

Adjusted Metering Practice Implementation Plan

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Purpose

The purpose of this implementation plan (“Plan”) is to describe the activities that the AESO, distribution facility owners (“DFO”), meter data managers (“MDM”) and transmission facility owners (“TFO”) will undertake to implement the AESO’s adjusted metering practice (“AMP”) at substations connected to electric distribution systems.

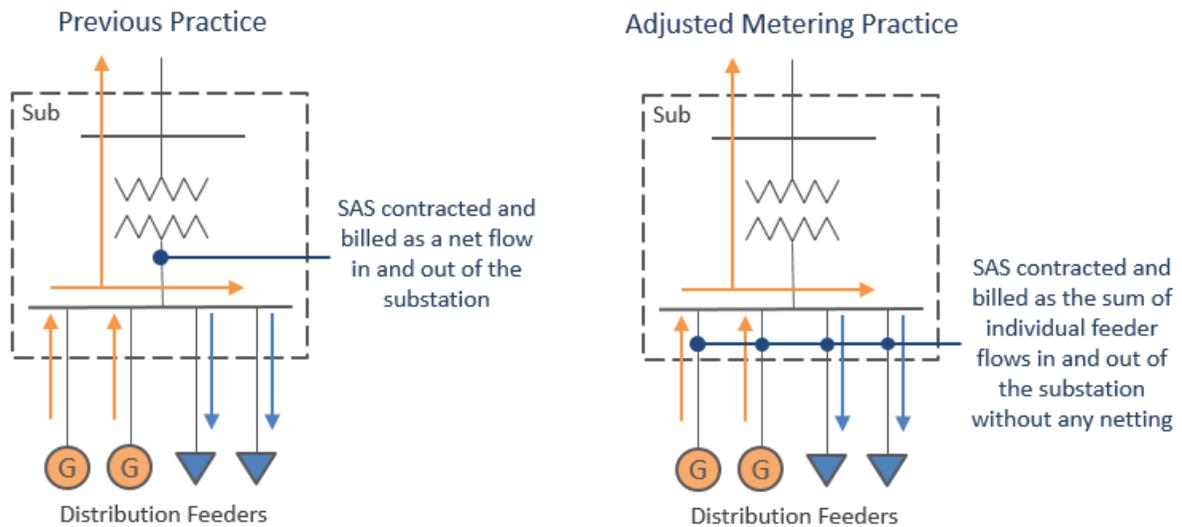
1. Overview of Adjusted Metering Practice

1.1 Background

The AESO has been directed by the Alberta Utilities Commission (“AUC”) to implement the AMP without legacy treatment, and as such, the AMP will apply to all new and existing substations. The AUC has recognized, however, that a natural transition period will be needed to fully implement AMP at existing substations. The AUC has therefore directed the AESO to develop and file a Plan that details the extent, timing, and cost for implementing AMP at these substations.¹

1.2 What is the AMP?

The approved AMP² is a practice of contracting, measuring, and billing for transmission system access service (“SAS”) in a manner that reflects the sum of flows on individual feeders, for substations that provide SAS to electric distribution systems. Under the previous practice, a substation was treated as a single point of delivery and a single point of supply, which allowed for the netting of feeder flows against each other for a total that reflected the net flow through the substation. Under the AMP, each feeder is recognized as a



¹ See Decision 25848-D01-2020, Stage 2 Review and Variance of Decision 22942-D02-2019 Adjusted Metering Practice and Substation Fraction Methodology, December 23, 2020 and Decision 26215-D01-2021, Review and Variance of Decision 26215-D01-02021, June 3, 2021

² See Alberta Utilities Commission Decision 22942-D02-2019 and Decision 25848-D01-2020 for approvals of the adjusted metering practice.

single point of delivery and single point of supply and totaled for system access service such that the individual feeder flows are not netted against each other.

Under the previous practice, SAS was generally contracted and billed under a single demand transmission service (“DTS”) for the substation based on the overall substation net flow; and similarly, under a single supply transmission service (“STS”) for the substation based on the overall substation net flow. Under the AMP, SAS can still be contracted and billed under a single DTS and a single STS for the substation; however, these agreements will now be based on the totalization of the points of delivery for the DTS and points of supply for the STS for each individual feeder.

