AUC consultation on Rule 024 and micro-generation application processes

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

    When it comes to a standardized consumption calculation to maximize system sizes, it is essential to highlight the interaction with section 7 of the *Micro-Generation Regulation* compensation. The most popular retailers utilize the UTILITYnet Solar Club dual feed-in tariff of a HI solar export summer rate (30.00¢/kWh) and a LO winter export rate (8.77¢/kWh). If a small micro-generation is able to oversize a system significantly and combine it with Solar Club there exists a tantalizing value proposition. Not only, will there be zero electricity bills each year, but also there could be extra cash left over on a tax-free basis. The current Solar Club strategy is to export as much as possible during the HI rate, and consume as little as possible to build the credits (during the HI rate). After the credits/payouts are accumulated, apply the HI rate credits to the LO winter rate. If enough annual consumption loads can be seasonal (i.e. air/ground source heat pumps), the easier it is to take advantage of the rates.

    Under Subparagraph 1(1)(h)(ii) of the *Micro-Generation Regulation* and subsection 2 of AUC Rule 024 describe "*a micro-generation generating unit to meet all or a portion of the customer's total energy consumption*". That is, the largest consumption historical or projected is the limit of system sizes, so it is imperative to have the maximum consumption possible to maximize Solar Club. Realistically speaking, it is difficult to perfectly match a 100% annual offset, so there will be some reasonable allowances (i.e. 105% offsets, 110% offsets). Nevertheless, projections are simply potential numbers that may never fully materialize, but historical consumption prove actual and tangible numbers. If the applicant's system is not able to be oversized due to uncertain future projections, then historical consumption data could be relied upon.

    Currently, the generally accepted system oversize workaround is creating an inflated 12-month historical consumption by first increasing loads (1 year prior to planned install), getting an approved system, and finally cutting back consumption dramatically post

solar PV energization since there are no specified mechanisms for monitoring per AUC. For example, an all-electric household could opt for resistive heating for heat and hot water to increase historical consumption and switch to heat pump only after interconnection is approved. Another possibility would be to lease multiple electric trucks, substantiate proof of registration, inflate site consumption, and then switch back to an internal combustion variant post energization. Both methods will materially lower consumption post energization while providing additional Solar Club credits/payout.

Without the Solar Club rates, the payback for residential solar could be 20 years, but now the payback is under 10 years and less than 7 years with grants and rebates. Having unlimited self-supply and export could potentially bring the payback to 3 years and generate tax-free profit for the lifetime of the system. Furthermore, larger systems are more cost effective as central string designs absent of module level power electronics. The efficiency losses would simply be dwarfed by significant oversizing. If AUC was to revise Rule 024 to relax the requirements in subparagraph 1(1)(h)(ii) then it could simplify the skills for solar sales and solar modelling. Existing micro-generators under 200-amp service can also expand their systems to further harness the Solar Club. The bottom line for annual consumption is to obtain the largest approved system possible and synergize with the dual rate nature of Solar Club.

2. **There are currently no specified mechanisms for monitoring the compliance of micro-generation 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.**
    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.).**

    As discussed in Question 1 above, primary objective for micro-generators is largely economic. That is, to maximize production for the purpose of utilizing the summer export rate of 30.00¢/kWh and applying the credits during the winter rate of 8.77¢/kWh for a potential 342% benefit. While not all small micro-generators are able to take advantage of Solar Club, those with or greater than 100% offsets (using extreme consumption reduction post energization) benefit immensely. Since subparagraph 1(1)(h)(ii) of the *Micro-Generation Regulation* generally applies during the initial application process, a drastic decrease in consumption post energization to historical/projected amounts is a common practice. Sometimes there are legitimate reasons such as electric vehicle range anxiety prompting a switch back to a combustion vehicle, or affordable natural gas post consumer carbon tax prompting a return to natural gas heating and hot water. So far, there is no consequence of violating subparagraph 1(1)(h)(ii) when the production is intended to meet more than "*customer's total annual energy consumption*." While reducing consumption is one thing, there is also the incentive to increase production

thanks to the Solar Club rates. Generally, 90% of the annual energy is generated from March through October and falls within the high export months.

