

Draft White Paper

**Proposed Revisions to the Applicability of NERC Reliability Standards
NERC Standards Applicability to Dispersed Generation Resources**

**Project 2014-01 Standards Applicability for Dispersed Generation
Resources Standard Drafting Team**

April 14, 2014

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2 Executive Summary

The purpose of this white paper is to provide background and technical rationale for proposed revisions to the applicability of several North American Electric Reliability Corporation (NERC) Reliability Standards or requirements. The goal of the NERC Project 2014-01 Standards Applicability for Dispersed Power Producing Resources¹ standard drafting team (SDT) is to ensure that the Generator Owners (GOs) and Generator Operators (GOPs) of dispersed generation resources are appropriately assigned responsibility for requirements that impact the reliability of the Bulk Power System (BPS), as the characteristics of operating dispersed generation resources can be unique. In light of the revised BES definition approved by the Federal Energy Regulatory Authority (FERC) in 2014², the intent of this effort is generally to maintain the status quo for applicability of the standards as they have been applied over time with respect to dispersed generation resources, where the status quo does not create a reliability gap.

The SDT performed a review of all standards that apply to GOs and/or GOPs (listed in Appendix A) and determined how each standard requirement should be appropriately applied to dispersed generation resources and categorized as follows:

- The existing standard language was appropriate when applied to dispersed generating resources and does not need to be addressed;
- The existing standard language was appropriate when applied to dispersed generating resources but additional NERC guidance documentation is needed to clarify how to implement the requirements for dispersed generating resources; and
- The existing standard language needs to be modified in order to account for the unique characteristics of dispersed generation resources. This could be accomplished through the applicability section of the standard in most cases or, if required, through changes to the individual requirements.

From this review, there are three (3) standards in which the SDT feels immediate attention is required to provide direction to industry stakeholders as soon as feasible regarding how to appropriately direct compliance related preparations. These standards include:

- PRC-004-2.1a;
- PRC-005 (relevant versions)³; and
- VAR-002.

However, the SDT has recognized that many standards (listed in Appendix B) should have further review by the SDT to determine the necessity and the type of clarification or guidance to the applicability for dispersed generation resources. This necessity is based on how each standard requirement, as written, would apply to dispersed generation resources and the individual generating units at these facilities,

¹ Although the BES definition uses the term “dispersed power producing resources,” the SAR and the SDT also use the term “dispersed generation resources” and “DGR.” For the purposes of this paper, these terms are interchangeable.

² Glossary of Terms Used in NERC Reliability Standards, updated March 12, 2014.

³ Reliability Standard PRC-005 is currently being revised as part of Project 2007-17.1 – Protection System Maintenance and Testing – Phase 3, available here: http://www.nerc.com/pa/Stand/Pages/Project-2007-17_3-Protection-System-Maintenance-and-Testing-Phase-3.aspx.

considering the recently approved BES definition. The proposed resolutions could target the applicability language in the applicability section or in individual requirements. There may be other methods to ensure applicability is consistent throughout the Regions, including modifying Reliability Standard Audit Worksheet (RSAW) language or having guidance issued by NERC. These tools, among others, will be considered by the SDT throughout the work effort.

The technical section of this paper includes insight from the SDT review, including the history of standards applicability to dispersed generation resources, identification of any unique circumstances for dispersed power producing resources and current practices, as well as the SDT's categorization and corresponding technical justification.

This white paper is a living document. It is the intent of the SDT to modify this document over the course of this project to document the SDT's rationale and technical justification for each standard until the work of the SDT is complete.

3 Purpose

The purpose of this white paper is to provide background and technical rationale for proposed revisions to the applicability of several Reliability Standards⁴ or requirements that apply to GOs and/or GOPs. The goal of the proposed applicability changes is to ensure that the GOs and GOPs of dispersed generation resources have clarity as to their responsibility for requirements that impact the reliability of the BPS, as the characteristics of operating dispersed generation can be unique. This clarity will be accomplished through revised applicability language in the standards, recommended changes to the RSAW, or recommendations for a reliability guideline or reference document.

This document lays out a common understanding of design and operational characteristics of dispersed generation resources, highlighting the unique features of dispersed generation resources. The recommendations identified in this document consider the purpose and time horizon of the standards and requirements, as well as the avoidance of applying requirements in a manner that has no significant effect on reliability.⁵ This document provides justification of and proposes revisions to the applicability of Reliability Standards and requirements, both existing and in development, and should be considered guidance for future standard development efforts. However, please note that recommendations provided in this paper are subject to comment and further review and revision.

Note that while this paper may provide examples of dispersed generation resources, the concepts presented are not specific to any one technology. The DGR SDT in general has referenced the BES Reference Document, which also refers to “dispersed power producing resources.” Although the BES definition uses the term “dispersed power producing resources,” the Standard Authorization Request (SAR) and the SDT also use the term “dispersed generation resources.” For the purposes of this paper, these terms are interchangeable.

⁴ Note that “Reliability Standard” is defined in the NERC Glossary as “approved by FERC,” but that the DGR SDT reviewed approved and unapproved standards.

⁵ *North American Electric Reliability Corporation*, 138 FERC ¶ 61,193 at P 81 (2012).

4 Background

By submitting a SAR to the NERC Standards Committee, industry stakeholders requested that the applicability of Reliability Standards or the requirements of Reliability Standards be revised to ensure that the Reliability Standards are not imposing requirements on dispersed generation resource components that are unnecessary or counterproductive to the reliability of the BPS. The SDT intends to ensure that Reliability Standards are applied to dispersed generation resources to support an effective defense-in-depth strategy and Adequate Level of Reliability for the reliability of the interconnected BPS.

For purposes of this effort, dispersed generation resources are those individual resources that aggregate to a total capacity greater than 75 MVA gross nameplate rating, and that are connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage of 100 kV or above. This request is related to the approved definition of the BES from Project 2010-17,⁶ which resulted in the inclusion of distinct components of dispersed generation resources.

4.1 BES Definition

The BES definition⁷ includes the following inclusion criterion addressing dispersed generation resources:

I4. Dispersed power producing resources that aggregate to a total capacity greater than 75 MVA (gross nameplate rating), and that are connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage of 100 kV or above. Thus, the facilities designated as BES are:

- a) The individual resources, and*
- b) The system designed primarily for delivering capacity from the point where those resources aggregate to greater than 75 MVA to a common point of connection at a voltage of 100 kV or above.*

Upon implementation of Inclusion I4, NERC standards and requirements applicable to Generator Owners and Generator Operators will apply to owners and operators of all of the components included in the definition, notably each individual generator of a dispersed generation resource facility in those requirements, except in certain standards that explicitly identify the applicable facilities or provide specific guidance on applicability to dispersed generation resources.

The *BES Definition Reference Document*⁸ includes a description of what constitutes dispersed generation resource:

“Dispersed power producing resources are small-scale power generation technologies using a system designed primarily for aggregating capacity providing an alternative to, or an enhancement of, the traditional electric power

⁶ http://www.nerc.com/pa/Stand/Pages/Project2010-17_BES.aspx

⁷ Glossary of Terms Used in NERC Reliability Standards, updated March 12, 2014.
http://www.nerc.com/pa/Stand/Glossary%20of%20Terms/Glossary_of_Terms.pdf

⁸ Bulk Electric System Definition Reference Document, Version 2, April 2014.
http://www.nerc.com/pa/Stand/Project%20201017%20Proposed%20Definition%20of%20Bulk%20Electri/bes_phas e2_reference_document_20140325_final_clean.pdf.

system. Examples could include but are not limited to: solar, geothermal, energy storage, flywheels, wind, micro-turbines, and fuel cells.”

