April 3rd, 2024

VIA EMAIL: comentarios@energia.pr.gov

RE: Urgent Request Regarding LUMA's Publication of a "Smart Inverter Settings Sheets – Technical Bulletin" / NEPR-MI-2019-0009

Dear Honorable Commissioners,

Comes now, the Puerto Rico Solar Energy Industries Association Corp., d/b/a/ SESA-PR (hereinafter, "SESA") the non-for-profit association that represents Puerto Rico's solar and energy storage industries. SESA advocates for solar and storage technologies at all scales as a central solution to the energy needs of Puerto Rico, promotes public policy that benefits the growth of these industries, brings awareness and understanding of these technologies to both government policymakers and the public, and facilitates collectively beneficial collaboration and good business practices within the industry.

SESA is grateful for the previous opportunities to provide our aggregated industry comments regarding the efforts to upgrade interconnection processes and standards, and recognize LUMA's spirit of taking an action to move forward with the important concepts of interconnection rulemaking and Smart Inverter Settings.

SESA hereby informs the Puerto Rico Energy Bureau ("PREB") of the recent publication by LUMA, of a document titled "Smart Inverter Settings Sheets – Technical Bulletin"[1] (hereafter referred to as "Bulletin"), which appeared on their official website[2] on April 1, 2024 as item "g) *Notificación importante sobre actualización de requisitos técnicos en proyectos renovables*".

The Bulletin purportedly orders changes concerning customer's distributed

[1] See Attachment A

[2] https://lumapr.com/residencial/energia-renovable/

generators and their compliance with the IEEE 1547-2018 standard for smart distributed energy resources, with a mandated compliance date of June 1st 2024.[3]

We acknowledge the importance of modern code implementation, and stand ready to consolidate industry feedback to support the best and smoothest implementation possible.

Importantly, we note no inherent fault in LUMA's attempt to move forward with this important topic, and are in no way requesting any sort of punitive action towards them. And LUMA has undoubtedly and consistently proven a good actor in regards improvement of DG interconnection timelines, as well as in several other important fronts.

However, we submit this communication today as a formal objection to the validity of the document in question, due to the manner in which LUMA issued the same, and request the intervention and remedies of this Honorable Energy Bureau as enumerated below, all aimed at using this experience as an opportunity to move forward in a structured, pragmatic way aimed at overall understanding, best faith efforts at consensus building, and smoothest continued ability of Puerto Rico homes and businesses to install and interconnect solar & battery storage:

1. **Unreasonable Procedure**: We feel it is unreasonable and we are not aware of any legal precedent for expecting energy stakeholders, the public, and this Honorable Energy Bureau to monitor every page of LUMA's website daily for documents impacting regulatory standards. If this practice were to be accepted, our understanding is that it would circumvent and work as a subterfuge to established procedures for stakeholder engagement and regulatory changes that follow the rulemaking procedures contained in Act 38-2017, as amended, known as the 'Government of Puerto Rico Uniform Administrative Procedure Act' (hereinafter, "LPAU"), and other procedures are required by law and as contained in previous PREB orders.

2. **Deviation from Legal Precedents**: LUMA's publication of the Bulletin without PREB's review and approval contradicts Act 57-2014, which designates PREB as the entity with the authority to review, approve, or deny proposals concerning interconnection regulations and technical requirements.[4] Also, PREB is in charge of establishing the parameters and standards to guarantee the efficiency and reliability of the electric power service, standards proposed by organizations specialized in

[3] Attachment A ,P. 6

[4] Puerto Rico Energy Transformation and RELIEF Act, Sec. 6.3 (w).

electric power service,[5] such as IEEE. Additionally, the contract on LUMA's website for clients who want to interconnect generators to the distribution system, recognizes that clients must comply with technical requirements published by LUMA, but approved by the PREB.[6]

LUMA is recognized as the Puerto Rico Electric Power Authority's ("PREPA") agent,[7] and as such can initiate reviews of regulatory compliance requirements with PREPA. However, LUMA cannot publish or issue new System Operation Principles or other similar documents without the review and express approval of the PREB.[8] In the Bulletin, LUMA proposes to alter frequency response times and reactive power parameters, which are System Operation Principles as stated in the O&M agreement[9] and must be reviewed by PREB to approve, deny, or modify the submitted System Operation Principles by LUMA or PREPA. Such an unilateral action by LUMA clashes with Act 57-2014 and falls outside of its contractual obligations as PREPA's agent, Thus, jurisdiction for this and similar matters falls squarely within the purview of this Honorable Bureau.