1.3 Compliance With the AMP

At substations where there are reversing flows on a feeder (i.e. flows into the transmission system), there are three conditions that must be satisfied to be compliant with the AMP:

SAS Agreements	<ul style="list-style-type: none"> • Contract capacities for SAS agreements for STS and DTS reflect the inflows and outflows of a substation without netting of the individual feeder flows against each other
Feeder Metering	<ul style="list-style-type: none"> • Revenue metering is installed on individual feeders so that the flows for each unique physical connection point to the transmission system (i.e. feeder) can be measured
Data Aggregation	<ul style="list-style-type: none"> • Measurement Point Definition Records (“MPDR”) aggregate the individual feeder meter data into the billing data without netting of the individual feeder flows against each other, and are implemented in the MDM’s data system for reporting

Satisfying the above conditions may require work ranging from administrative changes to update SAS agreements and MPDRs, to major physical changes within substations to install feeder-level metering.

Substations that do not have reversing flows on any feeders are compliant with the AMP for the following reasons:

- the SAS Agreements condition is inherently satisfied as there are no flows that offset each other; and
- the Data Aggregation and Feeder Metering conditions are irrelevant because there are no reverse flows that would impact billing (i.e. substations are contracted and billed appropriately for the flows from the transmission system).

1.4 Authoritative Provisions Relating to AMP

The ISO tariff and ISO rules provisions that enable the AMP will be effective April 1, 2022, subject to AUC approval of the provisions no later than March 1, 2022.

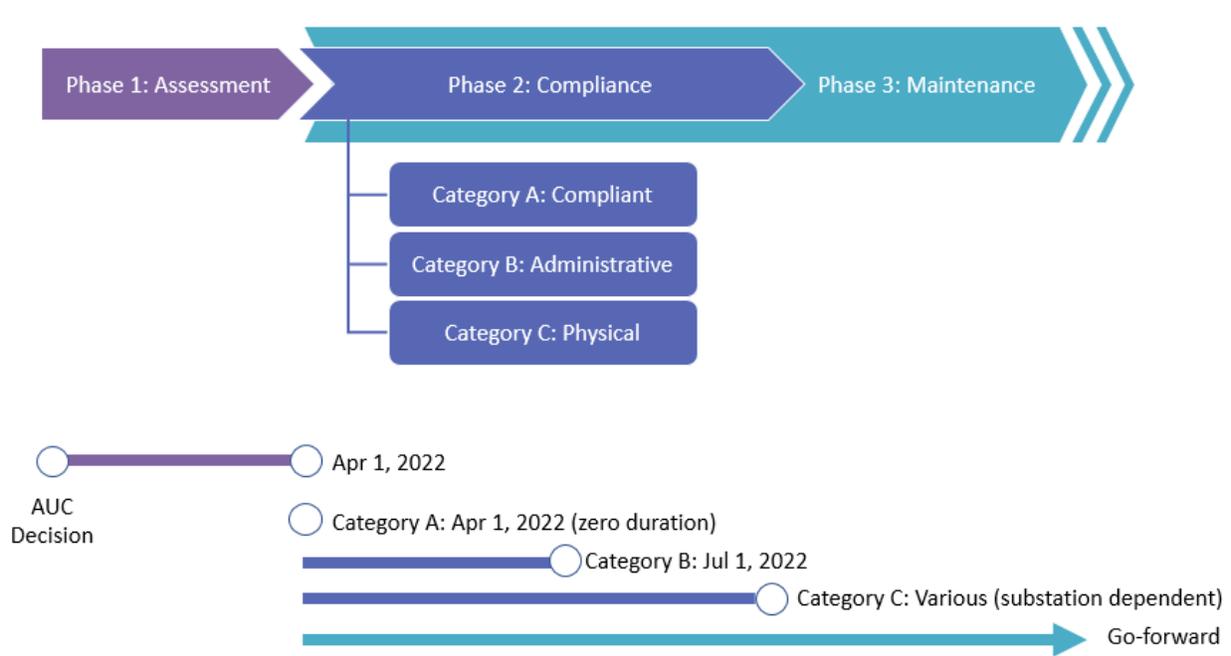
The ISO tariff requires that SAS contract capacities for DTS and STS reflect flows at the feeder level; and allows for totalization of DTS flows across multiple feeders (and similarly, for the totalization of STS flows across multiple feeders).