4.2 Dispersed Generation Resources

Dispersed generation resources are often considered to be variable energy resources such as wind and solar. This description is not explicitly stated in the BES definition; however, NERC and FERC characterize variable generation in this manner regarding the purpose of Inclusion I4 of the definition.⁹ Therefore, the SDT is considering the reliability impacts of variable generation that depends on a primary fuel source which varies over time and cannot be stored.¹⁰ Reliably integrating high levels of variable resources – wind, solar, ocean, and some forms of hydro – into the BPS require significant changes to traditional methods used for system planning and operation.¹¹ While these resources provide challenges to system operation, these resources are instrumental in meeting government-established renewable portfolio standards and requirements that are based on vital public interests.¹²

4.2.1 Design Characteristics

For dispersed power producing resources to be economically viable, it is necessary for the equipment to be geographically dispersed. The generating capacity of individual generating modules can be as small as a few hundred watts to as large as several megawatts. Factors leading to this dispersion requirement include:

- Practical maximum size for wind generators to be transported and installed at a height above ground to optimally utilize the available wind resource;
- Spacing of wind generators geographically to avoid interference between units;
- Solar panel conversion efficiency and solar resource concentration to obtain usable output; and
- Cost-effective transformation and transmission of electricity.

The utilization of these small generating units results in a large number of units (e.g., several hundred wind generators or several million solar panels) installed collectively as a single facility that is connected to the transmission system.

Dispersed generation resources interconnected to the transmission system typically have a control system at the group level that controls voltage and power output of the facility. The control system is capable of recognizing the capability of each individual unit or inverter to appropriately distribute the contribution required of the facility across the available units or inverters. The variable generation control system must also recognize and account for the variation of uncontrollable factors such as wind speed and solar

⁹ NERC December 13, 2013 filing, page 15 (FERC Docket No. RD14-2); NERC December 13, 2013 filing, page 17 (FERC Docket No. RD14-2); NERC January 25, 2012 filing, page 18 (FERC Docket No. RD14-2), FERC Order Approving Revised Definition, Docket No. RD14-2-000, Issued March 20, 2014.

¹⁰ “*Electricity Markets and Variable Generation Integration*”, WECC, January 6, 2011.
<https://www.wecc.biz/committees/StandingCommittees/JGC/VGS/MWG/ActivityM1/WECC%20Whitepaper%20-%20Electricity%20Markets%20and%20Variable%20Generation%20Integration.pdf>

¹¹ “*Accommodating High Levels of Variable Generation*”, NERC, April, 2009.
http://www.nerc.com/files/ivgtf_report_041609.pdf

¹² See *Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval, and Enforcement of Electric Reliability Standards*, Order No. 672, FERC Stats. & Regs. ¶ 31,204, at P 335, *order on reh’g*, Order No. 672-A, FERC Stats. & Regs. ¶ 31,212 (2006).

irradiance levels. Thus, for some standards discussed in this paper it is appropriate to apply requirements at the plant level rather than the individual generating unit.

4.2.2 Operational Characteristics

Dispersed generation resources often rely on a variable energy source (wind, for example) that is not able to be stored. Because of this, a facility operator cannot provide a precise forecast of the expected output to a Balancing Authority (BA), Transmission Operator (TOP) or Reliability Coordinator (RC); however, short-term forecasting capability is improving and thus reducing uncertainty.¹³ The forecasting and variable operating conditions are well understood by BAs, TOPs, and RCs as evidenced by the successful operation of these generating resources over the years. Dispersed generation resources by their nature result in each individual generating unit potentially experiencing varied power system parameters (e.g. voltage, frequency, etc.) due to varied impedances and other variations in the aggregating facilities design.

Many older dispersed generation resources are limited in their ability to provide essential reliability services. However, due to technological improvements, new dispersed generation resources are capable of providing system support for voltage and frequency. For efficiency, the facilities are designed to provide the system requirements at the point of interconnection to the transmission system.

4.2.3 Reliability Impact

A dispersed generation resource is typically made up of many individual generating units. In most cases, the individual generating units are similar in design and from one manufacturer. The aggregated capability of the facility may in some cases contribute significantly to the reliability of the BPS. As such, there can be reliability benefits from ensuring the equipment utilized to aggregate the individual units to a common point of connection are operated and maintained as required in certain applicable NERC standards. When evaluated individually, however, the individual generating units often do not provide a significant impact to BPS reliability, as the unavailability or failure of any one individual generating resource may have a negligible impact on the aggregated capability of the facility. The SDT acknowledges that FERC addressed the question of whether individual resources should be included in the BES definition in Order Nos. 773 and 773-A, and concluded that individual wind turbine generators should be included as part of the BES. The SDT is not challenging this conclusion, but rather is addressing the applicability of standards on a requirement-by-requirement basis as necessary to account for the unique characteristics of dispersed generation. Thus, the applicability of requirements to individual generating units may be unnecessary except in cases where a common mode issue exists that could lead to a loss of a significant number of units or the entire facility in response to a transmission system event.

4.3 Drafting Team Efforts

The SDT is approaching this project in multiple phases. First, after a thorough discussion of the new definition of the BES, the SDT reviewed each standard, as shown in Appendix A, at a high level to recommend changes that would promote consistent applicability for dispersed generation resources

¹³ “*Electricity Markets and Variable Generation Integration*”, WECC, January 6, 2011. <https://www.wecc.biz/committees/StandingCommittees/JGC/VGS/MWG/ActivityM1/WECC%20Whitepaper%20-%20Electricity%20Markets%20and%20Variable%20Generation%20Integration.pdf>

through the entire set of Reliability Standards. This review provided the type of changes proposed, the justification, and priority. The SDT has documented its review in this white paper, which will be posted for stakeholder comment to gain consensus on which standards require applicability changes to ensure application to dispersed forms of generation is clear. The next phase will include revising standards where necessary, addressing high priority issues first, and supporting the balloting and commenting process. The SDT will maintain and update the white paper throughout the effort.

4.3.1 Scope of Standards Reviewed

Initially, the focus of the standards review was on standards and requirements applicable to GOs and GOPs. However, during discussions, a question was raised to the SDT whether consideration is necessary for other requirements that affect the interaction of a Balancing Authority (BA), Transmission Operator (TOP), or Reliability Coordinator (RC) with individual BES Elements. For example, a requirement that states “an RC shall monitor BES Elements” may unintentionally affect the RC operator due to the newly revised BES definition. As such, the SDT decided to take a high-level look at all standards adopted by the NERC Board of Trustees or approved by FERC to ensure this issue is not significant.

All standards that were reviewed are listed in Appendix A along with the status of the standards as of April 10, 2014. The fields in Appendix A include the following;

- List of standards (grouped by approval status)
- Approval status of the standards which include
 - Subject to Enforcement
 - Subject to Future Enforcement
 - Filed and Pending Regulatory Approval
 - Pending Regulatory Filing
 - Designated for Retirement (2 standards – MOD-024-1 and MOD-025-1 – officially listed as Filed and Pending Regulatory Approval but will be superseded by MOD-025-2)
 - Proposed for Remand (4 standards – IRO-001-3, IRO-005-4, TOP-002-3, and TOP-003-2 – officially listed as Filed and Pending Regulatory Approval but, as of April 10, 2014, proposed to be remanded)
- Indication of change or additional review necessary

The SDT also reviewed, at a high-level, any approved regional standards. In cases where a change is recommended to a regional standard, the SDT will notify the affected Region. In addition, the SDT is prepared to provide recommendations to other active NERC standard development efforts, where appropriate.

4.3.2 Reliability Principles

The SDT used the following Reliability Principles to review the standards:

- Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
- The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.

- Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
- Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained, and implemented.
- Facilities for communication, monitoring, and control shall be provided, used, and maintained for the reliability of interconnected bulk power systems.
- Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
- The reliability of the interconnected bulk power systems shall be assessed, monitored, and maintained on a wide-area basis.
- Bulk power systems shall be protected from malicious physical or cyber attacks.

