SkyFireEnergy
Solar Energy Solutions

June 26, 2025

Dear AUC Commissioners and staff,

RE: Written Consultation on AUC Rule 024: Rules Respecting Micro-Generation, associated AUC forms and the Micro-generation notice submission guideline

Since completing our first grid-tied solar PV system in Calgary in 2001, SkyFire has completed more than 6,900 solar PV Micro-Generation systems in Alberta. Over the past 24 years, our team has worked with integrity in following the Micro-Generation Regulation and AUC Rule 024 in managing our client's grid connection applications for projects varying in range from 700 Watts (the early days of solar had humble beginnings!) to 4.2MW. Our work spans the homebuilder industry (>1000 systems per year), retrofit residential, commercial and industrial. We have worked collaboratively with wires owners to help ensure the fair and consistent application of the Regulation but have witnessed and at times struggled with differing views on these matters. We appreciate the AUC's attention on these issues and we are pleased to support this review of Rule 024: Rules Respecting Micro-Generation, associated AUC forms and the Micro-generation notice submission guideline. Note that our responses consider only solar given this is our core expertise and the vast majority of Micro-Generation systems in Alberta.

Questions and Responses

1. Should there be a standardized methodology or minimum information requirements for utilities' calculation of the estimated annual consumption at a customer's existing or new site and the calculation of the micro-generation unit's output? Please provide an explanation.

Yes, there should be a standardized methodology for utilities' calculation of both the estimated annual consumption at a customer's existing or new site and of the calculation of the micro-generation unit's generation.

This is important to us, the industry and consumers in order to ensure fairness. The industry (solar PV installers) compete for customers with many seeking the largest system possible. If one installer claims to be able to construct a larger system and generate more energy, for many of these customers, the decision becomes much

easier (i.e. go with the company offering the largest system). Whether or not the system can (or should) be approved or not, may be secondary and after the customer has committed and provided a deposit, the ability to switch providers becomes much more daunting. This is also true of expected generation (i.e. kWh/kWp) from a given system though this is more of an issue/challenge that needs to be addressed by the industry, through education.

a. Please identify and justify the best historical timespan for accurately assessing a customer's historical energy usage (for existing sites).

For existing sites, utilities should consider the maximum annual average found between one and five years of historical energy consumption data. While one year is typically sufficient for most residential applications, some industrial, agricultural or other consumers may have consumption that varies significantly from year to year. For example, grain drying operations may see significant variability in electricity consumption from year to year depending on the year's temperature, humidity, and rainfall which may require a longer outlook. Residential consumers may see variability connected to longer vacations or extended time out of town working remotely. A landlord will often see significant variability from one tenant to another that again justifies a longer outlook on energy consumption.

It is important that utilities are consistent, but flexible when considering historical energy consumption. The AUC has previously provided clear interpretation that aligns with this approach within Decision 28319-D01-2023:

> 22. Similarly, the Commission considers that in the context of Section 1(1)(h)(ii), the term "annual" does not preclude consideration of past time periods and does not restrict consideration of annual energy consumption to just the previous year.
>
> 23. The Commission further considers that an interpretation of Section 1(1)(h)(ii) that allows for flexibility in considering whether the condition is met is more consistent with the purpose of the *Micro-generation Regulation*, which is, in part, to promote self-supply by renewable energy resources and to simplify the regulatory process for micro-generators. The Commission endorses the following statement in Decision 23412-D01-2018:[14]
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> > Given the purpose of the *Micro-generation Regulation* […] the Commission does not consider it reasonable to find that because the definition of micro-generation generating unit contains conditions, that those conditions must be read as narrowly as possible. The Commission considers that a more restrictive interpretation of Section 1(1)(h)(ii) would dissuade self-supply by renewable energy sources.

b. Please identify and justify the best way for accurately projecting a customer's future energy usage (for new sites).

We would recommend that new sites be considered in two streams:

1) Basic minimum energy consumption assessment with no additional analysis required
    a) Residential: Assume that a new residential site will consume the Alberta average. Publish the Alberta average at a regular cadence (e.g. 3 years) to ensure that we are working with the best available data.
    b) Commercial and Industrial Sites: Use a reasonable estimate of the site's load capacity factor in relation to its estimated demand as would be considered by the utility in the new load service application.

