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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Conference Call Agenda
Project 2014-01 Standards Applicability for Dispersed Generation Resources Standards Drafting Team

February 21, 2014 | 9:30 a.m. to 1:00 p.m. Eastern

Dial-in: 866.740.1260 | Access Code: 4458510 | Security Code: 1979

Administrative

1. **Introductions**
2. **Review NERC Antitrust Compliance Guidelines and Public Announcement***
3. **Participant Conduct Policy***
4. **Email List Policy***
5. **Review Meeting Agenda and Objectives***

Agenda Items

1. **Discuss Original SAR Spreadsheet** (Evans-Mongeon)*
2. **Discuss NERC White Paper***
3. **Discuss Next Steps**
   a. Finalize GO/GOP standard list to inclusion
   b. Prioritize or group potential standard revisions
   c. Develop individual recommendations on implementing the SAR
   d. Develop DGR SDT position paper for posting
4. **Discuss Future Meeting and Action Dates**
   a. SDT meeting in Atlanta on March 10-12, 2014
   b. Conference call on March 21, 2014, 10:00 a.m. to 2:30 p.m. Eastern
   c. Post DGR SDT position paper in March 2014
   d. Standards and Compliance Workshop Presentation in San Diego on April 2 or 3, 2014
   e. Industry webinar in April or May 2014

f. Future SDT meeting dates and locations to be determined (expect at least 3-4)

5. **Adjourn**

*Background materials included.

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Standards Development Process Participant Conduct Policy

I. General

To ensure that the standards development process is conducted in a responsible, timely and efficient manner, it is essential to maintain a professional and constructive work environment for all participants. Participants include, but are not limited to, members of the standard drafting team and observers.

Consistent with the NERC Rules of Procedure and the NERC Standard Processes Manual, participation in NERC's Reliability Standards development balloting and approval processes is open to all entities materially affected by NERC's Reliability Standards. In order to ensure the standards development process remains open and to facilitate the development of reliability standards in a timely manner, NERC has adopted the following Participant Conduct Policy for all participants in the standards development process.

II. Participant Conduct Policy

All participants in the standards development process must conduct themselves in a professional manner at all times. This policy includes in-person conduct and any communication, electronic or otherwise, made as a participant in the standards development process. Examples of unprofessional conduct include, but are not limited to, verbal altercations, use of abusive language, personal attacks or derogatory statements made against or directed at another participant, and frequent or patterned interruptions that disrupt the efficient conduct of a meeting or teleconference.

III. Reasonable Restrictions in Participation

If a participant does not comply with the Participant Conduct Policy, certain reasonable restrictions on participation in the standards development process may be imposed as described below.
If a NERC Standards Developer determines, by his or her own observation or by complaint of another participant, that a participant's behavior is disruptive to the orderly conduct of a meeting in progress, the NERC Standards Developer may remove the participant from a meeting. Removal by the NERC Standards Developer is limited solely to the meeting in progress and does not extend to any future meeting. Before a participant may be asked to leave the meeting, the NERC Standards Developer must first remind the participant of the obligation to conduct himself or herself in a professional manner and provide an opportunity for the participant to comply. If a participant is requested to leave a meeting by a NERC Standards Developer, the participant must cooperate fully with the request.

Similarly, if a NERC Standards Developer determines, by his or her own observation or by complaint of another participant, that a participant's behavior is disruptive to the orderly conduct of a

teleconference in progress, the NERC Standards Developer may request the participant to leave the teleconference. Removal by the NERC Standards Developer is limited solely to the teleconference in progress and does not extend to any future teleconference. Before a participant may be asked to leave the teleconference, the NERC Standards Developer must first remind the participant of the obligation to conduct himself or herself in a professional manner and provide an opportunity for the participant to comply. If a participant is requested to leave a teleconference by a NERC Standards Developer, the participant must cooperate fully with the request. Alternatively, the NERC Standards Developer may choose to terminate the teleconference.

At any time, the NERC Director of Standards, or a designee, may impose a restriction on a participant from one or more future meetings or teleconferences, a restriction on the use of any NERC-administered list server or other communication list, or such other restriction as may be reasonably necessary to maintain the orderly conduct of the standards development process. Restrictions imposed by the Director of Standards, or a designee, must be approved by the NERC General Counsel, or a designee, prior to implementation to ensure that the restriction is not unreasonable. Once approved, the restriction is binding on the participant. A restricted participant may request removal of the restriction by submitting a request in writing to the Director of Standards. The restriction will be removed at the reasonable discretion of the Director of Standards or a designee.

Any participant who has concerns about NERC's Participant Conduct Policy may contact NERC's General Counsel.

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NERC Email List Policy

NERC provides email lists, or "listservs," to NERC committees, groups, and teams to facilitate sharing information about NERC activities; including balloting, committee, working group, and drafting team work, with interested parties. All emails sent to NERC listserv addresses must be limited to topics that are directly relevant to the listserv group's assigned scope of work. NERC reserves the right to apply administrative restrictions to any listserv or its participants, without advance notice, to ensure that the resource is used in accordance with this and other NERC policies.

Prohibited activities include using NERC-provided listservs for any price-fixing, division of markets, and/or other anti-competitive behavior.[1] Recipients and participants on NERC listservs may not utilize NERC listservs for their own private purposes. This may include announcements of a personal nature, sharing of files or attachments not directly relevant to the listserv group's scope of responsibilities, and/or communication of personal views or opinions, unless those views are provided to advance the work of the listserv's group. Use of NERC's listservs is further subject to NERC's Participant Conduct Policy for the Standards Development Process.