4.3.3 Prioritization Methodology

The SDT established a prioritization for the review and modification of applicability changes recommended to NERC standards and requirements. The SDT evaluated each requirement to identify the appropriate applicability to support reliability of the BPS. After the SDT identified a standard or requirement where changes to the applicability are warranted, it performed a prioritization. In general, any standard or requirement in which the SDT believes modifications are required has been assigned a high, medium, or low priority. The standards and requirements priorities were established as follows:

- High priority was assigned if compliance-related efforts with no appreciable reliability benefit would require not only significant resources but also would require efforts to be initiated by an entity well in advance of the implementation date;
- Medium priority was assigned if significant effort and resources with no appreciable reliability benefit would be required by an entity to be compliant; and
- Low priority was assigned to other changes that may need to be made to further ensure requirements add to reliability, but are not perceived as a significant compliance burden.

The prioritization of each recommendation is identified in Appendix B.

- List of standards (grouped by priority)
- Approval status of the standards (same designations as used in Appendix A)
- Recommendation of changing the applicability section of the standard or by changing the applicability for specific requirements
- Recommendation of what level of applicability should apply (e.g., point of interconnection, point where generation aggregates to greater than 75 MVA, individual generating units)

5 Technical Discussion

This section provides a review of each group of standards, focusing on the impact of the BES definition on reliability and compliance efforts. This discussion proposes a resolution for each standard, whether it is a change in the applicability section or in a specific requirement, clarification in a guidance document, or no action needed.

| Status | Number of Standards | Number of standards to be Addressed | Number of standards to be Changed |
|--|---------------------|-------------------------------------|-----------------------------------|
| NERC Standards | 162 | 20 | 14 |
| Subject to Enforcement | 99 | 9 | 8 |
| Subject to Future Enforcement | 19 | 6 | 3 |
| Pending Regulatory Approval | 29 | 5 | 3 |
| Pending Regulatory Filing | 9 | 0 | 0 |
| Designated for Retirement | 2 | 0 | 0 |
| Proposed for Remand | 4 | 0 | 0 |
| Region-specific Standards (*Out of Scope) | 19 | 4 | 4 |
| Subject to Enforcement | 16 | 3 | 3 |
| Subject to Future Enforcement | 1 | 1 | 1 |
| Pending Regulatory Approval | 2 | 0 | 0 |
| Grand Total | 181 | 24 | 18 |

5.1 BAL

The group of BAL standards focuses primarily on ensuring the Balancing Authority (BA) has the awareness, ability, and authority to maintain the frequency and operating conditions within its BA Area. Only two standards in this group affect GO and/or GOP, and no BAL standard reviewed affected the interaction of a host BA, TOP, or RC with individual BES Elements.

5.1.1 BAL-005 — Automatic Generation Control

The purpose of this standard, as it applies to GOPs, is to ensure that all facilities electrically synchronized to the Interconnection are included within the metered boundary of a BA Area so that balancing of resources and demand can be achieved. Ensuring the facility as a whole is within a BA Area ensures the individual units are included. *Therefore, the applicability of the BAL-005 standard does not need to be changed for dispersed generation resources.*

5.1.2 BAL-001-TRE-1 — Primary Frequency Response in the ERCOT Region

The purpose of BAL-001-TRE-1 standard is to maintain Interconnection steady-state frequency within defined limits. This standard should be modified to clarify the applicability for dispersed generation resources to the total plant level to ensure coordinated performance. However, this is a regional standard and not part of the SDT scope. *The SDT will communicate this recommendation to the relevant Region.*

5.2 COM¹⁴

The COM standards focus on communication between the RC, BAs, TOPs, and GOPs. The only requirements in any of the current or future enforceable standards that apply to the GOP are clearly intended to apply to the individual GOP registered functional entity (i.e., requires communication between GOPs, TOPs, BAs, and RCs), not the constituent Elements it operates. Consequently, there is no need to differentiate the GOPs obligation for dispersed generation resources from any other resources. *Therefore, the applicability of the COM-001-2, COM-002-2a, and COM-002-3 standards that were reviewed do not need to be changed for dispersed generation resources.*

5.3 EOP

The EOP standards focus on emergency operations and reporting. The standards that apply to GO and/or GOP entities are EOP-004 and EOP-005. No EOP standard reviewed affects the interaction of a host BA, TOP, or RC with individual BES Elements.

5.3.1 EOP-004 — Event Reporting

The purpose of this standard is to improve the reliability of the BES by requiring the reporting of events by Responsible Entities. The requirements of this standard that apply to the GO and GOP are clearly intended to apply to the individual GO and GOP registered functional entity, not the constituent Elements it operates. Moreover, reportable events identified in Attachment 1 could only apply at the plant level. There is no need to differentiate dispersed generation resources from any other GO and/or GOP resource. *Therefore, the applicability of EOP-004 does not need to be changed for dispersed generation resources.*

5.3.2 EOP-005 — System Restoration from Blackstart Resources

EOP-005 ensures plans are in place to restore the grid from a de-energized state. The requirements that apply to a GOP are primarily for individual generation facilities designated as Blackstart Resources, with one requirement to participate in restoration exercises or simulations as requested by the RC. The inclusion of Blackstart Resources is already identified in the BES definition through Inclusion I3. The expectation is that all registered GOPs will participate in restoration exercises as requested by its RC. *Therefore, the applicability of EOP-005 does not need to be changed for dispersed generation resources.*

5.4 FAC

The FAC standards focus on establishing ratings and limits of the facility and interconnection requirements to the BES. Several standards apply to GOs and/or GOPs. No FAC standard reviewed affects the interaction of a host BA, TOP, or RC with individual BES Elements.

5.4.1 FAC-001 — Facility Connection Requirements

Requirements R2 and R3 of this standard apply to any GO that has an external party applying for interconnection to the GO's existing Facility in order to connect to the transmission system. This scenario is uncommon and there is no precedent for applicability of this standard to dispersed generation resources known to the SDT. Current practice primarily includes the GO stating that they will comply with the standard if this scenario is ever realized. This standard allows the GO to specify the conditions that must

¹⁴ Note that COM-002-2a and COM-002-3, which are Pending Regulatory Filing, will be replaced by COM-002-4.

be met for the interconnection of the third-party, thus providing inherent flexibility to tailor the requirements specifically for the unique needs of the Facility. Furthermore, in 2012, the NERC Integration of Variable Generation Task Force (IVGTF) provided some suggested changes¹⁵ to this standard for the next version. The IVGTF report included modifying requirements to this standard as well as recommended guidance for considering integration of variable generation plants. The recommendations are technology neutral and independent of the type of generation. *For these reasons, the applicability of FAC-001 does not need to be changed for dispersed generation resources.*

5.4.2 FAC-002 — Coordination of Plans for New Facilities

The purpose of FAC-002 is to ensure coordinated assessments of new facilities. The requirement applicable to GOs requires coordination and cooperation on assessments to demonstrate the impact of new facilities on the interconnected system and to demonstrate compliance with NERC standards and other applicable requirements. The methods used to demonstrate compliance are independent of the type of generation and are typically completed at the point of interconnection. *Therefore, the applicability of FAC-002 does not need to be changed for dispersed generation resources.*

5.4.3 FAC-003 — Transmission Vegetation Management

The purpose of this standard is to ensure programs and efforts are in place to prevent vegetation-related outages. This standard applies equally to dispersed generation facilities and traditional Facilities in both applicability and current practices, as it pertains to overhead transmission lines of applicable generation interconnection Facilities. *Therefore, the applicability of FAC-003 does not need to be changed for dispersed generation resources.*

5.4.4 FAC-008 — Facility Ratings

FAC-008 ensures facility ratings used in the planning and operation of the BES are established and communicated. The facility ratings requirement has historically been applicable to dispersed power producing resources and current practices associated with compliance are similar to traditional generation facilities. There is inherent flexibility in the standard requirements for the GO to determine the methodology utilized in determining the facility ratings.

