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October 8, 2021

Holly R. Anderson, Clerk
Public Utilities Commission
112 State Street, 4th Floor
Montpelier, Vermont 05620-2701

Subject: Proposed changes to PUC rule 5.100, pertaining to construction and operation of net-metering systems
Case number 19-0855-RULE
Response to comments due September 24, 2021

Dear Ms. Anderson:

Thank you for the opportunity to comment on the responses made by participants on September 24. I present these comments from the point of view of an engineer who owns a small net metering system.

Applicant vs. Registrant

I find the discussion and comments confusing because of the incomplete distinction within the rule between registrations and applications; between registrants and applicants. In the rule, the requirements for registrations are different than those for applications. Yet the rule lumps applicants and registrants together, defining them both as applicants. So, when the term "applicant" is used in the rules, it is not clear whether that really applies to both applications and registrations or only to applications. I think the rule will be clearer if a distinction is made between applicants and registrants. When "registrant" is defined, there will be multiple locations in the rule where "application" and "applicant" will need to be amended. Neither the current rule nor the proposed rule defines "Registrant".

In these comments, I use the terms "registrant" and "applicant" for one seeking a CPG. I use the term "interconnection applicant" for one seeking an interconnection. An interconnection applicant includes both registrants and (CPG) applicants as the rule now is proposed.

Request: Amend the definition of "Applicant" and provide a definition of "Registrant". The definitions could be:

- "Applicant" means the entity seeking authorization submitting an application for a certificate of public good to construct and operate a net-metering system.
- "Registrant" means the entity submitting a registration for a certificate of public good to construct and operate a net-metering system.

Interconnections

Interconnections were discussed by several commenters. Part of the discussion seems to be the

interaction between 5.100 (interconnections relating to net-metering systems) and 5.500 (interconnections relating to all systems).

The discussion is confusing because it is not always clear whether a participant or commenter is using "applicant" (or "application") in the context of a CPG or of an interconnection. Also it is not always clear whether "applicant" in the context of a CPG also includes a "registrant".

pre-application / pre-registration discussion of interconnection

Several participants have made the case that in order to support and to increase net metering, we need to keep things simple. Instead, Stowe Electric proposes making the registration process more complex for registrants than the present process. Their proposal will require registrants to discuss interconnection requirements and to get an "ability-to-connect" letter before the registration is filed with the PUC. (Remember, many of my comments focus on registrants. The comments could apply to CPG applicants, too.)

Stowe Electric is proposing adding a time-consuming pre-registration meeting and process for all proposed registrations in order to receive an ability-to-interconnect letter from the utility. The reasons presented are:

- to reduce the administrative burden on registrants
- to make the process more efficient
- "to resolve clerical errors, or missing, incomplete, or incorrect information".

I fail to see how Stowe Electric's proposal reduces the administrative burden on registrants or how it makes the process more efficient. The process for registration seems more efficient under the current rule. Now, a registrant for a photovoltaic system files a registration with the PUC and the co-ordination on interconnection proceeds from there. In this context, administrative burden and efficiency are inversely related: as burden increases, efficiency decreases.

The proposal will increase the administrative burden by requiring a pre-registration meeting for all proposed registrations. These meetings will add time and the cost of a meeting to all proposed registrations. The present system adds time and cost to only those few registrations that actually need to have such a meeting. So, the proposal will add a burden to every registrant while not reducing the overall burden of those few systems with potential problems at the interconnection point. I do not know enough about utilities' operations to know the actual effect of such a process on them. However, I do not see how it will actually reduce administrative burden on them. It seems the proposal merely shifts their burden from after a registration to before a registration. And it requires the utility to have a meeting on every registration, rather than only those registrations that need such a meeting.

Stowe Electric suggests that requiring an additional pre-application / pre-registration step for everyone is more efficient than the present system. I disagree. The present system adds time only for those whose interconnection needs to be evaluated in more detail. Adding time for a few (the present process) is more efficient than delaying everyone.