Lastly, should there be reliability issues, consider introducing Public Safety Power Shutoff policies like FortisBC. If the voltages and/or frequencies are out of specifications due to excessive back feeding, shut it down for public safety. Alternatively, rather than random spot checks, it would be easier to increase the baseline grid voltage of the local transformer so that micro-generators would have to contact the wire owner because their inverters are cycling from over-voltage cut-outs.

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

    If an applicant using an oversized inverter, then there is no way to ensure that a customer would not later increase system capacity in the future. This should be easy to monitor with modern bi-directional meters for peak power and energy exported. Another de-rating that should be considered in the future are AC coupled battery installation with zero-export because it would increase the site nameplate capacity.

    There should be no room for interconnection approvals using de-rated inverters as there is no compliance mechanism post energization. Again, the principal issue is increased exports for monetary purposes (i.e. Solar Club rates).

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.**

    Pre-screening applicants has its benefits and drawbacks. While it may expedite the full application process, it is also an opportunity for aggressive solar sales representatives to block competition by providing a Solar PV System Size Review as a free of charge service. Now the potential micro-generation applicant is held hostage to the original company.

    It is really not difficult sizing a system based on historical consumption, but it is certainly more challenging if using future projections. Again, the system size is largely predicated on harnessing the dual rate for Solar Club with the largest system possible being the most ideal for the micro-generator applicant.

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.

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

Ultimately there needs to be compliance in addressing CSA Standard C22.2 107.1, and UL1741 Supplement A. This is clearly outlined on page 16 of the AUC *Micro-generation notice submission guideline*. If this technical issue stems from discount inverters (and micro-inverters) originating from China, then it is the problem of the solar sales and installers for not making proper risk assessments with product margins.

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.**

With regards to Rule 024 and the *Micro-generation Regulation*, there is a confusing interaction between subparagraph 1(1)(h)(ii) of the regulation and subclause 1(1)(a.1)(iii)(A) for aggregated sites. In theory, the approval process for aggregated micro-generation sites should be consistent with a single micro-generation site, but there is a special case where a single site may have an unintended advantage over aggregated sites. The *Regulation* defines the aggregated sites as:

(a.1) "aggregated sites" means 2 or more sites that are (i) located on property that is owned or leased by the same customer,

(ii) connected to a single electric distribution system feeder owned by one electric distribution system owner, and

(iii) either

(A) enrolled with the same retailer, with each site charged at the same rate for the supply of electric energy, or

(B) enrolled with the same rate of last resort provider, with each site charged at a regulated rate under a regulated rate tariff referred to in section 103 of the Act for the supply of electric energy;

If one were to treat a single site micro-generation application as two aggregated seasonal sites for micro-generation, it might not be possible due to the application of *Regulation*. To illustrate the interaction, there are 3 scenarios of involving micro-generation applicants. All scenarios are assumed production is 100% exported, and all consumption is 100% imported (i.e., no micro-generation self-consumption). All sites are enrolled with the same retailer. Figure 1-1 and Figure 1-2 illustrate two micro-generation sites and Figure 1-3 is for a single site. All scenarios have a 12,000kWh production and 12,000kWh in aggregate, as well as 12,000kWh consumption either as a single site (Figure 1-3), or in aggregate.