3. **Request for Removal and Formal Submission**: We request that the Honorable Energy Bureau order LUMA to remove the Bulletin from their website. Should LUMA wish to propose changes to the IEEE 1547 standards, we urge them to submit these proposals to PREB formally for its review and subsequent approval, modification, or denial. Also, stakeholder and public review should be allowed and encouraged as part of a rulemaking process, as provided by the LPAU[10]; a change of this magnitude, an IEEE Standard, could be considered an Amendment to Regulation 8915,[11] as it requires clients to comply with new parameters and additional requirements not

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[5] Id., Sec. 6.3 (x).

[6] Acuerdo para Interconectar Generadores con el Sistema de Distribución Eléctrica de la Autoridad de Energía Eléctrica y Participar en los Programas de Medición Neta, Clause 1.5. (https://LUMApr.com/wpcontent/uploads/2023/11/Acuerdo-Interconexion-y-Medicion-Neta-Distribucion_Entidades-Gubernamentales_aka-Anejo-F3-Rev.pdf).

[7] PUERTO RICO TRANSMISSION AND DISTRIBUTION SYSTEM OPERATION AND MAINTENANCE AGREEMENT, (hereinafter, "O&M Agreement") Sec. 5.2 (a). (https://www.p3.pr.gov/wp-content/uploads/2020/06/executed-consolidated-om-agreement-td.pdf).

[8] Id., Sec. 5.13 (c).

[9] Id., Annex I.

[10] 3 L.P.R.A. § 9611-9630.

[11] Regulation for the Interconnection of Generators with the Distribution System of the Puerto Rico Electric Power Authority and to Participate in Net Metering Programs, Regulation No. 8915, February 6, 2017.

contemplated in previous IEEE standards used for the review of interconnection notifications.[12]

As LUMA is an entity acting as PREPA's agent -on behalf of PREPA-, we understand that the Bulletin could be considered a guidance document.[13] But if it purports to create rights, impose obligations, and/or establish a pattern of conduct that has the force of law, it must be considered a Legislative Rule that must follow the rulemaking process set forth in LPAU.[14] Even more so, the Bulletin could be considered an amendment because the IEEE 1547-2018 standard is contained in a draft of a proposed regulation that is contained in PREB's docket,[15] which was never approved, and that is now being included in a LUMA's Bulletin. This skirts PREB's approval and LPAU's rulemaking process, which requires stakeholder and public review. SESA respectfully requests that the Honorable Energy Bureau allows stakeholder and public review of the newly proposed IEEE standards through the appropriate legal process.

4. **Impractical Implementation Timeline**: The timeline suggested by LUMA for enforcement by June 1st is impractical. The only timeline on record in relevant proceedings is the timeline stated on Page 28 of the Draft Interconnection Regulations, posted in the Interconnection Rulemaking Docket[16] on July 15th, 2021, which states:

> "Voltage fluctuation and harmonics limits are both addressed by IEEE 1547-2018. However, until full adoption of IEEE 1547-2018 is complete, IEEE 1453 and IEEE 519 may be used for the respective requirements. Equipment tested to comply with the updated harmonics requirements of IEEE 1547-2018 will not be available *until approximately 18 months*

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[12] Puerto Rico Energy Transformation and RELIEF Act. In annex F, it states that the standard being employed was the IEEE 1547a-2014.

[13] 3 L.P.R.A. § 9603(c), defines guidance documents as: "a record, whether in electronic or paper format, of general applicability developed by an agency which lacks the force of law but states the agency's interpretation of any law, the agency's public policy, or that describes how and when the agency shall exercise discretionary functions. It includes official interpretations as to a law or regulations administered by it."

[14] Asoc. de Maestros v. Comisión, 159 DPR 81, (2003), at pp. 94-95, The Court affirms "if the new rule is irreconcilable with an existing legislative rule, then the new rule is properly an amendment to the first and, consequently, must be considered as a legislative rule whose approval must observe the regulatory process described above."