Stowe Electric suggests that all proposed net metering systems get an ability-to-interconnect letter from the utility before one applies for a certificate of public good. This means an additional interconnection application and a 21-day period to obtain that letter for all systems. This adds additional time to the project. It also adds additional cost to a registrant, in that the installer of a small system will need to spend more time to get this letter.

Stowe Electric proposes a \$450 fee to fast track the procedure for obtaining that letter. It is not clear from the letter whether the fast-track study there is the same as the Fast-Track study in the current and proposed rules 5.500. Without a fast track, one gets a CPG in 31 days using the deemed approval process under the proposed rule. Or, one could pay \$450 to get a letter 10 days sooner (in 21 days). And then apply for a CPG which would be deemed approved 31 days after the application is filed. The fee and the times seem exorbitant for registrants.

Stowe Electric proposes that the interconnection applicant "countersign the letter accepting the terms and conditions, and acknowledging outstanding issues, and submit it with the standard net-metering application form with its CPG application." I am not sure how many registrants are knowledgeable enough about such a letter's content to be able to sign.

I do not see that Stowe Electric has made the case that systems using registration need to go through such an interconnection process. I think that their proposal is burdensome and time consuming for registrants.

Request: that the Commission reject Stowe Electric's approach. If the commission decides to consider this approach, I suggest that the Commission require Stowe Electric to document the need. The need (or lack of a need) would be shown by the number of times it placed objections on registered systems. And the number of systems that did not receive an objection and were deemed approved in 10 days. Or maybe the Commission's own data can provide this answer.

Request: that the Commission retain deemed approval of category I systems at 10 days. (The working draft would extend that to 31 days.)

inadequate applications / registrations

Stowe Electric claims that many (CPG?) applications result in the filing of an objection "to resolve clerical errors, or missing, incomplete, or incorrect information from the applicant". They are suggesting that everyone be subject to a pre-application meeting. The PUC has seven days to determine whether an application or registration is complete. It is not clear from Stowe Electric's comment what the source of the problem is. It might be that the form doesn't ask for enough information or is unclear about exactly what information is needed. It might be that the PUC is determining incorrectly that applications are complete. It might be something that I haven't thought of. If the problem is with the form, then change the form. If the problem is with the PUC, then figure out how to resolve it there. If it's something else, figure out what it is and how it might be resolved, in order to avoid a pre-application meeting.

Green Mountain Power requested a form for interconnection applications for section 5.107

systems (between 150 kW and 500 kW). It seems that developing a form might also help resolve the issue raised by Stowe Electric

Green Mountain Power did not comment on registrations for section 5.105 systems. I support the PUC's simple proposal that the registration for a net-metering system serve as the application for an interconnection. Of course, the registration will need to have the information required for the utility to evaluate and accept the interconnection.

If interconnection requirements for net metering are moved to rule 5.500, then I agree with Green Mountain Power's suggestion of different levels of review for different types (and sizes) of systems.

Request: Resolve the issues so that fewer or no applications reach a utility with clerical errors or missing, incomplete, or incorrect information.

Request: Retain the proposal to use the CPG registration as the interconnection application.

CPG issued without interconnection conditions

Renewable Energy Vermont supports issuing the CPG before interconnection requirements are known. An application in such a case would have a statement from the applicant that the applicant will satisfy the requirements of rule 5.500 as a condition of the CPG. This type of condition appears to violate the requirement that "Before the Public Utilities Commission issues a certificate of public good . . . it shall find that the purchase, investment, or construction . . . Will not adversely affect system stability and reliability." (30 V. S. A. (§248(b)(3))

My experience shows that, when such conditions are used, the issuer of the permit (in this case the CPG) will have no record, has nothing traceable, has nothing that documents what the utility actually required regarding the interconnection. That's a problem when trying to figure out what the CPG requires and whether it was actually implemented.

Request: Do not accept REV's suggestion that a CPG application contain a statement that the applicant will satisfy the requirements of rule 5.500

Wholesale Markets and Net Metering

Green Mountain Power commented on a question it received from ISO-NE on the ability of net metering to participate in the wholesale market. Part of my engineering experience involves interpreting contracts and regulations as they apply to projects. Based on that experience, I conclude that the statutory definition of a net metering system does not allow participation in the wholesale market. My comment is based on the simplification that the wholesale market deals with electricity in the transmission system and that the retail market deals with electricity in the distribution system.