	✔ APPROVED			✔ APPROVED		
	Micro-gen Site A1			**Micro-gen Site B1**		
	Export (kWh)	Import (kWh)	Rate ($/kWh)	Export (kWh)	Import (kWh)	Rate ($/kWh)
Jan	0	0	0.30	200	1,000	0.30
Feb	0	0	0.30	500	1,000	0.30
Mar	1,100	1,000	0.30	0	0	0.30
Apr	1,300	1,000	0.30	0	0	0.30
May	1,500	1,000	0.30	0	0	0.30
Jun	1,500	1,000	0.30	0	0	0.30
Jul	1,600	1,000	0.30	0	0	0.30
Aug	1,400	1,000	0.30	0	0	0.30
Sep	1,200	1,000	0.30	0	0	0.30
Oct	1,100	1,000	0.30	0	0	0.30
Nov	0	0	0.30	400	1,000	0.30
Dec	0	0	0.30	200	1,000	0.30
	10,700	8,000		1,300	4,000	

Figure 1-1: Assuming 100% export and 100% import (no self-consumption), micro-generation Site A1 and Site B1 have the same rates under Regulation 1(1)(a.1)(iii)(A) and can be considered as aggregated sites. Site A1 has a 133.75% offset and Site B1 has a 32.5% offset but aggregated has a 100% offset (12,000 kWh production, 12,000 kWh consumption). Both Site A1 and Site B1 are approved as an aggregate site.

	✘ NOT APPROVED			✔ APPROVED		
	Micro-gen Site A2			**Micro-gen Site B2**		
	Export (kWh)	Import (kWh)	Rate ($/kWh)	Export (kWh)	Import (kWh)	Rate ($/kWh)
Jan	0	0	0.30	200	1,000	0.0877
Feb	0	0	0.30	500	1,000	0.0877
Mar	1,100	1,000	0.30	0	0	0.0877
Apr	1,300	1,000	0.30	0	0	0.0877
May	1,500	1,000	0.30	0	0	0.0877
Jun	1,500	1,000	0.30	0	0	0.0877
Jul	1,600	1,000	0.30	0	0	0.0877
Aug	1,400	1,000	0.30	0	0	0.0877
Sep	1,200	1,000	0.30	0	0	0.0877
Oct	1,100	1,000	0.30	0	0	0.0877
Nov	0	0	0.30	400	1,000	0.0877
Dec	0	0	0.30	200	1,000	0.0877
	10,700	8,000		1,300	4,000	

Figure 1-2: Assuming 100% export and 100% import (no self-consumption), micro-generation Site A2 and Site B2 do not have the same rates under Regulation 1(1)(a.1)(iii)(A) and cannot be aggregated. Furthermore, Site A2 with a 133.75% offset is higher than what is described in subparagraph 1(1)(h)(ii) of the regulation. Site A2 would not be approved, and Site B2 will be approved.

	✔ APPROVED		
	Micro-gen Site A3		
	Export (kWh)	Import (kWh)	Rate ($/kWh)
Jan	200	1,000	0.0877
Feb	500	1,000	0.0877
Mar	1,100	1,000	0.30
Apr	1,300	1,000	0.30
May	1,500	1,000	0.30
Jun	1,500	1,000	0.30
Jul	1,600	1,000	0.30
Aug	1,400	1,000	0.30
Sep	1,200	1,000	0.30
Oct	1,100	1,000	0.30
Nov	400	1,000	0.0877
Dec	200	1,000	0.0877
	12,000	12,000	

Figure 1-3: Assuming 100% export and 100% import (no self-consumption), micro-generation site A would be approved because the total annual production (12,000 kWh) is equal to the total annual energy consumption (12,000 kWh). The single Site A3 would be approved as the assessment of rates only apply to aggregate sites. The net benefit would be $3,324.01 of exports and $2,750.80 of imports resulting in a net gain of $573.21.

