



April 14, 2019

Messrs. Mike Cizenski and Neil Joshipura
Virginia State Corporation Commission
Division of Public Utility Regulation
Tyler Building, 4th floor
1300 E. Main St.
Richmond, Virginia 23219

[transmitted by email]

**RE: PUR-2018-00107 In the matter of revising the Commission's
Regulations Governing Interconnection of Small Electric Generators**

Dear Messrs. Cizenski and Joshipura:

In response to the Staff's November 19, 2018 letter in this proceeding, below are comments on the Staff's proposed revisions to Virginia's interconnection regulations for small electric generators. Our recommendations generally take the form of additional revisions the Commission may wish to consider.

The Center for Renewables Integration appreciates the opportunity to comment on this matter and looks forward to continuing its participation in this proceeding.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Harry Warren".

Harry Warren
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Center for Renewables Integration
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**COMMENTS TO THE
VIRGINIA STATE CORPORATION COMMISSION STAFF**

**In the matter of revising the
Commission’s Regulations
Governing Interconnection of
Small Electric Generators**

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**Case No.
PUR-2018-00107**

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COMMENTS OF THE CENTER FOR RENEWABLES INTEGRATION

The Center for Renewables Integration (CRI) respectfully submits these comments on revisions to Virginia’s Regulations Governing Interconnection of Small Electric Generators, 20VAC5-314-10 et seq. proposed by Staff, offering recommendations for additional revisions for the Staff and the Commission to consider.

CRI is an active participant in the Interconnection Workgroup of Maryland’s Public Conference No. 44 (PC44) grid modernization proceeding, and the recommendations made below parallel changes already made to Maryland’s interconnection regulations in that proceeding, or that CRI and others have recommended. Harry Warren, representing CRI, has been co-chair of the Interconnection Workgroup’s Smart Inverter Subgroup.

In general, the recommendations made below relate to two issues:

- providing that “smart inverters” can be fully utilized to maximize distribution grid hosting capacity, minimize distribution upgrade costs, while improving voltage stability and grid reliability; and
- clarifying requirements for battery storage system interconnection.

CRI is a non-profit organization formed to provide state policymakers with information they need to put rules, regulations and market mechanisms in place that support a rapid pace of renewables deployment. More information on CRI is available on its website at www.center4ri.org.

Smart Inverters

CRI recommends that language be inserted into Virginia’s interconnection regulations allowing smart inverter features to be employed today, under certain



circumstances, and anticipating the deployment of smart inverters compliant with the new IEEE 1547-2018 standard. Smart inverters have two especially important sets of features:

1. Ride-through – These features allow inverters to provide power continuously through short disturbances in voltage or frequency on the grid, assuring that such disturbances do not result in the widespread, instantaneous loss of distributed generation. PJM currently has a stakeholder process underway to establish recommended settings under the new IEEE 1547-2018 standard that will best support the stability of the bulk power system, and Virginia regulations should anticipate the adoption of these recommendations into Virginia’s interconnection standards.
2. Voltage control – These features provide that inverters are capable of a number of operating modes that help control the impacts of solar PV systems and battery systems on distribution line voltage. Operating modes can control both real and reactive power output. By selecting and employing these modes appropriately, safe and reliable operation of the distribution grid can be enhanced, costly distribution system upgrades can be avoided, and DER system production and value to the grid can be maximized.

Language supportive of the use of smart inverters includes:

- 20VAC5-314-20. Definitions. and
- 20VAC5-314-170. Schedules for Chapter 314 – Schedule 1 Glossary of Terms

“Smart Inverter” means an inverter capable of performing advanced grid support and control functions with features that include, but are not limited to, low/high voltage/frequency ride-through, voltage/power control through active and/or reactive power control, and external communication interfaces. Inverters compliant with IEEE 1547-2018 meet this definition, as do inverters with features included in Amendment 1-2014 to IEEE 1547-2003.

- An appropriate reference to the latest version of IEEE 1547 and companion standards.

Schedule 3 of the regulations references IEEE Std 1547 and 1547.1 as well as UL 1741. If those references imply that the latest versions of the standards are available for use, no additional clarity may be necessary. Otherwise, it should be clarified that inverters compliant with IEEE 1547-2003



Amendment 1 – 2014, IEEE 1547.1-2005 Amendment 1 – 2015, and UL 1741 January 28, 2010 edition can be used. The Commission should further include wording clarifying that inverters compliant with IEEE 1547-2018 and companion standards can be used as soon as compliant hardware is available.