[15] IN RE: INTERCONNECTION RELATIONS, Resolution and Order, July 15, 2021, Sec. 3.04 (c) (3), at 28. (https://energia.pr.gov/wp-content/uploads/sites/7/2021/07/20210713-MI20190009-20180008-Resolution-and-Order-and-Draft.pdf)

[16] https://energia.pr.gov/en/dockets/?docket=nepr-mi-2019-0009

or more after publication of the revision of IEEE 1547.1." (emphases added)"[17]

After finalization of specific Smart Inverter Settings, hundreds of companies active in the solar & storage industry in Puerto Rico would need to take several steps for preparation, including but not limited to preparing software updates, training personnel for manual in-person implementation, training salespeople, developing revised Standard Operating Procedures, etc. Given the need for time to take all these steps, a multi-month timeline post-finalization is reasonable, reflecting the industry's need for adequate preparation, thorough education, and smooth implementation as initially portrayed in the previously shown in the Draft of Interconnections Regulations.

5. **Technical Concerns and Compliance Issues**: Some of the inverter settings proposed by LUMA contravene IEEE 1547 standards previously used, others pose practical implementation issues, and there is a lack of guidance for multiple settings which would make complete compliance unclear at best. Implementation with the document as presented would create significant confusion and practical compliance impossibilities for some or all companies in the solar + storage industry.

6. **Interactive Stakeholder Workshops Request**: SESA proposes the organization of multiple interactive stakeholder workshops, as an alternative and/or precursor to the rulemaking procedure contained in the LPAU. These workshops would allow LUMA to explain their rationale, industry stakeholders to voice concerns and practical challenges, and collectively to make a good faith effort at development of a consensus on smart inverter settings and a reasonable implementation timeline. One possible model for such workshops could be the process ordered by this Honorable Energy Bureau in the fall of 2023, focused on driving stakeholder consensus for the practical implementation of Wheeling standards.[18]

7. **Collective Approach to IEEE 1547 Implementation**: While SESA acknowledges the importance of modernizing IEEE 1547 standards in furtherance of the Energy Public Policy,[19] we suggest and request that the technical specifics and the timeline for such implementation would be best accomplished via a collaborative effort between LUMA and energy stakeholders, including SESA.

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[17] IN RE: INTERCONNECTION RELATIONS, Footnote 4, at p. 28.

[18] IN RE: Wheeling Implementation. Resolution and order, October 18, 2023. (https://energia.pr.gov/wp-content/uploads/sites/7/2023/10/20231018-Motion-Submitting-Updated-Wheeling-Services-Agreement-LUMAs-Responses-to-Comments-by-Stakeholders-and-Information-on-Progress-of-Wheeling-Implementation-Timelinet.pdf)

[19] Act. 17-2019, known Puerto Rico Energy Public Policy Act, Ch. 1, Sec. 1.5

8. **Urgency of Honorable Energy Bureau Action**: Given the procedural and technical complexities involved, we humbly urge the Honorable Energy Bureau to take action by or before this Friday, April 5th, to ensure a smooth and equitable IEEE 1547 implementation process. The Honorable Energy Bureau unquestionably holds the power and authority to order any remedy regarding any regulatory or legal provision under Honorable Energy Bureau's jurisdiction[20]

SESA reiterates our acknowledgement of LUMA's taking a tangible step forward in the process of Puerto Rico's implementation of certain aspects of IEEE 1547-2018, as we see value for both solar customers and non-solar customers in the modernization of standards. SESA reiterates that we are not requesting any sort of punitive action towards LUMA.

We appreciate the consideration of this Honorable Energy Bureau in this important matter, aiming to protect the interests of all stakeholders while promoting the adoption of solar and energy storage solutions in Puerto Rico's power grid. We also appreciate the opportunity to request specific and urgent consideration of the actions requested in this communication.

Sincerely,

[*signed*]

Javier Rúa-Jovet
Chief Policy Officer
SESA

javrua@sesapr.org

[20] Puerto Rico Energy Transformation and RELIEF Act, Sec. 6.3 (pp) (2).

Attachment A

LUMAPR.COM

SMART INVERTER SETTINGS SHEETS

LUMA Energy publishes the Technical Bulletin 2024-001 to provide supporting technical information to the current regulation, *Regulation for the Interconnection of Generators with the Distribution System of the Puerto Rico Electric Power Authority and to Participate in Net Metering Programs*, Regulation No. 8915, February 6, 2017. This bulletin seeks to apply the IEEE 1547-2018 standard for smart distributed energy resources (DERs) settings. Regulation 8915 in its Article of Control and Protection, #2 indicates that "In addition to the requirements contained in this Section, the customer's DG must comply with applicable standards, including, but not limited to, IEEE 1547, IEEE 519 and IEEE/ANSI C37.90 (Standard for Relays and Relay Systems Associated with Electric Power Apparatus)".