Part of the definition of a net-metering system "means a plant for generation of electricity that . . . (2) operates in parallel with facilities of the electric distribution system".

- If it is not possible for back-fed electricity from a net-metering system to get into the transmission network, then a Vermont net-metering system, then how can it participate in the wholesale market? As an example, the back-fed electricity from my net metering system probably goes no farther than the three other houses that come off the same pole as my service line.

- If the system is connected directly to transmission, how can it be net metering? That system would not be operating in parallel with the distribution system. It would operate outside the distribution system.

Of course, my experience also shows that having something clear in a rule is more effective than having to argue the point as I just have.

How Long does it Take?

The Public Utilities Commission in its working draft of rule 5.105 proposes to triple the time between registration and deemed approval of a small (less than 15 kW) net-metering system. The Department of Public Service suggests (in its comment letter) increasing the time between registration and CPG, so that periods in rule 5.100 and rule 5.500 agree.

Again, I focus on the impact on the small net-metering systems subject to registration by rule 5.105. The procedure in the current rule is that such a system is deemed approved on the 11th day unless an objection has been filed. I think that the proposals by both the PUC (in its working draft) and by the PSD (in its comments) add unnecessary time and complexity to the registration process. The PSD points out that full-blown interconnection studies are allowed 119 days or 161 days, depending on the type of study.

Request: Base rule 5.105 on the PUC's working draft of April 15, 2019 with some changes in the proposed 5.105 (E). The changes are to change the times back to those of the current rule: deemed approval on the 11th day; and the "30 days" be shortened to "10 days" to match. Also, as I pointed out in my comments on September 24, 2021 and above, "application" and "applicant" should be changed to "registration" and "registrant", respectively.

Forests

Several commenters have indicated that the amount of forest cleared for solar electric systems is negligible. However, the amount of land needed for solar photovoltaics is not negligible. Those commenters are looking to the past. I suggest that these arguments are inadequate for what the future will require.

Renewable Energy Vermont claims that tree cutting for solar has historically been at a *de minimis* level. The current net-metering rules took effect January 1, 2017. In the 4 1/2 years since then, 202 net metering systems proposed clearing 208 acres of forest according to ANR's slide show on August 24, 2021. ANR provided no information on how much more forest was proposed to be cleared under other renewable energy programs.

REV has not addressed the large amount of solar that we will need in the future to achieve 100%

renewable electricity. The goal of 100% is a proposal being made by the Cross-Sector Mitigation Subcommittee - Electricity to the full Vermont Climate Council on October 5, 2021.

According to my calculations in Attachment 1, we likely will need an additional 3500 MW of new renewable electricity to be 100% renewable by 2050, even without transitioning away from Hydro-Québec.. Most of this is likely to be solar photovoltaics. These will occupy over 18,000 acres (28 square miles). It is not clear where they will be: existing buildings, solar canopies on parking lots, open land, forests. The amount seems more than a *de minimis* situation to me.

REV claims that clearing forest for solar is a temporary conversion, comparing it to clear-cutting for lumber or fire wood. I find the situations to be not at all alike. Forest regeneration begins immediately after the end of the clear cutting. Solar on the other hand prevents regeneration until 20 or more years later, depending on the life of the system and on what happens at the end of that life.

When the system is at the end of its life, what happens to the site? REV points out the end-of-life requirement to remove all systems greater than 150 kW. However, we'll still need the electricity that the system generated. Where will that electricity come from?

- The system might be refurbished with new panels on the existing supports. This is beginning to look like long term forest conversion to me.

- The electricity might be generated by a new system in a different location. So the original location at last starts to regenerate and a new location is converted for the life of the system. This is beginning to look like a rotating conversion to me. And a rotating conversion likely will remove larger trees. The regeneration will be with young trees that sequester much less carbon per acre than do the removed mature trees.