- *Updated April 2013*

[1] Please see NERC's Antitrust Compliance Guidelines for more information about prohibited antitrust and anti-competitive behavior or practices. This policy is available at http://www.nerc.com/commondocs.php?cd=2

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Conference Call Notes
Project 2014-01 Standards Applicability for Dispersed Generation Resources Standards Drafting Team

February 7, 2014 | 4:00 p.m. to 5:00 p.m. Eastern

Administrative

1. NERC staff initiated the meeting and reviewed the NERC Antitrust Compliance Guidelines, Public Announcement, Participant Conduct Policy, and Email List Policy. NERC staff thanked all members and observers of the Project 2014-01 Standards Applicability for Dispersed Generation Resources (DGR) Standards Drafting Team (SDT) for participating on the call. The following members and observers participated:

Name	Company	Member/ Observer
Tony Jankowski	We Energies	M
Tom Pruitt	Duke Energy	M
David Belanger	Exelon Generation	M
George Brown	Acciona Energy North America	M
Stephen Enyeart	Bonneville Power Administration	M
Jessie Nevarez	Terra-Gen Operating Company	M
Jeffrey Plew	NextEra Energy Resources	M
Dana Showalter	E.ON Climate & Renewables	M
Randhir Singh	PSEG Fossil	M
Eric White	MidAmerican Energy	M
Pete Heidrich	Florida Reliability Coordinating Council	O

Name	Company	Member/ Observer
Sean Cavote	NERC	M
Ryan Stewart	NERC	M
Laura Hussey	NERC	M
Phil Tatro	NERC	M

2. **Review Meeting Agenda and Objectives**

   a. Chair Tony Jankowski reviewed the meeting agenda and objectives.

Agenda Items

3. **Introductions and Expectations**

   a. Chair Jankowski led team introductions and asked SDT members to share short biographies and to discuss what they expected to accomplish with the project. Members generally described the various perspectives they bring to the team and discussed their expectations for the project. Common expectations generally included consistency in application of the standards, reasonable application of the reliability standards, and ensuring that requirements adequately reflect assets in the field.

1. **Review Project Scope and Timeline**

   Chair Jankowski discussed the Standard Authorization Request (SAR) associated with this project and requested from NERC and SDT members preliminary information that would be helpful to the SDT, including any position papers from industry and data that could assist the SDT in developing the technical basis for its ultimate recommendation. NERC committed to providing the SDT a document identifying the reliability standards applicable to GOs and GOPs, and NERC's position paper detailing the standards likely impacted by this project.

   Chair Jankowski explained to the SDT that it needed to develop a sound technical justification for its recommendation. Part of that process, he explained, is understanding the definition of a "dispersed generation resource" in the context of the definition of the Bulk Electric System (BES). This project needs to review all of the reliability standards and quickly identify a set of standards to address first.

   Chair Jankowski also explained to the SDT that the first step in the project is to develop an initial SDT white paper that would not necessarily identify specific standard revisions, but rather would establish initial project momentum and afford industry an opportunity to react to the paper.

NERC staff noted that everyone involved in this project will feel individual pressure from companies and industry to provide certainty around application of the BES definition. Education and outreach will be necessary for the project's success. NERC has committed technical resources to the project and will assist with industry and internal outreach.

NERC staff also noted that it is not NERC's desire for the DGR SDT to recommend to other SDTs to make changes to standards. The purpose of the DGR SDT project is to file at the Federal Energy Regulatory Commission a single set of standards with its scope limited to applicability.

An observer cautioned the DGR SDT against developing a NERC Glossary of Terms definition of dispersed generation resources, noting that it would bog down project. He further noted that definition is provided within the BES reference document.[1] He also suggested that the DGR SDT consider SAR comments indicating that the scope of the SAR is too narrow.

Chair Jankowski noted that the SDT may not need to develop a glossary definition, but that the SDT needs to know the characteristics of assets that would be included.

Chair Jankowski also indicated that the first step of this project should be to develop a listing of all GO/GOP standards, in addition to those mentioned in the SAR. He also noted the need for coordination with the CIP SDT and NERC CIP experts. The DGR SDT also will need to consider industry comments in response to the SAR for this project, and the NERC white paper expected the week of February 9, 2014.

Chair Jankowski discussed the importance of receiving feedback from a number of NERC and industry resources, including CIP and the BES SDT. NERC noted that Pete Heidrich, Chair of the Project 2010-17 Proposed Definition of Bulk Electric System project, is participating on this project as an observer. Moreover, DGR SDT member Brian Evans-Mongeon also participated on the BES project.

4. **Next Steps**

Chair Jankowski discussed next steps for the project:

1. SDT members review NERC position paper
2. Finalize GO/GOP standard list to inclusion
3. Prioritize or group potential standard revisions
4. Request NERC use CEAP or ask for cost data from NAGF
5. Develop individual recommendations on revisions to the set of standards implementing the SAR

[1] Note that the BES Reference Document posted for ballot and comment on January 29, 2013 defines Dispersed power producing resources as 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 system. Examples could include but are not limited to: solar, geothermal, energy storage, flywheels, wind, micro-turbines, and fuel cells. The BES Reference Document as posted can be downloaded at http://www.nerc.com/pa/Stand/Project%20201017%20Proposed%20Definition%20of%20Bulk%20Electri/bes_phase2_reference_document_20140124_llh.pdf.