The main purpose of adopting the requirements in this bulletin is to improve the system stability and operations under high penetration of DERs. Starting **June 1, 2024**, all new Net Energy Metering applications must meet the default setting requirements that are specified in this bulletin.

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1. Required Smart Inverter Functions

Smart Inverters must be (a) set to conform to the default setting requirements and (b) capable of performing the default functions, both provided in this document, "Smart Inverter Settings Sheets", as applicable.

Customers must comply with the requirements set forth in this "Smart Inverter Settings Sheets" or, any alternative Smart Invert settings and functions that may be defined in the interconnection agreement. Any alternative settings and functions defined in the interconnection agreement will take precedent and override the default settings requirements and functions provided in this document. Notwithstanding the preceding provisions of this "Smart Inverter Settings Sheets", customer's Smart Inverter(s) shall conform with the requirements and functions required pursuant to interconnection agreement.

1.1. Communication Requirements

Table 1-1 lists minimum communication requirements for Smart Inverters connected to the distribution system.

Table 1-1- Minimum Requirements for Communication and Interface

Protocol	Transport	Physical Interface/Layer
IEEE 1815 (DNP3)/ SunSpec Modbus/ IEEE 2030.5 (Sep 2.0)	TCP/IP	Ethernet/ RS 485

1.2. Control Modes

Table 1-1 lists control modes that must be supported by Smart Inverters as well as default status of each control mode.

Table 1-2- Smart Inverter Control Modes

Applicable to Retail Customers Interconnected			
Mode of Operation	**Required/Optional**	**Description**	**Default Activation Status**
Anti-Islanding	Required	Refers to the ability to detect loss of utility source and cease to energize	Activated
Adjustable constant power factor	Required	Refers to Power Factor set to a fixed value.	Deactivated
Adjustable Constant Reactive Power	Required (If available)	Refers to Reactive Power set to a fixed value	If capable, deactivated
Voltage Ride through	Required	Refers to ability of Smart Inverter to ride through a certain range of voltages before tripping off	Activated
Frequency Ride through	Required	Refers to ability of Smart Inverter to ride through a certain range of frequencies before tripping off	Activated
Voltage – Reactive (Volt/Var)	Required	Refers to control of reactive power output as a function of voltage	Activated
Voltage – Active Power (Volt/Watt)	Required (If available)	Refers to control of real power output as a function of voltage	Activated
Frequency - Watt	Required (If available)	Refers to control of real power as a function of frequency	If capable, deactivated
Ramp Rates	Required	Refers to ability to have an adjustable entry service ramp rate when a DER restores output of active power or changes output levels over the normal course of operation.	Activated

2. Smart Inverter Function Settings

This section lists the required settings for smart inverter functions.

2.1. Anti-Islanding Settings

Smart Inverters shall detect the unintentional island and trip as specified in Table 2-1.

Table 2-1- Responses to Islanding and Open Phase Conditions - ACTIVATED

Applicable to Retail Customers Interconnected	
Condition	**Maximum Trip Time (s)**
Islanding/Open Phase	2

2.2. Voltage Settings

2.2.1. Voltage Trip Settings

Smart Inverters shall meet the abnormal voltage response requirements, as specified in Table 2-2.

Table 2-2- Smart Inverter Response to Abnormal Voltage

Voltage Trip Settings	Default Voltage (pu)	Adjustable Range for Voltage (pu)	Default Trip/Clearing Time (s)	Adjustable Range for Trip Time (s)
Over Voltage 2 (OV2)	V ≥ 1.2	0.16	Fixed at 1.2	Fixed at 0.16
Over Voltage 1 (OV1)	V ≥ 1.1	1.1 - 1.2	13	1 - 13
Under Voltage 1 (UV1)	V ≤ 0.88	0 - 0.88	21	11 - 50
Under Voltage 2 (UV2)	V ≤ 0.5	0 - 0.5	2	2 - 21

2.2.2. Voltage Ride-Through Settings

Smart Inverters shall meet the Low/High Voltage Ride-Through requirements, as specified in Table 2-3.