Section 502.10 of the ISO rules, *Revenue Metering System Technical and Operating Requirements* will require that new substations include meters at the individual feeder level. This ISO rule will also ensure that the design and operation of revenue metering, as documented in a functional specification, must allow for the appropriate settlement per the ISO tariff.

2. Implementation Plan

2.1 Overview

The Plan will be executed in three phases:



The above dates are subject to AUC approval of the Plan no later than March 1, 2022.

The estimated population of substations and expected costs of each phase are as follows:

Phase	Substation Count	Cost
Phase 1	~ 450	Operational costs
Phase 2 – Category A	~ 365	No associated costs
Phase 2 – Category B	Max 75	Operational costs
Phase 2 – Category C	Max 10	Avg \$750k per sub = Max \$7.5M
Phase 3	All existing and future	As required for future projects

Substation counts and costs based on very high-level information, and further explanation is provided in the following sections.

2.2 Phase 1: Assessment

This phase of the Plan will see all existing substations assessed by the DFOs to determine if the substation has any feeders that are reversing flow. Based on whether there are reverse flows, substations will be categorized for further actions in the next phase.

To provide helpful context to understand the scale of each phase, the AESO has done some preliminary analysis of existing substations as of August 2021. There are approximately 450 substations serving DFO distribution systems that will be assessed as part of Phase 1. Of these, approximately 365 do not have any distribution connected generation (“DCG”) located downstream of them, and therefore should not have any reversing flows.³ These numbers will fluctuate as new substations and DCGs energize over the next several months.

The Phase 1 assessment of existing substations is planned to be complete by April 1, 2022. This date aligns with the effective date of the ISO tariff and ISO rules provisions that enable the AMP.

2.2.1 Feeder Flow Analysis

For every substation, the corresponding DFO will perform an analysis to determine if there is the existence of (or potential for) any reversing flows at that substation, and the expected magnitude of those flows. Substations that do not have any generation connected downstream inherently would not have any reversing flows.

2.2.2 Substation Categorization

Substations will be placed into one of three categories based on the outcome of the feeder flow analysis, and the existence of meters on individual feeders at the substation. Each category has different actions and processes that need to be executed to satisfy the conditions required to be compliant with the AMP, as discussed in section 1.3.

The three categories are as follows:

ID	Name	Description
A	Compliant	Substations do not have any reversing flows on feeders, therefore the SAS Agreements condition is inherently satisfied, and the Data Aggregation and Feeder Metering conditions are irrelevant
B	Administrative	Substations satisfy the Feeder Metering condition, but do not satisfy the SAS Agreements or Data Aggregation conditions
C	Physical	Substations do not satisfy any of the three conditions

2.3 Phase 2: Compliance

This phase of the Plan will see actions undertaken to bring existing substations into compliance with the AMP. The actions required and timing is dependent upon the Phase 1 categorization of the substation.

For the Category B and Category C substations, there will be a transitory period to undertake the actions required to bring the substations into compliance with the AMP. During this transitory period, the AESO would continue to contract and bill at the substation based on the existing contracts and MPDRs in place.

Phase 2 will begin upon completion of Phase 1 (April 1, 2022).

³ The use of “DCG” for providing a preliminary estimate of substation counts in the Plan does *not* include microgeneration because, due to their size and nature (sized to meet a person’s load), they aren’t significant drivers of reverse flow. The exclusion of microgeneration therefore provides better estimates for the purpose of the estimated substation counts for the Plan. However, the use of “DCG” for all other purposes in the Plan includes microgeneration.

2.3.1 Category A: Compliant

Substations that fall into this category are already compliant with the AMP. They do not require any actions to be taken and immediately pass through to Phase 3 of the Plan.

Based on the AESO's preliminary analysis, it is expected that the approximately 365 substations that do not have downstream DCG will automatically fall into this category. Additional substations will fall into this category as the result of the feeder flow analysis showing that there are no reversing feeder flows.

2.3.2 Category B: Administrative

Substations that fall into this category already satisfy the Feeder Metering condition. To satisfy the Data Aggregation condition, the AESO and MDM will coordinate development and implementation of MPDRs and updating of meter data systems. To satisfy the SAS Agreements condition, the AESO and DFO will execute new or amended SAS agreements. All MPDRs and SAS Agreements will have an effective date of July 1, 2022.