    These are reasonable assumptions that can avoid costly and unnecessary energy analysis by the applicant and technical review by the wires owner.

2) All other applications - Applicant is required to produce an assessment of the estimated energy consumption by a reputable authority (ex. Energy Advisor for Small Micro-Generation, Professional Engineer for Large Micro-Generation)

c. Please specify and justify the minimum level of proof that utilities should accept if a customer explains that they intend to increase their electricity consumption shortly after installing a micro-generation system (such as electric vehicle proof of purchase, etc.)

Proof of purchase is a reasonable requirement for applicants seeking approval for micro-generation systems that would produce more than their historical consumption would otherwise allow.

d. Please explain how a new micro-generation unit's yearly energy output should be calculated, including accommodation for any partial shading or coverage of rooftop solar photovoltaic system.

The accurate analysis of solar PV generation requires consideration of a wide range of variables affecting generation including but not limited to:

- Solar array capacity (DC Watts, Wp)
- Inverter capacity (AC Watts, W)

- DC to AC oversize ratio - affecting 'clipping' of DC capacity. Clipping percentages will vary with the design of the array - clipping losses on an array that is split to face two directions (ex. East and West arrays) may be negligible while the same DC to AC oversize ratio on a single south facing array will be much higher.
- DC and AC wiring ohmic losses (affected by length, conductor sizing, etc)
- array angle (i.e. tilt)
- array azimuth (residential systems commonly use multiple roof surfaces facing different orientations)
- Racking type (fixed or tracking) - while rare for Micro-Generation systems, some larger MG systems may be designed with single axis, or even dual axis tracking systems.
- Geographical location
- Shading (far shading from mountains and near shading from trees, buildings, etc)
- Snow and soiling losses - this will vary significantly from system to system and will be affected by:
    - Location tied to climatic variability (ex. systems in Calgary clear snow naturally more effectively than systems in Edmonton given the higher irradiation levels, longer days and more mild temperatures including chinooks)
    - Specific site conditions such as
        - solar module angle and azimuth
        - shading
        - wind exposure
    - Bifacial vs. non-bifacial modules - bifacial modules in turn are affected by albedo, racking type (elevated modules will produce more from the backside and melt snow faster than monofacial modules or modules mounted flush to a roof surface for example), backside shading conditions, etc
    - Annual variability of snow and climatic conditions
- Solar module temperature coefficients and backsheet colour - modules with black backsheets will heat up more and therefore produce less power than white or clear backsheet solar modules
- Inverter type and efficiency (central, string, DC-optimized string or micro-inverter) - the effect of the inverter type can be significant when

affected by shading and module mismatch (no two solar modules are identical); mismatch losses will increase with time as the solar modules degrade over time
- Transformer no-load and efficiency losses (where applicable - more common on commercial or industrial systems)
- Availability (maintenance downtime, etc)
- Curtailment (may apply on export limited commercial and industrial projects)
- Additional conversion losses for battery based grid tied solar PV systems,
- Climatic data set - significant variability exists (20% in some cases) between some public and private (paid) data sets
- etc

Further to the above, the energy generation from a solar PV array will degrade over time (0.1 - 0.5%/year) and tree shading may increase or decrease with time as nearby or adjacent trees grow or are cut down.

It is simply not reasonable (or cost effective) for a wires owner to consider all of the above variables in order to *accurately* assess energy generation for a solar PV system in Alberta. As an alternative, we would suggest that wires owners consistently use simple energy generation estimating tools (ex. PVWatts) to *approximate* energy generation. Fortis can be commended for the integration of PowerClerk into its Micro-Generation application process to support in this analysis. While tools such as PVWatts and PowerClerk can support simple and quick calculations (PVWatts allows for simple API integration for streamlined use), they cannot be relied upon for accurate generation estimates without a complete and thorough assessment of the above variables which again, is simply not reasonable for a wires owner to complete. **Therefore, the approximate energy generation produced by these tools must only be used with an additional applied degree of uncertainty** - perhaps in the range of +/- 25% if inputting project specific capacities (DC and AC), GPS coordinates and array orientation details and inputting generic but reasonable average losses for soiling, line losses, etc. A further opportunity should then be available for applicants to provide project specific shading studies or other significant loss factors for more niche cases as necessary.