To identify the facility rating of a dispersed power producing resource the analysis of the entire suite of facility components is necessary to adequately identify the minimum and maximum Facility Rating and System Operating Limits, and thus there would be no differentiation between the compliance obligations between dispersed power producing resources and traditional generation. *Although The SDT believes the industry and Regions would benefit from additional guidance on FAC-008-3 R1 to achieve a uniform approach, the applicability of FAC-008 does not need to be changed for dispersed generation resources.*

5.5 INT

The INT standards provide BAs the authority to monitor power interchange between BA Areas. No INT standard is applicable to the GO or GOP, or affects the interaction of a host BA, TOP, or RC with

¹⁵ http://www.nerc.com/files/2012_IVGTF_Task_1-3.pdf

individual BES Elements. *Therefore, the applicability of the INT standards do not need to be changed for dispersed generation resources.*

5.6 IRO

The IRO standards provide RCs their authority. There are three IRO Standards that apply directly to GO and/or GOP entities. There are three standards that apply to the interaction of the RC with individual BES Elements. No other IRO standard reviewed affected the interaction of a host BA, TOP, or RC with GOs and/or GOPs.

5.6.1 IRO-001 — Reliability Coordination — Responsibilities and Authorities¹⁶

The purpose of these standards and their requirements as applicable to a GOP is to ensure RC directives are complied with so long as they do not violate safety, equipment, or regulatory or statutory requirements, or cannot be physically implemented. If a GOP is unable to follow a RC directive they are to inform the RC immediately of such.

Directives from RCs have been traditionally applied to the dispersed power producing resource at the aggregate facility level when they are related to either active power or voltage, such as an output reduction or the provision of voltage support. When such directives are not specific to any one Element within the Facility, it is up to the GOP to determine the appropriate method to achieve the desired result of the directive consistent with other applicable NERC Reliability Standards. When an RC directive specifies a particular Element or Elements at the GOP's facility, it is the expectation and requirement that the GOP will act as directed, so long as doing so does not violate safety, equipment, or regulatory or statutory requirements or cannot be physically implemented. For example, a directive could specify operation of a particular circuit breaker at a GOP Facility. *For these reasons, the applicability of IRO-001 does not need to be changed for dispersed generation resources.*

5.6.2 IRO-005 — Reliability Coordination — Current Day Operations¹⁷

The purpose of this standard and its requirements as it relates to GOPs is to ensure when there is a difference in derived limits the BES is operated to the most limiting parameter. A difference in derived limits can occur on any Element and therefore any limitation of the applicability of this standard may create a reliability gap. There is no need to differentiate applicability to dispersed generation resources from any other GOP resources. *Therefore, the applicability of IRO-005 does not need to be changed for dispersed generation resources.*

5.6.3 IRO-010 — Reliability Coordinator Data Specification and Collection

The purpose of this standard and its requirement(s) as it relates to GOs and GOPs is to ensure data and information specified by the RC is provided. As each RC area is different in nature, up to and including the tools used to ensure the reliability of the BPS, a 'one size fits all' approach is not appropriate. This Reliability Standard allows for the RC to specify the data and information required from the GO and/or

¹⁶ Note that IRO-001-3, which is adopted by the NERC BOT, was included in the proposed remand by FERC and is subject to revision as part of Project 2014-3 – Revisions to TOP and IRO Standards.

¹⁷ Note that applicability to GOPs has been removed in IRO-005-4, which is adopted by the NERC BOT. However, this standard was included in the proposed remand by FERC and is subject to revision as part of Project 2014-3 – Revisions to TOP and IRO Standards.

the GOP, based on what is required to support the reliability of the BPS. *Therefore, the applicability of IRO-010 does not need to be changed for dispersed generation resources.*

5.7 MOD

The MOD group of standards ensures consistent modeling data requirements and reporting procedures. The MOD standards provide a path for Transmission Planners (TPs) and Planning Coordinators (PCs) to reach out to entities for specific modeling information, if required. The existing and proposed modeling standards are sufficient for modeling dispersed generation resources; however, due to the unique nature of dispersed generation resources and an effort to bring consistency to the models, *the SDT will consider the need to develop guidelines for dispersed generation resource modeling and therefore recommends consulting other groups, e.g., the NERC Planning Committee and the MOD-032 SDT, to determine if developing such guidelines would be valuable to support accuracy of modeling.*

5.7.1 MOD-010 — Steady-State Data for Transmission System Modeling and Simulation

This standard is anticipated to be retired in the near future. There is no need to differentiate dispersed generation resources from any other GOP resources as discussed in 5.7.8 regarding MOD-032. *Therefore, the applicability of MOD-010 does not need to be changed for dispersed generation resources.*

5.7.2 MOD-012 — Dynamics Data for Transmission System Modeling and Simulation

This standard is anticipated to be retired in the near future. There is no need to differentiate dispersed generation resources from any other GOP resources as discussed in 5.7.8 regarding MOD-032. *Therefore, the applicability of MOD-012 does not need to be changed for dispersed generation resources.*

5.7.3 MOD-024-1 — Verification of Generator Gross and Net Real Power Capability

This standard was established to ensure accurate information on generator gross and net Real Power capability is available for steady-state models used to assess BES reliability. This standard will be superseded by MOD-025-2.¹⁸ *Therefore, the applicability of MOD-024-1 does not need to be changed for dispersed generation resources.*

5.7.4 MOD-025-1 — Verification of Generator Gross and Net Reactive Power Capability

This standard was established to ensure accurate information on generator gross and net Reactive Power capability is available for steady-state models used to assess BES reliability. This standard will be superseded by MOD-025-2. *Therefore, the applicability of MOD-025-1 does not need to be changed for dispersed generation resources.*

5.7.5 MOD-025-2 — Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability

The purpose of MOD-025-2 is to ensure that accurate information on generator gross and net Real and Reactive Power capability is available for planning models used to assess BES reliability. This standard is appropriate for and includes specific provisions for dispersed generation resources to ensure changes in capabilities are reported. *However, the SDT recommends developing guidance documentation to clarify*

¹⁸ MOD-024-1 and MOD-025-1 are NERC BOT Adopted but not subject to enforcement. They are commonly followed as good utility practice.

the applicability to ensure the reporting needs align with the dispersed generation resource control point (often one control system for an entire Facility), independent of the point at which it connects to the BES.

5.7.6 MOD-026 — Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions

This standard provides for verification of models and data for voltage control functions. This standard is appropriate for dispersed generation resources to ensure changes in control systems and capabilities are reported. *However, the SDT recommends clarifying the applicability to ensure the reporting needs align with the dispersed generation resource control point (often one control system for an entire Facility), independent of the point at which it connects to the BES.*

5.7.7 MOD-027 — Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions

This standard was established to verify that the turbine/governor and frequency control model accurately represent generator unit Real Power response to system frequency variations. This standard is appropriate for dispersed generation resources to ensure changes in control systems and capabilities are reported. *However, The SDT recommends clarifying the applicability to ensure the reporting needs align with the dispersed generation resource control point (often one control system for an entire Facility), independent of the point at which it connects to the BES.*

5.7.8 MOD-032 — Data for Power System Modeling and Analysis

The MOD-032 standard was established to ensure consistent modeling data requirements and reporting procedures for the planning horizon cases. The nature of dispersed generation resources is a challenge in modeling the steady-state and dynamic electrical properties of the individual components (e.g. individual units, collector system, interconnection components, etc.).

Models for dispersed generation resources are typically unique for each facility and proprietary. Generic models exist for dynamic analysis that may provide the accuracy of a facility-specific model. Some sections of the MOD-032 Attachment 1 pertain to modeling individual units, which may not be feasible. *Although the applicability of MOD-032 does not need to be changed for dispersed generation resources, the SDT recommends guidance documentation to ensure consistency in application of this standard. Such guidance may also have relevance to MOD-033, as well as provide interim guidance prior to and during the implementation period for these standards.*

5.8 NUC

The requirements in standard NUC-001 — *Nuclear Plant Interface Coordination* individually define the applicability to Registered Entities, not to the Elements the entities own or operate. While it is unlikely any Elements that are part of a dispersed generating resource would be subject to an agreement required by this standard, limiting the applicability of this standard could create a reliability gap and thus, there is no need to differentiate applicability to dispersed generation resources. *Therefore, the applicability of the NUC standard does not need to be changed for dispersed generation resources.*

5.9 PER

The PER standards focus on operator personnel training. The only requirements in any of the current or future enforceable standards that apply to the GOP is requirement R6 in PER-005-2 – *Operations Personnel Training*, and it is clearly intended to apply to the individual GOP registered functional entity that controls a fleet of generating facilities, not the constituent Elements it operates. As such, there is no need to differentiate dispersed generation resources from any other GOP resources. *Therefore, the applicability of the PER standards do not need to be changed for dispersed generation resources.*

5.10 PRC

The PRC standards establish guidance to ensure appropriate protection is established to protect the BES.