Assuming all sites are with the same retailer, Figure 1-2 illustrates both the inability for Site A2 and Site B2 to be aggregated because of the different rates. Furthermore, subparagraph 1(1)(h)(ii) who deny the approval of Site A2 because of the proposed offset ratio of 133.75%. If both Site A1 and Site B1 have the same retailer and rate, then they can be aggregated as per Figure 1-1. Where the confusion lies is that if Figure 1-2 was combined to produce Figure 1-3, it would be approved. Furthermore, Figure 1-3 shows a net gain of $573.21 in light of the 12,000kWh annual production and 12,000kWh annual consumption. Certainly, this is something to explore with the Solar Club because it potentially allows an equivalent of 1 kWh summer credit to 3.42 kWh of winter credit ($0.30/$0.0877). If Figure 1-3 represents a micro-generation customer using the Solar Club rates, then there is total annual export of $3,224.01 and $2,750.80 of imports. The remaining $573.21 can then be applied to any other electricity and retailer fees on a tax-free basis. Should Rule 024 be relaxed to allow for additional capacity, then the benefit would further increase.

To further increase the Solar Club benefit, a small micro-generator could also shift majority of loads to the lower rate if $0.0877/kWh. Usually this is made possible with the advent of ground or air sourced heat pumps as well as discretionary loads such as electric vehicle charging. If we assume the same scenario of Figure 1-3 but shift the loads to 25% annual HI rate and 75% LO rate. We will get the amounts as shown in Figure 1-4 below.

	✔ APPROVED		
	Micro-gen Site A4		
	Export (kWh)	Import (kWh)	Rate ($/kWh)
Jan	200	3,000	0.0877
Feb	500	2,200	0.0877
Mar	1,100	550	0.30
Apr	1,300	350	0.30
May	1,500	350	0.30
Jun	1,500	350	0.30
Jul	1,600	350	0.30
Aug	1,400	350	0.30
Sep	1,200	350	0.30
Oct	1,100	350	0.30
Nov	400	1,000	0.0877
Dec	200	2,800	0.0877
	12,000	12,000	

Figure 1-4: Assuming 100% export and 100% import (no self-consumption), micro-generation site A4 would realize $3,324.01 in exports and $1,589.30 in imports resulting in $1,634.71 net benefit.

Simply by shifting annual seasonal loads to 75% winter will result in a net benefit of $1,634.71 for Site A4. This is in a magnitude of a 285% improvement of Site A3 and the $573.21 net benefit. The annual consumption is identical between Sites A3 and A4, but combining this strategy in addition to significantly oversizing a small micro-generator's system with reap massive tax-free payouts. Whether or not the *Regulation* under subsection 7(5) equates to subparagraph 1(1)(h)(ii) is something to be considered. The first references rates ($), while the latter references energy (kWh). With the rate structure of Solar Club, the net-billing arrangement decouples subparagraph 1(1)(h)(ii) and shown in Figure 1-3 and Figure 1-4. This decoupling is further exacerbated with all-electric homes due to seasonal load shifting.

Further to the discussion with rates, subsection 7(5.1) states "*If a retailer and a micro-generator agree, in writing, the retailer may credit the micro-generator for electric energy supplied out of the micro-generator's micro-generation site at a different rate than what is set out in subsection (5).*". It's also important to highlight this, because there is a lack of clarity on the intent of the "*different rate*". The spirit of the subsection 7(5.1) is likely intended for the Rate of Last resort, but opens the possibility of other rate changes. In the context of Figure 1-3, there would be potentially three rate switches from 8.77¢/kWh at the end of February to 30.0¢/kWh in March and back to 8.77¢/kWh in November. Application of subsection 7(5.1) would allow for the different rate to be higher or lower than the original rate being switched. Theoretically, there is even the possibility of having a HI export rate equal to the hourly pool price of $999.99/MWh. That would be a 1140% benefit over the LO rate of $87.7/MWh if small micro-generators bank the HI export credits at the pool price cap.

This then brings the question of the mechanics of small micro-generator customer compensation for credits and/or payouts. Most Solar Club members do not realize that

the majority of the funds generated come from general transmission fees charged in Alberta. Under subsection 7(6) and 7(7), the small micro-generators will be paid by the ISO (i.e Alberta Electric System Operator) through the applicable ISO tariff (i.e. transmission fees). Meanwhile large micro-generators are settled through the ISO's financial settlement system (i.e. hourly power pool).