2. There are currently no specified mechanisms for monitoring the compliance of microgeneration systems with the Micro-Generation Regulation (i.e., the

micro-generation system generates all or a part of, but not more than, the customer's yearly electricity consumption) after the system is approved. How important is post-approval compliance monitoring to ensure micro-generators are remaining aligned with the Micro-Generation Regulation? Please provide an explanation.

Post-approval compliance monitoring and intervention should not be necessary if improved vetting takes place during the application stage. The work to create improved consistency and compliance through this questionnaire and process should assist in this goal.

In our opinion, post-approval assessments of compliance do not appear to align with the Micro-Generation Regulation's consideration of *'intention'*. Generators are assessed at the application stage against Micro-Generation Regulation section 1(1)(h)(ii) which stipulates that the generating unit is *"intended to meet all or a portion of the customer's total annual energy consumption at the customer's site or aggregated sites"*. Where a wires owner has assessed this intention, a generator should not be penalized for generation that exceeds expectations or for reductions in consumption. They should not be penalized for removal of an old tree from the property (decreased shading), a high irradiance year, greater bifacial production than anticipated or a warming climate that causes lower snow losses. They should not be penalized for implementing energy efficiency measures, for going on an extended trip overseas or for their kids leaving home for college. Industrial consumers should not be penalized for a change in their industrial processing or a closure of an assembly line during difficult economic times.

If the AUC decides to implement compliance monitoring, limiting residential compliance intervention to cases where significant (ex. >200%) excess generation is noted, by the wires owners would be recommended. Commercial and industrial micro-generators must receive even more grace and consideration given the higher likelihood of significant load changes.

These are 25+ year investments. It is critical that investors have certainty that all of the generation from their Micro-Generation systems will earn revenue. It is critical that the AUC avoid adding unnecessary and complex risk to these investments. In particular, it is reasonable to expect that some commercial and industrial projects could see major reductions in energy consumption over a 25 year life - the AUC should allow these systems to continue generating without penalty. Stranding or

curtailing a Large Micro-Generation asset is certainly not in the interest of the public or consumers.

a. Please identify and justify the best way to structure mechanisms for post-approval compliance monitoring, particularly regarding which party (or parties) should assume primary responsibility (such as the AUC, the AESO, utilities, etc.).

Where deemed absolutely necessary and compliance monitoring and enforcement is implemented, we would again recommend that a consistent standard for non-compliance be very high (ex. >200% over-generation for residential and much higher for commercial and industrial). Wires owners would identify the compliance issue through an audit process or review of their customer's generation profiles and have a prescribed process for direct engagement with the generator on alternative pathways such as a grace period to increase load and a streamlined process for Distributed Generation application and approval (avoiding new study costs, additional protection and control upgrades, etc). Where agreement cannot be reached, a dispute resolution process through the AUC, MSA or other appropriate authority could be established.

3. What type of inverter de-rating, and associated evidence of this de-rating, would ensure that a micro-generation facility will not later increase its system capacity beyond the micro-generation system size approved by the utility? Please provide an explanation.

Energy generation is primarily driven by DC Watts of solar capacity (Wp), ***not*** AC inverter capacity. Inverter de-ratings should only be applied and required where capacity limitations exist (ex. service size, transformer size, etc). Inverter de-ratings should never be required as a means to curtail energy generation.

Where inverter de-ratings are required to safely stay within customer load service or distribution system capacity limitations, a sign off by the applicant with photo evidence of the established inverter setting should be deemed sufficient.

There is no compliance mechanism that will negate all risk to the utility given that solar PV equipment is readily accessible online and can always be installed without any permits whatsoever. Utilities can identify and manage non-compliance risk through implementation of smart meters. Evidence of intentional

mis-representation by nefarious contractors or homeowners should result in fines, generator lock out or other penalties to support compliance.

a. Should micro-generators be permitted to de-rate their inverters, subject to the previously described limitations? Please provide an explanation.