2. **Discuss Future Meeting and Action Dates**

   Chair Jankowski discussed future meeting and action dates and established a preliminary schedule as follows:

   a. Conference call on February 21, 2014, 9:30 a.m. to 1:00 p.m. ET
   b. SDT meeting in Atlanta on March 10-12, 2014
   c. Conference call on March 21, 2014, 10:00 a.m. to 2:30 p.m. ET
   d. Post preliminary DGR SDT position paper in March or April 2014
   e. Industry webinar in April or May 2014
   f. Provide clarification to NERC, the Regions, and industry on the direction of SDT work
   g. Future SDT meeting dates and locations to be determined (expect at least 3-4)
      i. Looking for volunteer Hosts for future Face to Face meetings

3. **Adjourn**

Chair Jankowski adjourned the call at 5:00 p.m. Eastern.

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Team Roster

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

	Participant	Entity
Chair	Tony Jankowski	We Energies
Vice Chair	Tom Pruitt	Duke Energy
Member	David Belanger	Exelon Generation
Member	George Brown	Acciona Energy North America
Member	Stephen Enyeart	Bonneville Power Administration
Member	Brian Evans-Mongeon	Utility Services, Inc.
Member	Jessie Nevarez	Terra-Gen Operating Company
Member	Jeffrey Plew	NextEra Energy Resources
Member	Dana Showalter	E.ON Climate & Renewables
Member	Randhir Singh	PSEG Fossil
Member	Eric White	MidAmerican Energy
NERC Staff	Sean Cavote (Lead Standards Developer)	NERC
NERC Staff	Ryan Stewart (Supporting Standards Developer)	NERC
NERC Staff	Laura Hussey (Dir. of Standards Development)	NERC
PMOS	Gary Kruempel	MidAmerican Energy Company
FERC	Susan Morris	FERC
FERC	Andrea Scott	FERC

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Standards Authorization Request Form

When completed, please email this form to:
sarcomm@nerc.com

NERC welcomes suggestions to improve the reliability of the bulk power system through improved reliability standards. Please use this form to submit your request to propose a new or a revision to a NERC's Reliability Standard.

Request to propose a new or a revision to a Reliability Standard			
Title of Proposed Standard:	Application of certain GO/GOP Reliability Standards and Requirements to Dispersed Generation		
Date Submitted:	10/1/2013		
SAR Requester Information			
Name:	Jennifer Sterling-Exelon, Gary Kruempel-MidAmerican, Allen Schriver-NextEra Energy, Inc., Brian Evans-Mongeon-Utility Services Inc.		
Organization:	Exelon, MidAmerican, NextEra Energy, Utility Services Inc.		
Telephone:	(630) 437-2764 – primary contact	E-mail:	jennifer.sterling@exeloncorp.com primary contact
SAR Type (Check as many as applicable)			
☐ New Standard ☒ Revision to existing Standard		☐ Withdrawal of existing Standard ☐ Urgent Action	

SAR Information
Industry Need (What is the industry problem this request is trying to solve?):
The industry is requesting that the application section of certain GO/GOP Reliability Standards or the requirements of certain GO/GOP Reliability Standards be revised in order to ensure that the Reliability Standards are not imposing requirements on dispersed generation that are unnecessary and/or counterproductive to the reliable operation of the Bulk Electric System (BES). For purposes of this SAR, dispersed generation are those resources that aggregate to a total capacity greater than 75 MVA (gross

SAR Information
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 proposed new definition of the Bulk Electric System (BES) from Project 2010-17, that results in the identification of elements of new dispersed generation facilities that if included under certain Reliability Standards may result in a detriment to reliability or be technically unsound and not useful to the support of the reliable operation of the BES .
Purpose or Goal (How does this request propose to address the problem described above?):
The goal of the request is to revise the applicability of GO/GOP Reliability Standards or the Requirement(s) of GO/GOP Reliability Standards to recognize the unique technical and reliability aspects of dispersed generation, given the proposed new definition of the BES.
Identify the Objectives of the proposed standard's requirements (What specific reliability deliverables are required to achieve the goal?):
The objective of the revisions to the applicability section and/or Requirements of certain GO/GOP Reliability Standards is to ensure that these revisions are approved by the Board of Trustees and applicable regulatory agencies prior to the effective date for newly identified elements under the proposed BES definition (i.e., June 2016).
Brief Description (Provide a paragraph that describes the scope of this standard action.)
The scope of this SAR involves revisions to the applicability section of the following GO/GOP Reliability Standard applicability sections and/or Reliability Standard Requirements: (a) PRC-005-2 (-3); (b) FAC-008-3; (c) PRC-023-3/PRC-025-1; (d) PRC-004-2a (-3) ; and (e) VAR-002-2 so it is clear what, if any, requirements should apply to dispersed generation. Also, IRO,MOD, PRC or TOP Standards that require outage and protection and control coordination, planning, next day study or real time data or reporting of changes in real and reactive capability should be examined and revised, as needed, to ensure it is clear that these activities and reporting are conducted at the point of aggregation to 75 MVA, and not at an individual turbine, inverter or unit level for dispersed generation. This scope would also include development of a technical guidance paper for standard drafting teams developing new or revised Standards, so that they do not incorrectly apply requirements to dispersed generation unless such an application is technically sound and promotes the reliable operation of the BES. To the extent, there are existing Reliability Standard Drafting Teams that have the expertise and can make the requested changes prior to the compliance date of newly identified assets under the BES definition (i.e., June 2016), those projects may be assigned the required changes as opposed to creating new projects.