- Permitting the use of smart inverter features currently available, prior to the availability of IEEE 1547-2018 compliant equipment.

Language similar to the following should be inserted into 20VAC5-314-40.E.7 as a new subsection (f):

“Equipment certified under the latest published editions of IEEE 1547, IEEE 1547.1 and UL 1741 shall be permitted to be used upon mutual agreement of the utility and the interconnection customer.”

Similar language should be inserted into other sections of the regulations applicable to Level 2 and Level 3 interconnections as well as in 20VAC5-315.

- Provide for implementation of PJM recommendations on ride-through settings

After January 1, 2022, all smart inverters installed shall be configured to conform to settings for abnormal operating conditions recommended by the PJM Interconnection, LLC and approved by the Commission.

- Provide for a stakeholder process to determine the optimal selection of smart inverter voltage control modes and settings for various classes of applications.

Since IEEE 1547-2018 provides a number of voltage control options, state-level processes should begin to identify the control modes of settings that provide optimal results for various classes of applications. For larger interconnecting systems, customized selections of modes and settings might be established as part of the interconnection review, while for smaller systems, default approaches might be established to streamline review and installation.

On or before January 1, 2021, each utility shall file tariffs establishing its Utility Required Inverter Settings Profile including voltage/power control modes and settings for normal operation.



- (a) The tariffs shall be developed with stakeholder input through an engagement process specified by the Commission.
- (b) The tariffs shall assure the safe and reliable operation of the distribution system and to the maximum extent possible:
- (i) expand hosting capacity.
 - (ii) achieve state-wide consistency in requirements, and
 - (ii) minimize small generator facility power output curtailment.
- (c) In cases where smart inverter tariff requirements are not uniform across a utility service territory, the utility shall document localized inverter setting requirements on its website or in an alternative, Commission-approved manor.

Battery Storage

CRI recommends that language be added to Virginia’s regulations that support the broader deployment of battery storage systems. Battery systems have certain unique operating characteristics that should be recognized in the interconnection evaluation process. The issues discussed below may, in part, be addressed by Staff’s new language proposed for 20VAC5-314-150.C., but more detail may be advisable.

Language supportive of the use of smart inverters includes:

- 20VAC5-314-20. Definitions. and
- 20VAC5-314-170. Schedules for Chapter 314 – Schedule 1 Glossary of Terms

“Inadvertent Export” means the unscheduled export of power from a small generating facility, beyond a specified magnitude and for a limited duration, generally due to fluctuations in load-following behavior.

“Net System Capacity” means the nameplate capacity of a small generator facility, or the total of the nameplate capacities of the units comprising a small generator facility, as designated by the manufacturer(s) of the unit(s) minus the consumption of: electrical power of the unit(s), and if applicable, as limited through the use of a control system, power relay(s), or other similar device settings or adjustments while excluding Inadvertent Export.

“Proposed Use” means the operational control mode(s) of a small generator facility upon which the applicant’s technical review is based and under which the small generator facility is bound to operate upon the execution of the



interconnection agreement. The proposed use for a small generator facility may include a combination of electric generators and energy storage devices operating in specified operational control mode(s) during specified time periods including but not limited to export, load management, backup, and market participation.

- Use of recommended new definitions in screening criteria.

Net System Capacity, Proposed Use and Inadvertent Export, as defined above, should be used appropriately in applying screening criteria.

Net Metered Interconnection Regulations

The Commission's September 5, 2018 Order initiating this rulemaking specifically called for review of Regulations Governing Interconnection of Small Electrical Generators, 20VAC5-314. CRI notes that interconnection requirements for generators eligible for net metering are separately set forth in 20VAC5-315. CRI recommends, therefore, that revisions similar to those described above also be made to the regulations for net metered systems to support the use of smart inverters and battery storage systems.

CRI thanks the Commission and the Staff for the opportunity to provide these recommendations and looks forward to continuing its participation in this proceeding.

Respectfully submitted,



Harry Warren
Co-founder and Board member
Center for Renewables Integration, Inc.