Yes, de-rating of inverters is an industry standard method for ensuring export limitations are maintained.

4. The City of Medicine Hat's micro-generation application process includes an initial step to determine a potential micro-generation system's maximum permissible size, which has been found to reduce the number of full applications received. Would it be useful for the micro-generation application process to include an initial sizing determination phase, where a utility first determines a customer's maximum permissible micro-generation system size before the customer makes a decision to proceed to a full application? Please provide an explanation.

Among the most desirable outcomes of the Micro-Generation Regulation, historically, has been the speed with which approvals can be granted. Mirroring the City of Medicine Hat's application process appears overly burdensome. At times, the turn around for Micro-Generation reviews significantly exceeds what is prescribed within the regulation. Unless a wires owner plans to add additional staff to administer a pre-screening and sizing process, adding an additional stage will only serve to further delay approvals. An *optional* pre-screening process could be helpful in some cases to avoid unnecessary design and development work by the proponent and application processing work by the wires owner.

5. The AUC has heard from stakeholders that inverter standards for micro-generation systems often change, creating temporary misalignment with some AUC guidance documents and contributing to some confusion among micro-generation applicants. Would it be helpful for the AUC to facilitate a working group of relevant parties that reviews technical standards (for inverters, etc.)? Please provide an explanation.

We are finding the biggest challenge today is with interconnection of Large Micro-Generation systems (and even larger " Small Micro-Generation" systems. In particular, interconnection requirements and standards vary widely by wires owner

and in some cases are a moving target. These challenges are causing significant schedule and cost hardship for our clients, causing delays within wires owners internal processes and creating friction between wires owners and industry. Changes to interconnection requirements should be implemented no more frequently than every two years (or in alignment with major IEEE-1547 or CSA C22.3 updates). Further consultation with industry on the challenges facing wires owners and the proposed interconnection requirement changes would be beneficial and deeply appreciated. Alignment with the Interstate Renewable Energy Council's (IREC) Model Interconnection Procedures or industry standards (in development by CanREA) would help to mitigate these challenges.

It would be very helpful to have a facilitated platform to support alignment between wires owners and industry on interconnection requirements and proposed changes.

a. If yes, how often should the working group meet? (e.g. monthly, quarterly, bi-annually). Please provide examples of technical requirements, other than inverters, that should be included in the discussions.

We would suggest quarterly to start and then bi-annually or annually as alignment improves. Key discussion points should include:

- Interconnection standards (create alignment between wires owners, review proposed changes with industry, etc)
- Application process and timelines (benchmarks vs. actuals)
- Utility challenges, suggestions and feedback
- Industry challenges, suggestions and feedback

b. If no, please suggest a different way that the AUC can keep abreast of changing technical standards.

N/A

6. Please identify, and provide justification and details for any other high priority micro-generation issues that should be addressed to ensure the effective and efficient functioning of the micro-generation landscape.

The timelines and process for Large Micro-Generation processing is egregiously long and poorly managed in many cases. Alignment with the Interstate Renewable Energy

Council's (IREC) Model Interconnection Procedures would really help improve consistency, timeliness, and cost effectiveness of these processes while also prescribing generator requirements that appropriately align with system size, generation to load ratios, etc.

The other issue is around changing requirements. We have seen Wire Owners change their requirements multiple times a year, thus creating a moving target for developers looking to connect into the grid, and have somewhat of a stable estimate on costs and resources. In some jurisdictions, Wires Owners are fined if they do not meet their obligations around application timelines. Perhaps a more prescriptive regulatory policy should be looked at for approvals here for Alberta to ensure efficient processing. It is very common for wires owners in Alberta to not meet their own prescribed timelines - there is no recourse and developers are left in a state of limbo and shouldering cost and schedule changes. There is an opportunity for the AUC as the regulator to create a more fair and efficient landscape while protecting the economic and social interests of Albertans.

Thank you for the consideration and opportunity to provide this feedback. We look forward to engaging further with the AUC on any proposed changes.

Sincerely,

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