SAR Information
Detailed Description (Provide a description of the proposed project with sufficient details for the standard drafting team to execute the SAR. Also provide a justification for the development or revision of the standard, including an assessment of the reliability and market interface impacts of implementing or not implementing the standard action.)

The following description and technical justification(including an assessment of reliability impacts) is provided for the standard drafting teams to execute the SAR for each applicable Standard.

PRC-005-2

Testing and maintenance of protection and control equipment for dispersed generation should start at the point of aggregation to 75 MVA. Manufacturers of dispersed generation turbines and solar panels recommend against specific testing and maintenance regimes for protection and control equipment at the dispersed generation turbine and panel level. In fact it is counterproductive to implement protection and control at the individual turbine, solar panel, or unit level. Instead this is best done at an aggregated level. Therefore, PRC-005 should indicate that the standard applies at the point of aggregation to at 75 MVA or greater for dispersed generation. This change would clarify that the facility section 4.2.5.3 is the section that would apply to dispersed generating facilities and that the remaining sections would not apply.

FAC-008-3

For dispersed generation, it is unclear if in FAC-008-3 the term “main step up transformer” refers to the padmount transformer at the base of the windmill tower or to the main aggregating transformer that steps up voltage to transmission system voltage. From a technical standpoint, it should be the point of aggregation at 75 MVA or above that is subject to this standard for dispersed generation, such as wind. It is at the point of aggregation at 75 MVA or above that facilities ratings should start, since it is this injection point at which a planner or operator of the system is relying on the amount of megawatts the dispersed generation is providing with consideration of the most limiting element. To require facility ratings at for each dispersed turbine, panel or generating unit is not useful to a planner or operator of the system, and, therefore, FAC-008-3 should be revised to be clear that facility ratings start at the point of aggregation at 75 MVA or above for dispersed generation.

SAR Information

Also consider that the BES definition specifically excludes collector system equipment at less than 75 MVA from being included in the BES. Thus, those portions of the collector systems that handle less than 75 MVA are not BES "Facilities," and, therefore, need not be evaluated per R1 or R2. Given this, there seems to be no technical value to conduct facility ratings for individual dispersed generation turbines, generating units and panels.

PRC-023-3/PRC-025-1

In keeping with the registration criteria for Generator Owners as well as the proposed BES Definition, the 75MVA point of aggregation should be the starting point for application of relay loadability requirements.

PRC-004-2

There is no technical basis to claim that misoperation analysis, corrective action plan implementation and reporting for dispersed generation at the turbine, generating unit or panel level is needed for the reliable operation of the BES. Similar to the statements above, the appropriate point to require misoperation analysis, corrective action plan implementation and reporting is at the point of aggregation at 75 MVA and above.

VAR-002-2

Voltage control for some types of dispersed generating facilities is accomplished by a controller that is able to adjust either generating unit controls or discrete reactive components to provide transmission system voltage adjustment. The VAR-002 standard should be modified to allow this type of control for dispersed generation facilities under the requirements of the standard.

General review of IROs, MODs, PRCs, TOPs

IRO, MOD, PRC or TOP Standards that require outage and protection and control coordination, planning, next day study or real time data or reporting of changes in real and reactive capability should be examined and revised, as needed, to ensure it is clear that these activities are conducted at the point of aggregation at 75 MVA, and not an individual turbine, generating unit or panel level for dispersed generation. Unless this clarity is provided applicability at a finer level of granularity related to dispersed generation may be seen as required and such granularity will result in activities that have no benefit to

SAR Information
reliable operation of the BES. Furthermore applicability at a finer level of granularity will result in uneeded and ineffective collection, analysis, and reporting activities that may result in a detriment to reliability.

Reliability Functions	
The Standard will Apply to the Following Functions (Check each one that applies.)	
☐ Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
☐ Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐ Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.
☐ Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐ Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.
☐ Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐ Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☐ Transmission Owner	Owns and maintains transmission facilities.
☐ Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.

Reliability Functions		
☐	Distribution Provider	Delivers electrical energy to the End-use customer.
☒	Generator Owner	Owns and maintains generation facilities.
☒	Generator Operator	Operates generation unit(s) to provide real and reactive power.
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

Reliability and Market Interface Principles		
Applicable Reliability Principles (Check all that apply).		
☒	1. 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.	
☐	2. 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.	
☒	3. 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.	
☐	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.	
☒	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.	
☐	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.	
☐	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.	
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.	
Does the proposed Standard comply with all of the following Market Interface Principles?		Enter (yes/no)
1. A reliability standard shall not give any market participant an unfair competitive advantage.		Yes

Reliability and Market Interface Principles	
2. A reliability standard shall neither mandate nor prohibit any specific market structure.	Yes
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard.	Yes
4. A reliability standard shall not require the public disclosure of commercially sensitive information. All market participants shall have equal opportunity to access commercially non-sensitive information that is required for compliance with reliability standards.	Yes

Related Standards	
Standard No.	Explanation
PRC-005-2, FAC-008-3, PRC-023-3/PRC-025-1/PRC-004-2a, VAR-002-2b and various IRO, MOD, PRC and TOP Standards	See explanation under technical analysis.