As a rough estimate for small micro-generators, 1 kWh summer export at 30.00¢/kWh could mean that the adjacent neighbouring customers utilizing the 1kWh will pay 4.00¢/kWh (estimate only) for transmission fees and the remaining 26.00¢/kWh will be primarily covered by non-micro-generation customers (86.67%). In essence, the Solar Club members are being subsidized through transmission fees. This number will continue to grow as more small micro-generators join the Solar Club. For 2024, Solar Club has recently reported a payout of $14.6M energy exported to the grid (https://solarclub.ca/solar-club-news/solar-club-members-celebrate-a-record-14-9-million-in-earnings/)

To summarize, the Rule 024 consultation bulletin's final request is that: *"the Commission understands that there are instances where a micro-generation application is approved, but then the customer's forecasted annual consumption increase does not materialize or subsequently falls below the qualifying requirements. The Commission is interested in hearing more from stakeholders about these concerns and post-approval compliance options."*

If the Commission were to relax Rule 024, there would be a strong economic gain for a select number of solar sales/installation businesses who have scaling abilities. To combat the increased demand of applicants, a clever way would be to expedite and streamline the administrative tasks. If a micro-generator can maximize summer exports for winter usage, there is an effective 342% potential benefit using a retailer such as UTILITYnet Solar Club dual rate structure. To even further maximize the benefit, it is imperative to obtain the largest system size possible for a small micro-generator principally by inflating historical and/or projected annual consumption numbers. Once the micro-generation contract is valid, there is further opportunity to increase the system size because of the lack of post-installation compliance. Above all, the economic benefit of Solar Club is primarily subsidized through transmission fees of non-micro-generators (estimated at 86.67% above). This is truly a hypocrisy for small micro-generation if the economic benefit of Solar Club is a burden borne by non-microgenerators.

Should AUC make changes to Rule 024, there should be consistency on the application of Micro-generation Regulation subparagraph 1(1)(h)(ii), subclause 1(1)(a.1)(iii)(A) and subsection 7(5).

Practical changes for the AUC are as follows:

1. Update Rule 024 in accordance to subsection 8(3) of the *Regulation* to cap the payment to a nominal amount of $1.00 and mandate a single payment settlement from August 1 to July 31. Any unused credit would expire and the accumulated credit balance would be $0.00 starting August 1.
2. Make modifications to the *Micro-Generation Regulation* subsection 7(5) so small micro-generators are compensated at wholesale rates for exports. This is similar to California's current net billing policy with 8,760 hourly rate schedule (24 x 365).
3. Make modifications to the *Micro-Generation Regulation* subsection 7(4) to include a micro-generation tariff so large microgeneration customers and subsidize small microgenerators instead of non-micro-generators per *Regulation* 7(6)(b)(ii). The tariff would be on exports to encourage self-consumption and discourage system oversizing.
4. Add a third micro-generation size, residential, for less than 10kW inverter nameplate and move small micro-generation to 10kW to less than 150kW inverter nameplate. Expedite and streamline the 10kW nameplate applicants and require a pre-assessment for greater than 10kW nameplate applications (may require an engineer stamp for certain documents).

Any of these changes above would wholistically address the Rule 024 consultation questions as well as the concern noted in the bulletin of actual annual energy consumption post-energization.

Restricting the $1.00 credit payout to a single anniversary date (no earlier payouts) of July 31 would be the simplest and most effective to implement for the Commission. The remaining credit balance would expire and the credit balance would be $0.00 as of August 1. Again, the dual rate Solar Club structure is the underlying issue for this Rule 024 consultation as it provides strong incentive for oversized small micro-generation systems. Under the net billing structure, the credits should still be able to be applied to other charges in the utility bill such as fixed fees and natural gas. Some retailers currently offer a payout if the credit balance is over $200 for two consecutive months, so that will also have to be monitored.

Relaxing Rule 024 to streamline the administrative process can be explored later but is likely unnecessary if the motivation of maximum solar net exports is adequately curtailed.