Greenhouse gases are an important factor relating to the effects of solar electricity. They are not the only consideration. Forest fragmentation, habitat loss, habitat connectivity, and water quality are other equally important considerations. These should not be overridden in favor of greenhouse gas reductions.

Request: Establish a system for solar electricity that evaluates carefully all potential effects of conversion of forests for solar electricity. Greenhouse gas reductions should not automatically override the other factors.

Thank you for taking the time to read these comments.

Sincerely,
Thomas Weiss

Attachment 1
land need for solar electricity

Land need for solar

This section provides an estimate of the amount of land needed to meet Vermont's renewable energy requirements for electricity.

Electricity use in Vermont in 2050

From the 2016 Comprehensive Energy Plan:

- site energy demand in 2050 is projected to be about 9.0 TWh per year (exhibit 9-4, p. 186).
- electricity is estimated to make up 80% of that amount in 2050, which amounts to 7.2 TWh per year. (text p. 186).
- VELCO indicates that electric energy in Vermont in 2014 was about 6.2 TWh per year (exhibit 9-2).
- Nuclear electricity, fossil fuel electricity and unspecified non-renewable electricity provided 40% of Vermont's electricity in 2014. (exhibit 9-8)
- Hydropower provided 42% of Vermont's electricity in 2014. (exhibit 9-8)
- The rest of the electricity in 2014 was provided by wind (8%), wood (7%), methane (2%), and solar (1%). (exhibit 9-8)

The Vermont Climate Council's Cross-Sector Mitigation Subcommittee - Electricity is developing a pathway to develop a 100% carbon-free or renewable portfolio standard for implementation post 2030. This was in a slide show dated October 5, 2021.

Converting the percentages to TWh used in 2014 yields:

- nuclear = 4% of 6.2 TWh = 0.3 TWh / year
- fossil fuel and unspecified = 36% x 6.2 TWh = 2.2 TWh
- hydroelectric = 42% x 6.2 TWh = 2.6 TWh
- other renewable = 18% x 6.2 TWh = 1.1 TWh / year. This breaks down to:
 - wind, 0.50 TWh / year
 - wood, 0.43 TWh / year
 - methane, 0.12 TWh / year
 - solar, 0.05 TWh / year

For 100% renewable electricity in 2050, there will be no non-renewable component.

To achieve the 100% level, new renewable energy must supplant 2.5 TWh of non-renewable electricity. In addition, there is growth of electricity to 7.2 TWh. That means an additional $7.2 - 6.2 = 1.0$ TWh of new renewable electricity. So we will need an additional 3.5 TWh / year of new renewable electricity. Transitioning away from large hydroelectricity will require an additional 2.6 TWh of electricity.

Sources of new renewable energy

This electricity will need to be new renewable electricity. It likely will not be large-scale

hydroelectric. Several presenters at workshops have documented that large-scale hydroelectricity does not reduce greenhouse gas emissions.

1The new renewable electricity likely will not be wind at any significant scale.

Methane generation will not increase according to the 2016 Comprehensive Energy Plan.

So that leaves solar photovoltaic as the in-state source for new renewable electricity.

The PUC issued final orders on seven photovoltaic systems in 2020. Those seven systems have a rated capacity of 25.8 MW. They occupy 135 acres. The generation density of solar systems is then 190 kW per acre. Conversely, solar generation density is 5.2 acres / MW.

Well oriented solar systems have a long-term yield of about 1.3 MWh of electricity per kW of solar panels. Their dependable yield (a concept from hydrology and hydroelectric systems and water supply systems), based on seven years of my system's operation, will be a bit less than 1 MWh of electricity per kW. That is based on the yields of my system over seven years. With a dependable yield of 1 MWh per kW, the dependable yield then is 190 MWh per acre per year.

Supplying 3.5 TWh / year of solar electricity will require something like 3500 MW of panels. They will occupy 18,000 acres (28 square miles). Supplying 6.1 TWh of solar electricity will require something like 6100 MW which will require 32,000 acres.