Related SARs	
SAR ID	Explanation
	N/A

Related SARs	

Regional Variances	
Region	Explanation
ERCOT	
FRCC	
MRO	
NPCC	
RFC	
SERC	
SPP	
WECC	

Individual or group. (28 Responses)
Name (17 Responses)
Organization (17 Responses)
Group Name (11 Responses)
Lead Contact (11 Responses)
IF YOU WISH TO EXPRESS SUPPORT FOR ANOTHER ENTITY'S COMMENTS WITHOUT ENTERING ANY ADDITIONAL COMMENTS, YOU MAY DO SO HERE. (1 Responses)
Comments (28 Responses)
Question 1 (27 Responses)
Question 1 Comments (27 Responses)
Question 2 (24 Responses)
Question 2 Comments (27 Responses)
Question 3 (0 Responses)
Question 3 Comments (27 Responses)
Question 4 (0 Responses)
Question 4 Comments (27 Responses)
Question 5 (0 Responses)
Question 5 Comments (27 Responses)
Question 6 (0 Responses)
Question 6 Comments (27 Responses)

Group
Caithness Shepherds Flat, LLC
Jeffrey Delgado
Yes
Yes
Caithness Shepherds Flat Wind Farm (CSF), located in Oregon, supports the SAR as written and believes the scope should address dispersed generation resources with collector systems only. In the development of CSF's NERC compliance program, it became apparent that some GO/GOP applicable Reliability Standards were written with fossil fuel facilities in mind, and not generation resources such as wind. The VAR-002 standard for example, requiring reactive and voltage control of individual generators and notification of the TOP when there is a change in status, would appear to be irrelevant to the TOP, but rather the aggregate MW output at the point of interconnection should be what is relevant. CSF's wind farm consists of several hundred wind turbines, all < 3 MW in nameplate capacity. The TOP does not need to be notified about individual turbine voltage status, as any loss of voltage control of an individual turbine will not be detected by the TOP. The relevant factor is in the voltage at the point of interconnection which is controlled by a "Wind Farm Management System" WFMS voltage control system. Change in status of the WFMS would be of interest to the TOP, so the standard should allow for this variance.
Yes
No
No
No
Group
Arizona Public Service Company
Janet Smith, Regulatory Affairs Supervisor
Yes
No

Scope should expanded to include all small generators regardless of types. There is no specific reason to not include all. Generally, there is little reliability benefits to BES by applying NERC standards to small generators regardless of the type.
Yes
No
No
No
Group
SPP Standards Review Group
Robert Rhodes
Yes
No
We believe that this evaluation should be extended to all small generation regardless of type because the impact on the BES would be the same regardless of the source or prime mover of the generation.
While we may agree with the list of standards as presented in the SAR we would encourage the SAR drafting team to not limit itself to just those particular standards. For example, once a drafting team is established and work begins on the project, we don't want the project to be limited by the scope as currently defined in the SAR. We need to factor in some flexibility to go beyond this specific list to capture all those standards/requirements/definitions which may be impacted in this review.
Not at this time.
Although we are not aware of any specific federal regulatory requirements, the drafting team needs to keep in mind that there may be state regulatory requirements established for dispersed generation that may need to be considered in this project.
Regarding the July 2016 deadline, the drafting team needs to be sure that this effort is complete in time for the industry to be ready by July 2016. We need to be sure that as the deadline approaches, compliance preparations aren't made and then un-made as a result of a modification to an existing standard which is impacted by this effort. In the 1st line of the 1st paragraph of the Industry Need section under SAR Information, we suggest replacing 'application' with 'applicability'. In the 5th line of the 1st paragraph of the Brief Description section under SAR Information, replace 'real time' with 'Real-time', the NERC Glossary term. In the 1st line of the FAC-008-3 paragraph under SAR Information, hyphenate step-up. In the next to last line of the General review of IROs, MODs, PRCs, TOPs paragraph, change 'uneeded' to 'unneeded'.
Group
Northeast Power Coordinating Council
Guy Zito
Yes
Yes.
No.
Yes. It must be considered that the operating system in Quebec follows chapter R-6.01 An Act Respecting the Regie de L'Energie, which details: (1) an owner or operator of a facility with a capacity of 44 kV or more connected to an electric power transmission system; (2) an owner or operator of an electric power transmission system; (3) an owner or operator of a production facility with a capacity of 50 megavolt amperes (MVA) or more connected to an electric power transmission system; (4) a distributor with a peak capacity of over 25 megawatts (MW), whose facilities are connected to an electric power transmission system; and (5) a person who uses an electric power transmission system under an electric power transmission service agreement with the electric power carrier or with any other carrier in Québec.

No.
Individual
Thomas Foltz
American Electric Power
Yes
AEP would prefer that the solution for applicability of dispersed generation at the turbine or generating unit level would be by adjusting the BES definition accordingly. Creating a new SAR, allowing this topic be discussed within the framework of the BES definition itself, would seem the most direct and efficient way of debating the topic. However, if that cannot be accomplished, AEP supports the effort of this SAR as an alternative (though less desirable) means to accomplish the same goal.
No
We believe it is preferable, at least initially, for the scope to remain limited to dispersed generation resources.
Every standard that involves the GO and/or GOP should be included in the scope of the SAR. This does not imply that all standards should be modified, but the SDT and commenters should be afforded the opportunity to consider the impacts of such changes. For example, PRC-024, PRC-001, CIP-002 through CIP-011, etc. should be considered.
No.
No.
No.
Individual
Shirley Mayadewi
Manitoba Hydro
Yes
Yes
No
No
Although we do not have any concerns with this SAR, we have the following suggestions to improve clarity. (1) Industry Need - remove the words “Bulk Electric System” from the second paragraph to leave only the acronym, BES because this is the second instance of BES in the document. (2) SAR Information - capitalize ‘misoperation’ because it appears in the Glossary of Terms.
Individual
Patricia Metro
National Rural Electric Cooperative Association
No
NRECA does not believe this SAR is necessary. If entities with dispersed generation are registered as a Generator Owner (GO)/Generator Operator (GOP), it is the obligation of the registered entity to determine applicable standards and associated requirements and be able to explain how it complies accordingly. There is no need to modify the applicability of standards to specifically recognize dispersed generation as there is no recognizable reliability gap with the existing applicability of the standards included in this SAR.
No
See response to Question 1
See response to Question 1