Once the new or amended MPDRs and SAS agreements are effective, these substations will be compliant with the AMP and will pass through to Phase 3 of the Plan. Note that this means there will be a transitional period between April 1, 2022 and July 1, 2022 as this category is brought into compliance.

Based on the AESO's preliminary analysis, it is expected that only a subset of the approximately 75 substations with downstream DCG will fall into this category, as some of those substations will likely be placed into Category A on the basis of no reversing flows. This will result in a maximum of 150 MPDRs to update and implement (for both STS and DTS calculations), and 75 SAS agreements (as only STS agreements require capacity updates).

2.3.3 Category C: Physical

Substations that fall into this category require physical changes to the current metering arrangement to satisfy the Feeder Metering condition. Since the installation of meters at the feeder level is within the transmission facility, TFOs will be executing a metering alteration project for each applicable substation. These substation alterations will be TFO direct assign projects. The cost for these Category C alterations will be recovered as a transmission system cost from all Alberta ratepayers.

Upon starting Phase 2, the AESO will work with the TFOs to develop a master schedule for the Category C substations. Substations with significant reverse flows will be higher in priority. The AESO will direct the TFO to provide information on the scope, cost, and timing for each substation. Using this information, along with the results of the Phase 1 reverse flow analysis, the AESO will work with the TFO to prioritize the substations and develop the schedule.

Timing will also depend on factors such as the scope of the work at the substation (which is site-specific); and when the TFO can plan for and perform the work (including limitations for resources, outage scheduling, and if/how to optimize the alterations at multiple substations). As a general guideline for these substation alteration projects, the AESO is targeting to have one to two projects per TFO underway per year, but this number may change following the development of scope and timing for all Category C substations.

At this time, the AESO does not have sufficient information to reasonably set a firm deadline to complete the alterations for all Category C substations. Additionally, the master schedule for these Category C substations must be dynamic enough to adapt for various changes (for example, if the TFO needs to shift the work for outages or other emergencies that may arise, or if a Phase 3 substation subsequently requires

metering alterations). If any changes of this nature occur, the AESO may shift the prioritization of a Category C substation to spread out the work and costs. The AESO will work with the TFO to determine how any Category C substations may be shifted. Note that this may result in some cases where alterations for a Phase 2 substation are completed after a Phase 3 substation.

The AESO will direct the TFOs to start executing the metering alterations for a substation per the master schedule. As the work nears completion, the AESO will provide the MDM with an updated MPDR and execute a new or amended SAS agreement with the DFO. The MPDR and SASR agreement will have an effective date for the first of the month following the completion of the metering alteration work.

It follows that because these substations don't have meters on individual feeders until the completion of the substation alteration project, the SAS Agreements and Data Aggregation conditions cannot be satisfied because the inflows and outflows on the individual feeders can't be measured. The AESO acknowledges that there will be a transitory period while the necessary meters are installed on the feeders to allow for contracting and billing that reflects the feeder flows. During this transitory period, the AESO would continue to contract and bill at the substation based on the existing contracts and MPDRs in place. The AESO will maintain a record of all substations that require *temporary* variance including details regarding how long the temporary variance would be in place.

The substations in this category currently have meters at the transformer level instead of on individual feeders. Based on the AESO's preliminary analysis, it is expected that only a portion of the approximately 10 substations with downstream generation will fall into this category, as some of those substations will likely be placed into Category A on the basis of no reversing flows.

Based on high-level discussions with the TFO about ballpark costs for metering alterations, each substation can cost on average, \$750,000. Note that this is a ballpark number based on abstract estimates, and not based on actual substation estimates – substation-specific estimates can only be provided once a TFO has been directed to develop the scope and estimates for a substation, and may deviate significantly from this number.

2.4 Phase 3: Maintenance

This phase of the Plan moves the AMP into an ongoing compliance mode governed by authoritative documents, similar to any other ISO tariff and ISO rule provisions. While all existing substations will be compliant with the AMP at the completion of Phase 2, there are circumstances that can lead to a substation requiring actions to maintain compliance in the future. Most commonly, the addition of new or additional generation connected downstream of a substation can lead to reverse flows at the feeder level.

As this phase is for a go-forward basis, there are no set timelines for this phase. This phase ensures that those substations are brought under compliance as required in a timely manner. See subsections below for further details.

