and/or DFO processes are required
  - This approach will help all parties manage their costs and resources while implementing the necessary changes to keep pace with the growth of DERs
- Continue with planned exploration and implementation activities in 2021

We value stakeholder feedback, and we invite all interested stakeholders to provide their input on this presentation to the stakeholder email address: [stakeholderrelations@aeso.ca](mailto:stakeholderrelations@aeso.ca)



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