Individual
David Jendras
Ameren
Yes
(1) The proposed SAR appears to advocate the GSU as the Element within these standards' applicability, which appears reasonable for a SAR. However, we believe that this conflicts with the BES Definition Phase 2 Reference figures. Our expectation is that the BES Definition would be included in the scope of this SAR.
Yes
Yes, we agree.
(1) Apply the Generator Site Boundary used in the BES Definition Reference (e.g. Figure I2-5) consistently for dispersed generation so that multiple GSU do not circumvent the 75MVA aggregate. (2) Develop a NERC Glossary definition for the term 'dispersed generation'.
Individual
Silvia Parada Mitchell
NextEra Energy
Agree
MidAmerican
Individual
Jonathan Meyer
Idaho Power
No
The BES definition in process has addressed the concerns raised in the SAR (in our opinion). Application of Standards applies to BES elements unless specifically excluded.
No
I see no need for a SAR.
No
N/A
N/A
Individual
Alice Ireland
Xcel Energy
Yes
We strongly support the objective of this SAR.
We believe that in addition to the approved standards mentioned in the SAR, NERC should communicate this issue directly to drafting teams working on active projects such as PRC-004-3 or PRC-027-1 to assure that they consider the applicability of their standard relative to dispersed generation and, if it is intended to include dispersed generation as in scope, to assure that correct terminology is used within their draft standard to avoid ambiguity and inconsistencies such as the SAR discusses for use of the term "main step up transformer" in FAC-008-3.

Individual
John Seelke
Public Service Enterprise Group
No
The SAR relies upon the phase 2 BES definition, as recently approved by the ballot body, but which has yet to be approved by the NERC Board or FERC. Under this definition, traditional generators at a site that exceed 75 MVA in aggregate as well as the all the equipment from terminals of each generator to the connection point with the BES are included in BES. Dispersed generators are treated differently. The individual dispersed generators are part of the BES if they are at a site where their aggregate nameplate capacity exceeds 75 MVA and they are connected to the BES; however, only equipment that delivers capacity from the point where those resources aggregate to greater than 75 MVA are included in the BES. Stated differently, traditional generators are contiguous with the BES, from the individual BES generators to their connection to the BES. Dispersed generators are not contiguous with the BES – the equipment that aggregate their output prior to it exceeding 75 MVA is excluded. These exclusions create a gap between dispersed BES generators and the BES they connect to. All generators should be treated comparably. The Eastern Interconnection Reliability Assessment Group (ERAG) manual supports our recommendation regarding inclusion equipment for dispersed generators. Wind farm modeling, as specified in the ERAG manual, (https://rfirst.org/reliability/easterninterconnectionreliabilityassessmentgroup/mmwg/Documents/MMWG%20Procedure%20Manual%20V10.pdf) requires a high level of detail – see p. 30, item 6, which states: “Wind Farms - Include all 34.5 kV collector bus(es) and the main facility step-up transformer(s) from 34.5 kV to transmission voltage, as well as one 0.600 kV (or whatever the wind generator nominal voltage is) level bus off each collector bus with a lumped generator and lumped GSU representing the aggregate of the wind turbines attached to that collector bus and their GSUs.” Thus, the ERAG manual requires modeling of non-BES Elements under phase 2 BES definition – see the BES Webinar slides nos. 5-7. (http://www.nerc.com/pa/Stand/WebinarLibrary/bes_phase2_third_posting_20131010_webinar_final.pdf) Setting aside our phase 2 definition concerns, the SAR does not make a coherent technical case for any standards changes. As an example, the justification for a change in PRC-005-2 has contradicting statements: “Manufacturers of dispersed generation turbines and solar panels recommend against specific testing and maintenance regimes for protection and control equipment at the dispersed generation turbine and panel level. In fact it is counterproductive to implement protection and control at the individual turbine, solar panel, or unit level. Instead this is best done at an aggregated level.” In the first sentence, it appears that manufacturers install protection and control equipment at the “dispersed generation turbine and panel level,” yet the next sentence states that “it is counterproductive to implement protection and control at the individual turbine, solar panel, or unit level.” Which is it? During the balloting of PRC-005-2, no comments were submitted to the drafting team regarding the changes proposed in the SAR for PRC-005-2. Yet only a year after the final ballot on PRC-005-2, the SAR proposes changes to PRC-005-2 (and other standards) because the phase 2 definition, according to the SAR, would result in BES equipment at “dispersed generation facilities that if included under certain Reliability Standards may result in a detriment to reliability or be technically unsound and not useful to the support of the reliable operation of the BES.” We believe that dispersed generators will have less equipment, not more, under the proposed BES definition because of the excluded equipment under that definition. Finally, there has been no justification put forth that would justify different treatment of dispersed generation from traditional generation. See our remarks in questions 2 and 6 below.
No
As stated previously, “small generators” (traditional versus dispersed) are not treated comparably in the phase 2 definition – traditional BES generators must be contiguous with the BES but dispersed generators need not be. While we would welcome changes that provide for comparable treatment for small generators, regardless of type, the unequal treatment embedded in the phase 2 definition must be corrected before those changes are considered.