5.10.1 PRC-001-1.1 — System Protection Coordination

Requirement R1 requires GOPs to be familiar with the purpose and limitations of Protection System schemes applied in their area. The recently approved changes to the BES definition extend the applicability of this requirement. Often this familiarity is provided to GOP personnel through training on the basic concepts of relay protection and how it is utilized. The basic relaying concepts utilized in protection on the aggregating equipment at a dispersed generating site typically will not vary significantly from the concepts used in Protection Systems on individual generating units.

Requirement R2 requires that GOPs report protective relay or equipment failures that reduce system reliability. Protective System failures occurring within a single individual generating unit at a dispersed generation resource will not have any impact on overall system reliability and thus it should not be necessary for GOPs to report these failures to their TOP and host BA. Only failures of Protection Systems on aggregating equipment have the potential to impact BPS reliability and may require notification. When interpreted as stated above, no related changes should be required to the existing PRC-001-1 standard, as the BES definition changes do not have an impact on these requirements.

Requirement R3 requires GOPs to coordinate new protective systems. Coordinating new and changes to existing protective relay schemes should be applied to aggregating equipment protection only if a lack of coordination could cause unintended operation or non-operation of an interconnected entity's protection, thus potentially having an adverse impact to the BPS. Existing industry practice is to share/coordinate the protective relay settings on the point of interconnect (e.g. generator leads, radial generator tie-line, etc.) and potentially the main step-up transformer, but not operating (collection) buses, collection feeder, or individual generator protection schemes, as these Protection Systems do not directly coordinate with an interconnected utility's own Protection Systems. Relay protection functions such as under and overfrequency and under and overvoltage changes are not applicable here since they are independent of the interconnected utility's protective relay settings and because setting criteria are defined in PRC-024.

Requirement R5 requires GOPs to coordinate changes in generation, transmission, load, or operating conditions that could require changes in the Protection Systems of others. A GOP of a dispersed generation resource should be required to notify its TOP of changes to generation, transmission, load, or operating conditions on an aggregate facility level.

Project 2007-06 – System Protection Coordination and Project 2014-03 – Revisions to TOP and IRO Standards are presently revising various aspects of this standard or addressing certain requirements in other standards. The reliability objective of requirement R3 and R4 will be addressed Project 2007-06, and requirements R2, R5, and R6 will be addressed by Project 2014-03.

For these reasons, the SDT recommends communicating these concerns to the Project 2007-06 and 2014-03 drafting teams, and modifying the applicability of this standard to address dispersed generation resources.

5.10.2 PRC-001-2 — System Protection Coordination

The concerns addressed with PRC-001-1.1b are removed in PRC-001-2, which is adopted by the NERC BOT. However, this standard was included in the proposed remand by FERC and is subject to revision as part of Project 2014-03 – Revisions to TOP and IRO Standards. *For this reason, the SDT recommends communicating the concerns with PRC-001-1.1 to the 2014-03 drafting team.*

5.10.3 PRC-002-NPCC-01— Disturbance Monitoring PRC-018-1 — Disturbance Monitoring Equipment Installation and Data Reporting

Requirements related to installation of Fault/Disturbance monitoring and/or sequence of events (SOE) recording capabilities on generating units and substation equipment which meet regional specific criteria may require installation of these capabilities on the aggregating equipment at a dispersed generation resource facility, and also requires maintenance and periodic reporting requirements to their RRO. However, these requirements have been previously applicable to the aggregating equipment at these dispersed generation resources, and these capabilities are not required to be installed on the individual generating units. The BES definition changes have no direct impact on applicability of these standards to dispersed generation resources. *Therefore, the applicability of these standards does not need to be changed for dispersed generation resources.*¹⁹

5.10.4 PRC-004-2.1a – Analysis and Mitigation of Transmission and Generation Protection System Misoperations

Misoperation reporting per PRC-004 is currently a requirement applied on the aggregating equipment at applicable dispersed generation resource sites meeting BPS criteria. The continuation of this analysis and reporting on the aggregating equipment by dispersed generation resource owners can provide value to BPS reliability and should remain in place. However, based on the experience of the SDT, there is minimal impact to BPS reliability for analyzing, reporting and developing Corrective Action Plans for each individual generating unit that trips at a dispersed generation resource site, as the tripping of one or a small number of these units has no material impact to the BPS reliability.

Additionally, reporting of Misoperations on each individual generating unit may result in substantial and unnecessary burdens on both the dispersed generation resource owner and the Regional Entities that review and track the resulting reports and Corrective Action Plan implementations. The SDT recognizes that many turbine technologies do not have the design capability of providing sufficient data for an entity to evaluate whether a Misoperation has occurred. Furthermore, dispersed generation resources by their nature result in each individual generating unit potentially experiencing varied power system parameters

¹⁹ See NPCC CGS-005.

(e.g., voltage, frequency, etc.) due to varied impedances and other variations in the aggregating facilities design. This limits the ability to determine whether an individual unit correctly responded to a system disturbance.

The SDT concludes that it is not necessary under PRC-004 to analyze Protection System Misoperations affecting individual generating units of a dispersed generation resource, but is concerned with the potential for unreported Misoperations involving a common mode trip of several individual generating units. The SDT proposes requiring analysis for potential Misoperation of individual generating units, if a trip of greater than 75 MVA aggregate occurs in response to a system disturbance. The above consideration by the SDT will be closely tied to its analysis of the applicability of and potential modifications to PRC-024, which provides for voltage and frequency ride-through requirements for individual generating units. *The SDT recommends changing the applicability of this standard and will consider how a common mode failure which results in Misoperation of a large number of the individual generating units at a dispersed generation resource site may impact BPS reliability.*

5.10.5 PRC-004-WECC-1 — Protection System and Remedial Action Scheme Misoperation

Dispersed generation resource sites typically would not be associated with a WECC Major Transfer Path or Remedial Action Scheme, and thus would not be affected by PRC-004-WECC-1. If a site were to be involved with one of these paths or schemes, it is likely that associated protection or RAS equipment would be located on the aggregating equipment rather than the individual generating units. As such, the BES definition changes may have an impact on applicability of this standard to dispersed generation resources. This standard should be modified to clarify the applicability for dispersed generation resources; however, this is a regional standard and not part of the SDT's scope. *Therefore, the SDT will communicate this recommendation to the relevant Region.*

5.10.6 PRC-005-1.1b — Transmission and Generation Protection System Maintenance and Testing **PRC-005-2 — Protection System Maintenance** **PRC-005-3 — Protection System and Automatic Reclosing Maintenance**

The aggregated capability of the individual generating units may in some cases contribute to the reliability of the BPS; as such there can be reliability benefit from ensuring the collection system and other BES equipment utilized to aggregate the individual units to a common point of connection are operated and maintained as required in PRC-005-1.1b. When evaluated individually, however, the generating units themselves do not have the same impact on BPS reliability as the system used to aggregate the units. The unavailability or failure of any one individual generating unit would have a negligible impact on the aggregated capability of the facility; this would be irrespective to whether the dispersed generation resource became unavailable due to occurrence of a legitimate fault condition or due to a failure of a control system, protective element, dc supply, etc.

The protection typically utilized in these generating units includes elements which would automatically remove the individual unit from service for certain internal or external conditions, including an internal fault in the unit. These units typically are designed to provide generation output at low voltage levels, (i.e., less than 1000 V). Should these protection elements fail to remove the generating unit for this scenario, the impacts would be limited to the loss the individual generating unit and potentially the next device upstream in the collection system of the dispersed generation resource. However, this would still

only result in the loss of a portion of the aggregated capability of the facility, which would be equally likely to occur due to a scenario in which a fault occurs on the collection system.