2.4.1 Ongoing System Access Service for DFOs

DFOs are accountable for determining if they hold the correct SAS contract capacities at existing substations. If a change to either a DTS or STS agreement is needed, or if a new agreement is needed, the DFO submits a SASR to the AESO to implement the change to their SAS, and the AESO initiates a

project under the Connection process⁴ to respond to the SASR. This is the current longstanding practice and does not change.

As part of the project, the AESO will determine if the substation will require any actions to remain in compliance with all ISO tariff and ISO rule provisions, including those related to the AMP. Depending on the reason for the change, the AESO may require actions to satisfy the SAS Agreements condition, the Data Aggregation condition, the Feeder Metering condition, or some combination thereof.

Administrative changes required to satisfy the SAS Agreements and Data Aggregation conditions will occur within the scope of the project and the Connection process, which is the same practice that occurs today.

Actions required to satisfy the Feeder Metering condition will also occur as part of the scope of the project. In cases where the proposed connection of a new DCG tips the balance for reverse flows, the metering alterations are inextricably linked to the new DCG. Ideally, the timing for the completed metering alterations and energization of the DCG would align, but there may be cases where the metering alterations will require more time to complete. To balance the risk of delaying the connection of the DCG with undertaking costly metering alterations that are tied to the energization of that DCG, the AESO will work with TFOs to time the metering alterations to occur *after* the project triggering the reverse flow is certain.

As part of the connection process, the AESO will develop a customer contribution decision (“CCD”) to classify the project costs as system-related or participant-related; to determine the amount of AESO investment available for a project; and to determine the amount of contribution required from the DFO. The ISO tariff provides the AESO with the discretion to classify all or a portion of the metering costs as system-related, as warranted. Consistent with the longstanding practice, the final determination of connection project costs in a CCD are subject to the framework at the time of that determination (this would include the ISO tariff and AESO Contribution Policy that applies to the project, and the legislative framework).

Similar to what occurred for Phase 2 substations, there will be a transitory period while the metering alterations are completed, during which, the AESO would continue to contract and bill at the substation based on the existing contracts and MPDRs in place.

Note that there are a number of circumstances that may result in a change to the balance of load and generation on a feeder. The DFO should perform feeder flow analysis at substations with downstream generation when circumstances indicate that a change in flows may be possible to ensure that they are contracted correctly.

2.4.2 Metering Infrastructure at Substations Compliant With the AMP (Including New)

Newly constructed substations do not have reversing feeder flows upon energization are therefore compliant with the AMP as noted in subsection 1.3. However, new substations will be required to install full revenue metering on each feeder when constructed. Proactively installing the feeder metering is an efficient way to avoid a potential costly retrofit in the future.

Existing substations that do not have reversing flows are also compliant with the AMP as noted in subsection 1.3. However, if an existing substation without feeder metering undergoes maintenance,

⁴ Each project type (connection project; behind the fence project; or contract change project) will follow its designated process.

modifications, or alterations that involve the installation of a complete set of switchgear for a bus, the TFO will be required to install full feeder metering for that bus as part of the work being performed.

2.5 In-Flight Projects

In-flight projects will continue to follow the current Connection process and related ISO tariff provisions until the effective date of the provisions discussed in section 1.4.

There are a number of in-flight projects (and likely new projects) that will be occurring at substations that will also require actions for the substation to comply with the AMP. Having a concurrent project occur at a substation can create timing issues and complexities for the AMP activities as these activities will have to factor in the in-flight project timing for energization and execution of SAS agreements. The specific timing of SAS agreement execution and the in-service date of the project will be reviewed to determine if there are any efficiencies that can be gained between the project and execution of the Plan. In cases where a substation requires physical changes to comply with the AMP, projects that have not completed Stage 2 of the Connection (or BTF) process will be considered as a project in Phase 3; projects that have completed Stage 2 will have the associated substation treated as a Category C substation.

The AESO notes that there may be some in-flight projects where the execution of SAS agreements is pursuant to a prior version of the ISO tariff as provided by the Transitional Election of GUOC and System Access Service Agreement Provisions.⁵ In these cases, the execution of Phase 2 activities for compliance with the AMP should be coordinated in a manner that allows the project to continue to comply with the ISO tariff provisions that are applicable to the project. The AESO will not adjust the Generating Unit Owner's Contribution amount determined for these projects to reflect the STS contract capacity required under the AMP.

⁵ See subsection 3.8(1)-3.8(4) of 2021 ISO tariff effective January 1, 2021.