No comments
No comments
No comments
Section 303 of the NERC ROP addresses “Relationship between Reliability Standards and Competition.” Item 1 states: “Competition — A Reliability Standard shall not give any market participant an unfair competitive advantage.” By not treating all generators comparably, the SAR violates item 1. Based upon this and our prior comments, we recommend that the SAR be rejected by the Standards Committee.
Individual
Barbara Kedrowski
Wisconsin Electric Power Company
No
The SAR needs to include applicability to CIP-002-5, proposed for the identification of BES Cyber Assets and BES Cyber Systems. If individual wind turbines are included in the BES, those cyber assets which support their operation (monitoring and control functions local to each turbine) would become BES Cyber Systems subject to some level of compliance requirements of the CIP v5 standards. The SAR needs to include all the CIP version 5 standards, including CIP-010 and CIP-011. Addtionally, these standards need to be listed: PRC-001/027 – Coordination for distributed resources needs to be accomplished with the collector system of the distributed resource, not with the transmission system. The collector system needs to be coordinated with the transmission system, however, the BES definition specifically excludes collector system equipment at less than 75 MVA from being included in the BES. PRC-024 – In most cases most distributed resources are many identical units. It would seem reasonable to document the relay data for one unit and then use it for many. PRC-019 – Voltage control for some types of dispersed generating facilities is accomplished by a controller that is able to adjust either generating unit controls or discrete reactive components to provide transmission system voltage adjustment. The PRC-019 standard should be modified to allow coordination with this type of control for dispersed generation facilities under the requirements of the standard. MOD 012/032 – In most cases most distributed resources are many identical units. It would seem reasonable to provide an example model of one resource and then use it for many. MOD 025 & 026 and 027 – In most cases most distributed resources are many identical units. It would seem reasonable to validate one unit and then use the results for many.
Response from Q1: The SAR needs to include applicability to CIP-002-5, proposed for the identification of BES Cyber Assets and BES Cyber Systems. If individual wind turbines are included in the BES, those cyber assets which support their operation (monitoring and control functions local to each turbine) would become BES Cyber Systems subject to some level of compliance requirements of the CIP v5 standards. The SAR needs to include all the CIP version 5 standards, including CIP-010 and CIP-011. Addtionally, these standards need to be listed: PRC-001/027 – Coordination for distributed resources needs to be accomplished with the collector system of the distributed resource, not with the transmission system. The collector system needs to be coordinated with the transmission system, however, the BES definition specifically excludes collector system equipment at less than 75 MVA from being included in the BES. PRC-024 – In most cases most distributed resources are many identical units. It would seem reasonable to document the relay data for one unit and then use it for many. PRC-019 – Voltage control for some types of dispersed generating facilities is accomplished by a controller that is able to adjust either generating unit controls or discrete reactive components to provide transmission system voltage adjustment. The PRC-019 standard should be modified to allow coordination with this type of control for dispersed generation facilities under the requirements of the standard. MOD 012/032 – In most cases most distributed resources are many identical units. It would seem reasonable to provide an example model of one resource and then use it for many. MOD 025 & 026 and 027 – In most cases most distributed resources are many identical units. It would seem reasonable to validate one unit and then use the results for many.

Group
MRO NERC Standards Review Forum
Russel Mountjoy
Yes
The SAR indicates several standards that should be considered for modification for dispersed generating units. It also provides for examination of other standards that may need to be similarly modified to accommodate the unique aspects of dispersed generation. In addition the SAR provides an explanation of which types of generation are to be reviewed in this project and this explanation is appropriate to define the scope of the project.
Yes
The SAR does not specify what types of generation should be included for analysis as “dispersed generation resources. It only refers to those that are a part of a facility that aggregates to 75 MVA or more. As written the SAR is not limited to any particular type of small generation. Under the SAR all types could and should be considered for revision.
The SAR provides a list of several specific standards application to Generator Owners and/or Generator Operators that would be reviewed as part of the project. In addition it proposes a review of several project families (IRO,MOD, PRC and TOP) that would be examined. The specific list is recommended as proposed in the SAR and with the flexibility to review other standards the list as indicated is appropriate Consideration should be given to an addition to the Attachment in CIP-002 to add an item that would exclude components below the 75MVA aggregation point. The reasoning would be parallel to the other standards addressed in the SAR where the aggregation point would be identified as the point at which the standard would apply. For CIP the result would be that the components below the aggregation point would not have to be addressed, i.e. they would not be high, medium, or low.
The SAR includes the objective to complete the changes and obtain regulatory approval prior to the completion of the implementation of the BES definition. It is essential that this schedule is met so that dispersed generation owners and operators can plan and implement their compliance programs without having to temporarily implement requirements that will be superseded by this project.
Individual
Chris Scanlon
Exelon
Yes
The SAR indicates several standards that should be considered for modification for dispersed generating units. It also provides for examination of other standards that may need to be similarly modified to accommodate the unique aspects of dispersed generation. In addition the SAR provides an explanation of which types of generation are to be reviewed in this project and this explanation is appropriate to define the scope of the project.
Yes
Yes, the SAR should focus on generation resources that are part of a facility that aggregates dispersed resources at 75 MVA or more. We believe the intent is to exclude individual units from certain requirements when those units do not meet the reporting criteria but are part of a facility that aggregates those units at the BES voltage level. We note that the question may lead to confusion. As written the use of "or" appears to be implying there is a choice between "dispersed generation" as used in the first clause of the question and some generation "types" (undefined but commonly understood to refer to fuel source) as used in the second clause. We do not believe the SAR should exclude generation based on fuel type.
The SAR provides a list of several specific standards application to Generator Owners and/or Generator Operators that would be reviewed as part of the project. In addition it proposes a review of several project families (IRO,MOD, PRC and TOP) that would be examined. The specific list is