Internal faults on the low voltage system of these generating units would not be discernible on the interconnected transmission systems, as this is similar to a fault occurring on a typical utility distribution system fed from a substation designed to serve customer load. It is important to note that the collection system equipment (e.g., breakers, relays, etc.) used to aggregate the individual units may be relied upon to clear the fault condition in both of the above scenarios, which further justifies ensuring portions of the BES collection equipment is maintained appropriately.

For this reason, activities such as Protection System maintenance on each individual generating unit at a dispersed generation facility would not provide any additional reliability benefits to the BPS, but maintenance on facilities that aggregate the generation to 75 MVA or more would. *PRC-005-2 and -3 require modifications to the Applicability section (Facilities) to indicate that maintenance activities should only apply on the aggregating equipment at or above the point where the aggregation reaches 75 MVA. PRC-005-1.1b requires the same changes to the applicability section along with the addition of the facilities section already found in PRC-005-2 and -3. Modification to PRC-005-1.1b are necessary given the lengthy transition to its successor standards.*

Reliability Standard PRC-005 is currently being revised as part of Project 2007-17.1 – Protection System Maintenance and Testing – Phase 3, *available here: http://www.nerc.com/pa/Stand/Pages/Project-2007-17_3-Protection-System-Maintenance-and-Testing-Phase-3.aspx*. Any proposed changes to the PRC-005 Reliability Standard will be coordinated with this project. Project 2007-17.1 is considering technical changes and Project 2014-01 will consider any applicability change.

5.10.7 PRC-006-NPCC-1 — Automatic Underfrequency Load Shedding PRC-006-SERC -1 — Automatic Underfrequency Load Shedding Requirements

The regional specific PRC-006 standards deviate from the PRC-006-1 standard in that they have specific requirements for GOs. In particular, the NPCC version requires that GOs set their underfrequency tripping to meet certain criteria to ensure reliability of the BPS. Typically a dispersed generation resource site may have underfrequency protection on both the aggregating equipment (i.e., collection buses or feeders) as well as the individual generating units. Were this standard only to apply to aggregating equipment, the net impact to the BPS should a system disturbance occur may still result in a loss of significant generating capacity should each of the individual generating units trip for the event. Therefore it may be appropriate to include the individual generating units at a dispersed generation resource site as subject to this standard. The standard could be interpreted this way as written, but further clarification in the standard language may be considered. While this standard may need to be modified to clarify the applicability for dispersed generation resources, this is a regional standard and not part of the SDT's scope. *Therefore, the SDT will communicate this recommendation to the relevant Region.*

The SERC version of PRC-006 requires GOs to provide, upon request, certain under and overfrequency related setpoints and other related capabilities of the site relative to system disturbances. It may be appropriate to include the capabilities of the individual generating units at a dispersed generation resource site when providing this information; however, it may be sufficient to provide only the capabilities of a single sample unit within a site as these units are typically set identically. This would be in addition to

any related capabilities or limitations of the aggregating equipment as well. This may be accomplished by providing clarifications in the requirements sections. While this standard may need to be modified to clarify the applicability for dispersed generation resources, this is a regional standard and not part of the SDT's scope. *Therefore, the SDT will communicate this recommendation to the relevant Region.*

5.10.8 PRC-015 — Special Protection System Data and Documentation
PRC-016 — Special Protection System Misoperations
PRC-017 — Special Protection System Maintenance and Testing

Relatively few dispersed generating resources contain portions of or entire Special Protection Systems; however, they do exist and therefore need to be evaluated for applicability based on the revised BES definition. The vast majority of these SPSs involve the aggregating equipment (transformers, collection breakers, etc.) and not the individual generating units. The SPS are installed to protect the reliability of the BPS, and as such the aggregated response of the site (e.g., reduction in output, complete disconnection from the BES, etc.) is critical, not the response of individual generating units. *Therefore, the applicability of these standards does not need to be changed for dispersed generation resources.*

5.10.9 PRC-019-1 — Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection

Dispersed generating resources typically utilize a site level voltage control scheme which will direct the individual generating units to adjust their output to meet the voltage requirements at an aggregate facility level. In these cases the individual generating units will simply no longer respond once they are “maxed out” in providing voltage or reactive changes, but also need to be properly coordinated with protection trip settings on the aggregating equipment to mitigate risk of tripping in this scenario. For those facilities that only regulate voltage at the individual unit, these facilities need to consider the Protection Systems at the individual units and their compatibility with the reactive and voltage limitations of the units. The applicability in PRC-019-1 (section 4.2.3) includes a “Generating plant/ Facility consisting of one or more units that are connected to the Bulk Electric System at a common bus with total generation greater than 75 MVA (gross aggregate nameplate rating).” *The SDT recommends guidance documentation to address applicability to dispersed generation resources.*

5.10.10 PRC-023— Transmission Relay Loadability

Dispersed generating resources in some cases contain facilities and Protection Systems that meet the criteria described in the applicability section (e.g., load responsive phase Protection System on transmission lines operated at 200kV or above); however, in the majority of cases these lines are radially connected to the remainder of the BES and will be excluded from the standard requirements if PRC-023-3 is approved.²⁰ While certain entities with dispersed generation resources are required to meet the requirements of PRC-023-2 on components of their aggregating equipment (e.g., main step-up transformers, interconnecting transmission lines) the standard is not applicable to the individual generating units. The BES definition changes have no direct impact on the applicability of this standard to

²⁰ FERC has proposed approving PRC-023-3 in its Notice of Proposed Rulemaking issued on March 20, 2014. Docket No. RM13-19-000, RM14-3-000, *Generator Relay Loadability and Revised Transmission Relay Loadability Reliability Standards*.

dispersed generation resources. *Therefore, the applicability of these standards does not need to be changed for dispersed generation resources.*

5.10.11 PRC-024— Generator Frequency and Voltage Protective Relay Settings

There is a technical basis to leave the applicability of this standard as-is, due to the fact that were the individual generating units at a dispersed generation resource excluded from this requirement, it is possible large portions or perhaps the entire aggregated output of a dispersed generation resource site may be lost during certain system disturbances, negatively impacting BPS reliability. The SDT has determined it is necessary to require that Protection Systems applied on both the individual generating units, as well as any aggregating facilities, are set within the “no-trip zone” referenced in the requirements to maintain reliability of the BPS. However, for the purpose of compliance evidence it may be sufficient to provide the settings of a single sample unit within a site as these units are typically set identically, rather than providing documentation for each individual unit. This would be in addition to any related settings implementation evidence for the aggregating equipment. *No changes are required; however, an RSAW or guidance should specify compliance evidence requirements.*

5.10.12 PRC-025— Generator Relay Loadability

The Protection System utilized on individual generating units at a dispersed generation facility may include load-responsive protective relays and thus would be subject to the settings requirements listed in this standard. Were this standard only to apply to aggregating equipment, the net impact to the BPS should a system disturbance occur, may be a loss of significant generating capacity should each of the individual generating units trip for the event. Therefore, it is appropriate to include the individual generating units at a dispersed generation resource site as applicable to this standard. However, for the purpose of compliance evidence it may be sufficient to provide the settings of a single sample unit within a site as these units are typically set identically, rather than providing documentation for each individual unit. This would be in addition to any related settings implementation evidence for the aggregating equipment. *No changes are required; however, an RSAW or guidance should specify compliance evidence requirements.*

5.11 TOP

The TOP standards provide TOPs their authority. There are four TOP standards that apply directly to GO and GOP entities. The TOP standards as they relate to GOs/GOPs ensure RCs and TOPs can issue directives to the GOP, and the GOP follows such directives. They also ensure GOPs render all available emergency assistance as requested. Finally, they require GO/GOPs to coordinate their operations and outages and provide data and information to the BA and TOP. No TOP standard refers to the interaction of a host BA, TOP, or RC with individual BES Elements.