Table 2-3- Low/High Voltage Ride-Through Minimum Requirement – ACTIVATED

Voltage Ride-Through Settings	Voltage Range (pu)	Smart Inverter Response (Operating Mode)	Maximum Response Time (s)	Minimum Ride Through Time (s)
High Voltage 2 (HV2)	V ≥ 1.2	Cease to Energize	0.16	N/A
High Voltage 1 (HV1)	1.1 ≤ V ≤ 1.2	Momentary Cessation	0.083	12
Near Normal Voltage (NNV)	0.88 ≤ V ≤ 1.1	Continuous Operation	N/A	Infinite
Low Voltage 1 (LV1)	0.7 ≤ V ≤ 0.88	Mandatory Operation	N/A	20
Low Voltage 2 (LV2)	0.5 ≤ V ≤ 0.7	Mandatory Operation	N/A	10
Low Voltage 3 (LV3)	V ≤ 0.5	Momentary Cessation	0.083	1

2.3. Frequency Settings

2.3.1. Frequency Trip Settings

Smart Inverters shall meet the abnormal frequency response requirements, as specified in Table 2-4.

Table 2-4- Smart Inverter Response to Abnormal Frequency

Frequency Trip Settings	Default Frequency (Hz)	Adjustable Range for OF1 (Hz)	Default Trip/Clearing Time (s)	Adjustable Range for Trip Time (s)
Over Frequency 2 (OF2)	f ≥ 62	61.8 - 66	0.16	0.16 - 1000
Over Frequency 1 (OF1)	f ≥ 61.2	61.2 - 66	300	21 - 1000
Under Frequency 1 (UF1)	f ≤ 58.5	50 - 58.8	300	21 - 1000
Under Frequency 2 (UF2)	f ≤ 57	50 - 57	0.16	0.16 - 1000

2.3.2. Frequency Ride-Through Settings

Smart Inverters shall meet the Low/High Frequency Ride-Through requirements, as specified in Table 2-5.

Table 2-5- Low/High Frequency Ride-Through Minimum Requirement – ACTIVATED

Frequency Ride-Through Settings	High Frequency Range (Hz)	High Smart Inverter Response (Operating Mode)	Minimum Ride Through Time (s)
High Frequency 2 (HF2)	f ≥ 62	N/A	N/A
High Frequency 1 (HF1)	61.2 ≤ f ≤ 62	Mandatory Operation	299
Near Normal Frequency (NNF)	58.8 ≤ f ≤ 61.2	Continuous Operation	Infinite
Low Frequency 1 (LF1)	57 ≤ f ≤ 58.8	Mandatory Operation	299
Low Frequency 2 (LF2)	f ≤ 57	N/A	N/A

2.4. Voltage-Reactive Power Control Mode Settings

An example Volt-Var characteristic is shown in Figure 2-1. The voltage-reactive power characteristic shall be configured in accordance with the default parameter values specified in Table 2-6.