5.11.1 TOP-001-1a — Reliability Responsibilities and Authorities

This standard as it applies to GOPs is reviewed at the requirement level, with only one change recommended.

5.11.1.1 Requirement R3

The purpose of requirement R3 as it relates to GOPs is to ensure the RC and TOP reliability directives are complied with so long as they do not violate safety, equipment, or regulatory or statutory requirements. If

a GOP is unable to follow a RC or TOP reliability directive they are to inform the RC or TOP immediately of such. The requirement is applicable to the registered functional entity, not the constituent Elements it operates. *Therefore, there is no need to differentiate applicability to dispersed generation resources from any other GOP resources, and no change to this requirement is needed.*

5.11.1.2 Requirement R6

The purpose of requirement R6 as it relates to GOPs is to ensure all available emergency assistance to others as requested, unless such actions would violate safety, equipment, or regulatory or statutory requirements. The requirement is applicable to the registered functional entity, not the constituent Elements it operates. *Therefore, there is no need to differentiate applicability to dispersed generation resources from any other GOP resources, and no change to this requirement is needed.*

5.11.1.3 Requirement R7

The purpose of requirement R7 as it relates to GOPs is to ensure BES facilities are not removed from service without proper notification and coordination with the TOP and, when time does not permit such prior notification and coordination, notification and coordination shall occur as soon as reasonably possible. This is required to avoid burdens on neighboring systems. It should be noted that the purpose of this standard is to keep the TOP informed of all generating facility capabilities in case of an emergency. It is assumed that required notification and coordination from the GOP to the TOP would be done in real-time and through verbal communication media. The concern here is how to apply this to a dispersed generation resource facility. The SDT recommends that the GOP report at the aggregate facility level to the TOP any generator outage above 20 MVA for dispersed generation resource facilities. The justification is based on the following:

- This is consistent with Inclusion I2 of the revised BES definition, which addresses only generating units greater than 20MVA.
- TOP-002-2.1b R14 requires real-time notification of changes in Real Power capabilities, planned and unplanned. Setting the threshold at 20 MVA would address routine maintenance on a small portion of the facility (e.g. 2% of the generators are out of service on any given day) and individual generating units going into a failure. Otherwise, coordinating each individual generating unit outage would burden the TOP without providing an increase in reliability to the interconnected BPS.
-

Dispersed generation resource outages should be reported as X MW out of Y MW are available. *Therefore, the SDT recommends that a modification to the applicability of this requirement is necessary for dispersed power producing resources for generator outages greater than 20 MVA.*

5.11.2 TOP-001-2— Transmission Operations

The purpose of this standard as it relates to GOPs is to ensure TOP directives are complied with so long as they do not violate safety, equipment, or regulatory or statutory requirements. If a GOP is unable to follow a TOP directive they are to inform the TOP immediately of such. It directs the TOP to issue directives and as such the TOP may provide special requirements for dispersed generation resources for its unique capabilities. Note that while this standard is adopted by the NERC BOT, this standard was

included in the proposed remand by FERC and is subject to revision as part of Project 2014-03 – Revisions to TOP and IRO Standards. *The SDT recommends that Project 2014-3 provide direction for a dispersed generation resource to be only reported at the aggregate facility level. If TOP-001-1a R7 is reintroduced, then the recommendation provided above should be included in their efforts.*

5.11.3 TOP-002-2.1b — Normal Operations Planning²¹

This TOP standard has five requirements applied to GOPs. Several modifications are recommended below, and the SDT recommends that the most effective and efficient way to accomplish this is through modification of the Applicability section of this standard.

5.11.3.1 Requirement R3

The purpose of requirement R3 as it relates to GOPs is to ensure a GOP's current day, next-day and seasonal operations are coordinated with its Host BAs and TSP. This requirement relates to planned operations at a generator and does not include unplanned operations such as forced or emergency operations. The SDT recommends that this requirement be applied at the aggregate facility level for dispersed power producing resources. For example, forecasting available MW at the aggregated facility level is currently one method used. The SDT does not see any reliability gap in that would prompt this team to apply R3 to any point less than the dispersed power resource aggregated facility level. *The SDT has not found or been made aware of a reliability gap that would prompt this team to apply R3 to any point less than the dispersed power resource aggregated facility level and recommends such modification to the applicability of this requirement.*

5.11.3.2 Requirement R13

The purpose of requirement R13 as it relates to GOPs is to ensure Real Power and Reactive Power capabilities are verified as requested by the BA and TOP. The SDT feels a modification to the applicability of this requirement is necessary for dispersed power producing resources. The SDT is recommending that this requirement be applied at the aggregate facility level for dispersed power producing resources for the following reasons:

- Due to the nature, amount of individual generators at a dispersed power producing resource, internal Real Power losses, and natural inductance and capacitance of dispersed power resource system connected in series, verification of real and reactive capabilities should be conducted at the dispersed power producing resource aggregate facility level. Performing verification in this manner will provide an actual net real and reactive capability, which would be seen by both the BA and TOP. In addition, performing verification in this manner is also consistent with operating agreements such as an interconnection agreement, which the dispersed power resource has with the TOP and BA.
- MOD-025-2 also provides that verification for any generator <20MVA may be completed on an individual unit basis or as a “group.” Reporting capability at the aggregated facility level is consistent with the MOD-025-2 provision for group verification.

²¹ The GOP applicability is removed in TOP-002-3, which was adopted by the NERC BOT. However, TOP-002-3 was included in the proposed remand by FERC and is subject to revision as part of Project 2014-3 – Revisions to TOP and IRO Standards.

The SDT recommends a modification to the applicability of this requirement at the aggregated facility level for dispersed power producing resources.

5.11.3.3 Requirement R14

The purpose of requirement R14 as it relates to GOPs is to ensure BAs and TOPs are notified of changes in real output capabilities without any intentional time delay. It should be noted that the purpose of this requirement is to address unplanned changes in real output capabilities. It is assumed the required notification and coordination from the GOP to the BA and TOP would be done in real-time and through verbal communication media. The concern here is how to apply this to dispersed power producing resources. The SDT recommends that the GOP notify at the aggregate facility level to the TOP any unplanned changes in real output capabilities above 20 MVA. The justification is based on the following:

- This is consistent with Inclusion I2 of the revised BES definition which includes generating units greater than 20MVA.
- TOP-002-2.1b R14 requires real-time notification of changes in Real Power capabilities, planned and unplanned. Setting the threshold at 20 MVA would address routine maintenance on a small portion of the facility (e.g. 2% of the generators are out of service on any given day) and individual generating units going into a failure. Otherwise, coordinating each individual generating unit outage would burden the TOP without providing an increase in reliability to the interconnected BPS.

Dispersed generation resources changes in real output capabilities should be reported as X MW out of Y MW are available. *The SDT recommends that a modification to the applicability of this requirement is necessary for dispersed power producing resources for unplanned outages greater than 20 MVA.*

5.11.3.4 Requirement R15

The purpose of requirement R15 as it relates to GOPs is to ensure BAs and TOPs are provided a forecast (e.g., seven day) of expected Real Power. The SDT believes this requirement as requested by the BA or TOP is being applied at the aggregate facility level for dispersed power producing resources.

Based on the SDT's experience, expected Real Power forecasts (e.g. 5 or 7 forecast) for a dispersed power producing resource has been traditionally coordinated with the BA and TOP at the aggregate facility level for dispersed power producing resources. *Therefore, the SDT recommends that R15 be applied at the aggregate facility level for dispersed power resources and as such, modification to the applicability of this requirement is necessary.*

5.11.3.5 Requirement R18

The purpose of requirement R18 as it relates to a GOP is to ensure uniform line identifiers are used when referring to transmission facilities of an interconnected network. The standard applies to transmission facilities of an interconnected network, which would not apply to any Elements within the dispersed generation facility. There is no need to differentiate applicability to dispersed generation resources from any other GOP resources. *Therefore, the applicability of this requirement does not need to be changed for dispersed generation resources.*

5.11.4 TOP-003-1— Planned Outage Coordination²²

This TOP Standard has three requirements applied to GOPs. Modification to one of these requirements is recommended.

5.11.4.1 Requirement R1

The purpose of requirement R1 as it relates to GOPs is to ensure TOPs are provided planned outage information on a daily basis for any scheduled generator outage >50MW for the next day. *Therefore, the applicability of this requirement does not need to be changed for dispersed generation resources.*

5.11.4.2 Requirement R2

The purpose of requirement R2 as it relates to GOPs is to ensure all voltage regulating equipment scheduled outages are planned and coordinated with affected BAs and TOPs. A modification to the applicability of this requirement is necessary for dispersed power producing resources. The SDT recommends that this requirement be applied at the aggregate facility level for dispersed power producing resources.

Based on the SDT's experience, scheduled outages of voltage regulating equipment at a dispersed power producing resource has been traditionally provided to the BA and TOP at the aggregate facility level for dispersed power producing resources. Outages of voltage regulating equipment at a dispersed power producing resource are coordinated typically as a reduction in Reactive Power capabilities, specifying whether it is inductive, capacitive or both. Additionally, automatic voltage regulators that do not necessarily provide Reactive Power, but direct the actions of equipment that do supply Reactive Power, are typically coordinated at the aggregate facility level as they usually are the master controller for all voltage regulating equipment at the facility. A key aspect of the SDT project is to maintain the status quo, if it is determined not to cause a reliability gap. *The SDT has not found or been made aware of a reliability gap, which would prompt this team to apply R2 to any point less than the dispersed power resource aggregated facility level and as in such, feels a modification to the applicability of this requirement is necessary for dispersed power producing resources.*

5.11.4.3 Requirement R3

The purpose of requirement R3 as it relates to GOPs is to ensure scheduled outages of telemetering and control equipment and associated communication channels are planned and coordinated among BAs and TOPs. Based on the SDT technical expertise, scheduled outages of telemetering and control equipment and associated communication channels at a dispersed power producing resource have been traditionally provided to the BA and TOP at the aggregate facility level for dispersed power producing resources. In addition, only scheduled outages of telemetering and control equipment and associated communication channels that can affect the BA and TOP are coordinated with the BA and TOP. *Therefore, the applicability of this requirement does not need to be changed for dispersed generation resources.*

5.11.5 TOP-006 — Monitoring System Conditions

The purpose of this standard as it relates to GOPs is to ensure BAs and TOPs know the status of all generation resources available for use as informed by the GOP. It should also be noted that the purpose

²² Note that TOP-003-2, which is adopted by the NERC BOT, was included in the proposed remand by FERC and is subject to revision as part of Project 2014-3 – Revisions to TOP and IRO Standards.

of this standard is to ensure critical reliability parameters are monitored in real-time. It then can be extrapolated that the requirement, “GOP shall inform...” is done by sending dispersed power producing resource telemetry in real-time and through a digital communication medium, such as an ICCP link or RTU. The SDT feels a modification to the applicability of this requirement is necessary for dispersed power producing resources. The SDT is recommending that this requirement be applied at the aggregate facility level for dispersed power producing resources for the following reasons:

- This is consistent with Inclusion I2 of the revised BES definition, which includes generating units greater than 20MVA. If removing <20MVA would cause a burden to the BPS, then the threshold for inclusion in the BES would have been less than 20MVA.
- Routine maintenance is frequently completed on a small portion of the entire facility (e.g. 2% of the generators are out of service on any given day) such as to not have a significant impact to the output capability of the facility. Additionally, it is not uncommon to have individual generating units at a dispersed power producing resource to go into a failure mode due to internal factors of the equipment, such as hydraulic fluid pressure tolerances, gearbox bearing thermal tolerances, etc. As such, coordinating each individual generating unit outage would burden the TOP without providing an increase in reliability to the interconnected BPS.
- As this standard requires real-time monitoring, this is most likely completed through a digital medium such as an ICCP link or RTU. The data that a dispersed power resource provides to the BA and TOP in real-time should include the aggregate active power output of the facility, among other telemetry points. These data specifications are usually outlined in interconnection agreements among the parties.

Based on the SDT technical expertise, BAs and TOPs are informed by the GOP of all generation resources available at the dispersed power producing resource at the aggregate facility level. Traditionally the dispersed power producing resources are providing the BA and TOP, at minimum, the following telemetry points in real-time: aggregate Real Power, aggregate Reactive Power and main high-side circuit breaker status. A key aspect of the SDT project is to maintain the status quo, if it is determined not to cause a reliability gap. *The SDT has not found or been made aware of a reliability gap, which would prompt this team to apply these requirement to any point less than where the dispersed power resource aggregates and as in such, recommends a modification to the applicability of this requirement is necessary for dispersed power producing resources.*

5.12 TPL

These standards do not affect GOs or GOPs directly. Input from GO or GOP entities is provided to transmission planning entities through the MOD standards. *Therefore, the applicability of the TPL standards does not need to be changed for dispersed generation resources.*

5.13 VAR

The VAR standards exist to ensure that voltage levels, reactive flows, and reactive resources are monitored, controlled, and maintained. There are two VAR Standards that apply to GOs and/or GOPs. The voltage and/or reactive schedule provided by TOPs is specified to be at the point of interconnection or the point specified in the interconnection agreement.

5.13.1 VAR-001 — Voltage and Reactive Control (WECC Regional Variance)

The purpose of this standard as it relates to GOPs in WECC is to ensure a generator voltage schedule is issued that is appropriate for the type of generator(s) at a specific facility. Additionally, it requires GOPs to have a methodology for how the voltage schedule is met taking into account the type of equipment used to maintain the voltage schedule. Based on the SDT technical expertise, voltage control and voltage schedule adherence for dispersed power producing resource occurs at the aggregate facility level. There is no need to differentiate dispersed generation resources from any other GOP resources. *Therefore, the applicability of VAR-001 does not need to be changed for dispersed generation resources.*

5.13.2 VAR-002-2b — Generator Operation for Maintaining Network Voltage Schedules

The purpose of this standard as it relates to GOs and GOPs is to ensure generators provide reactive and voltage control necessary to ensure voltage levels, reactive flows, and reactive resources are maintained within applicable Facility Ratings to protect equipment and reliability of the Interconnection. Based on the SDT technical expertise, voltage control and voltage schedule adherence for dispersed power producing resource occurs at the aggregate facility level. In addition, dispersed power producing resources individual generator transformers have traditionally been excluded from the R4 and R5, as they are not used to improve voltage performance at the point of interconnection. *Therefore, the SDT recommends clarifying the applicability of VAR-002 for dispersed generation resources.*

5.14 CIP

5.14.1 CIP v5

The CIP standards ensure physical and cyber security for BES Cyber Assets and BES Cyber Systems critical to the reliability and security of the BES. CIP-002 identifies critical assets or systems of a facility, while CIP-003 to CIP-011 depend on the outcome of the CIP-002 assessment to determine applicability.

The SDT states that the CIP Version 5 Revisions SDT should consider developing guidance documentation around the following areas:

- Low Impact BES Cyber Systems that must comply with a limited number of requirements, all located in CIP-003-5. The only technical requirement is R2, which will be modified during the current drafting activity to add clarity to the requirement. The SDT notes that the CIP Version 5 Revisions SDT should consider developing guidance around how this requirement relates to dispersed generation.
- Any programmable logic device that has the capability to shut down the plant within 15 minutes; and
- Remote access from third party entities into the SCADA systems that control the aggregate capacity of a facility should be assessed to determine if there is a need of any additional cyber security policies.

NERC staff has committed to facilitate communication between the SDT and the CIP Version 5 Revisions SDT as appropriate to ensure alignment. *Therefore, the applicability of CIP standards does not need to be changed for dispersed generation resources.*

6 Appendix A: List of Standards

7 Appendix B: List of Standards Recommended for Further Review