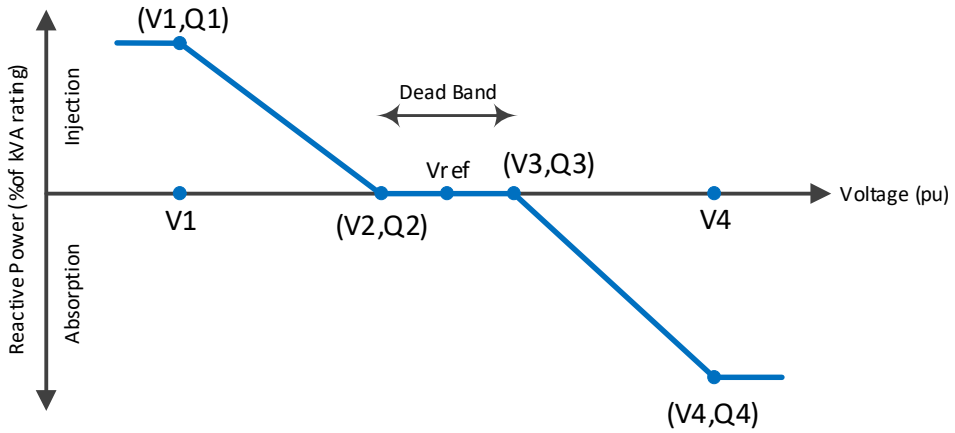

Figure 2-1. Example Volt-Var characteristic

Table 2-6- Volt-Var Settings – ACTIVATED

Volt-Var Parameters	Definitions	Default Values (% of nominal rating)	Allowable Range	
			Minimum	Maximum
Vref	Dead band center	VN	95% VN	105% VN
V2	Dead band lower voltage limit	98% VN	Vref – 3%VN	Vref
Q2	Reactive power injection or absorption at voltage V2	0	maximum reactive power capability, absorption	maximum reactive power capability, injection
V3	Dead band upper voltage limit	102% VN	Vref	Vref + 3%VN
Q3	Reactive power injection or absorption at voltage V3	0	maximum reactive power capability, absorption	maximum reactive power capability, injection
V1	Voltage at which DER shall inject Q1 reactive power	92% VN	Vref – 18%VN	V2 – 2%VN
Q1[(1)]	Reactive power injection at voltage V1	44%	0	maximum reactive power capability, injection
V4	Voltage at which DER shall absorb Q4 reactive power	108% VN	V3 + 2%VN	Vref + 18%VN
Q4[(1)]	Reactive power absorption at voltage V4	44%	maximum reactive power capability, absorption	0
Open loop response time	Time to 90% of the reactive power change in response to the change in voltage	5 sec	1 sec	90 sec

[(1)] This requires that the Smart Inverter operates with a reactive power priority and generate/absorb reactive power to the ranges specified in this table irrespective of active power production.

2.5. Voltage-Active Power Control Mode Settings

Two examples of these characteristics are shown in Figure 2-2. The characteristic shall be configured in accordance with the default parameter values specified in Table 2-7.

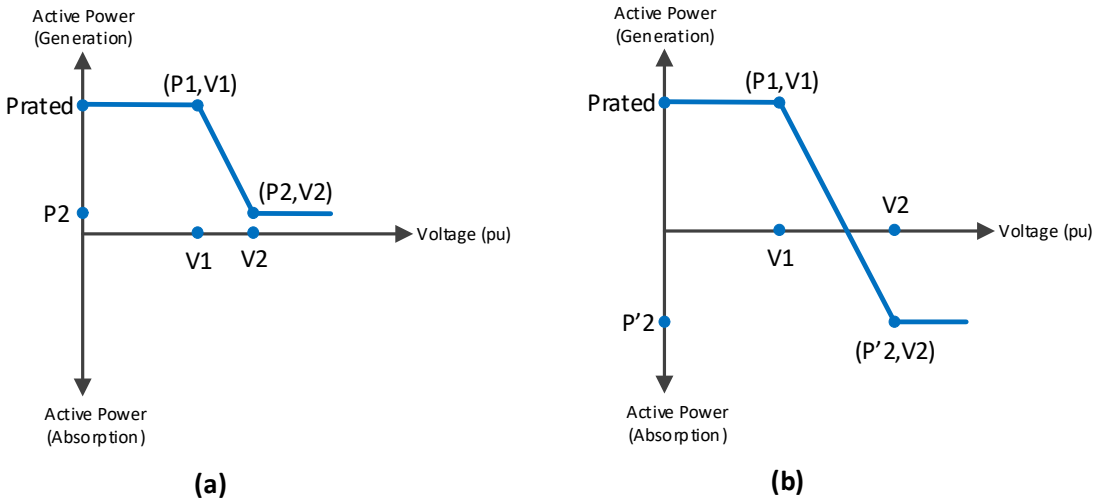

Figure 2-2. Example Volt-Watt characteristics

Table 2-7- Volt-Watt Settings – ACTIVATED

Voltage-active power parameters	Default Settings	Ranges of allowable settings	
		Minimum	Maximum
V1	106% VN	105% VN	109% VN
P1	P_{RATED}	NA	NA
V2	110% VN	V1 + 1% VN	110% VN
P2 (applicable to DER that can only generate active power)	The lesser of 0.2 P_{RATED} or P_{MIN}[(1)]	P_{MIN}	P_{RATED}
P'2 (applicable to DER that can generate and absorb active power)	0	0	P'_{RATED}[(2)]
Open-loop response time	10 sec	0.5 sec	60 sec

[(1)] P_{MIN} is the minimum active power output in p.u. of the DER rating (i.e., 1.0 p.u.).
[(2)] P'_{RATED} is the maximum amount of active power that can be absorbed by the DER.

2.6. Ramp Rate Settings

The following is the ramp-rate requirement during normal and reconnection operation of Smart Inverters:

- Normal ramp-up rate: For transitions between energy output levels over the normal course of operation, the default value is 100% of maximum current output per second with a range of adjustment between 1% to 100%.
- Connect/Reconnect Ramp-up rate: Upon starting power into the grid, following a period of inactivity or a disconnection, the inverter shall wait for 300 seconds before reconnecting and shall be able to control its rate of increase of power from 1 to 100% maximum current per second. The default value is 2% of maximum current output per second. The maximum active power step during restoring output is 20%