recommended as proposed in the SAR and with the flexibility to review other standards the list as indicated is appropriate.
No
No
The SAR includes the objective to complete the changes and obtain regulatory approval prior to the completion of the implementation of the BES definition. It is essential that this schedule is met so that dispersed generation owners and operators can plan and implement their compliance programs without having to temporarily implement requirements that will be superseded by this project.
Individual
David Greyerbiehl
Consumers Energy Company
Yes
Yes
Yes
The SAR is required at a minimum, but a change to the BES definition is more appropriate. From the comments below submitted during the BES, the BES definition should at minimum be modified to provide consistency between generating resources (I2) and dispersed power producing resources (I4). Generating resources are required to be 20MVA in order to be considered an BES element, while dispersed power producing resources have no size consideration as long as they meet the net total MVA. Consumers Energy has completed studies with an operating wind farms and the loss of individual resources makes no impact the BES. The addition of individual resources does not make improve reliability as they have no effect on the system. The SAR intention is to modify the individual standards to define the requirements for all the additional BES elements that are being added that are not presently addressed in the standards or are against the manufacturers recommendations. While this approach can be used, and is required if the BES definition is not changed. A better method would be to include dispersed power producing resources at a point in which the total affects the BES and not as individual units. Previous Comments on BES definition: The inclusion and the clarification of the inclusion seem to contradict each other. The highlight portion above seems to indicate inclusion only from the point of aggregation of 75MVA or above. This, in most Wind Park cases would include a collector bus but probably not individual wind turbines. However I4 seems to indicate that the case of a Wind Park that has a total aggregation of 75 MVA, all associated equipment including every individual wild turbine would be included. There is inconsistency. If and when Distributed Generation gains saturation is it our intent that whole neighborhoods or industrial parks be considered BES resources? Technical justification should be needed to include resources in the BES, not the other way around. Is there a real expectation that a single collector circuit containing ten, 1.2MW wind turbines can cause cascading or uncontrollable outages of the surrounding system? It is extremely doubtful. We can support the inclusion of equipment where the aggregation of 75 MVA or more connects to the Bulk Electric System at voltages of 100kv or greater. There is a clear indication here that a single contingency can remove the total of the capacity from the system where with this definition as proposed, that is simply not the case.
No
No
Group
ISO/RTO Council Standards Review Committee
Greg Campoli
Yes
Yes

Small generators that do not meet the individual 20 MVA criteria and are not part of the aggregated 75 MVA group that meets the BES inclusion criteria are not regarded BES facilities and therefore do not need to be addressed by this SAR. The scope therefore does not need to be expanded to all small generators.
Yes
No
No
No
Individual
Gary Kruempel
MidAmerican Energy Company
These comments were developed by NextERA (contact Brian Murhpy), MidAmerican, and Exelon
Yes
The SAR indicates several standards that should be considered for modification for dispersed generating units. It also provides for examination of other standards that may need to be similarly modified to accommodate the unique aspects of dispersed generation. In addition the SAR provides an explanation of which types of generation are to be reviewed in this project and this explanation is appropriate to define the scope of the project.
Yes
The SAR does not specify what types of generation should be included for analysis as “dispersed generation resources. It only refers to those that are a part of a facility that aggregates to 75 MVA or more. As written the SAR is not limited to any particular type of small generation. Under the SAR all types could and should be considered for revision.
The SAR provides a list of several specific standards application to Generator Owners and/or Generator Operators that would be reviewed as part of the project. In addition it proposes a review of several project families (IRO,MOD, PRC and TOP) that would be examined. The specific list is recommended as proposed in the SAR and with the flexibility to review other standards the list as indicated is appropriate Consideration should be given to an addition to the Attachment in CIP-002 to add an item that would exclude components below the 75MVA aggregation point. The reasoning would be parallel to the other standards addressed in the SAR where the aggregation point would be identified as the point at which the standard would apply. For CIP the result would be that the components below the aggregation point would not have to be addressed, i.e. they would not be high, medium, or low.
No
No
The SAR includes the objective to complete the changes and obtain regulatory approval prior to the completion of the implementation of the BES definition. It is essential that this schedule is met so that dispersed generation owners and operators can plan and implement their compliance programs without having to temporarily implement requirements that will be superseded by this project.
Individual
Bill Fowler
City of Tallahassee (TAL)
Yes
Should the 75MVA be differentiated for Solar PV and other generating units that have both a DC and AC rating?
Yes
Dispersed generation should include intermittent power sources such as wind and solar, but also non-intermittent such as WTE, biogas and biomass generation sources.
yes
No. The City of Tallahassee is not aware of other business practices to be included.
No. The City of Tallahassee is not aware of such.

No.
Group
ACES Standards Collaborators
Ben Engelby
Yes
We find this SAR timely and necessary to avoid confusion in the application of the revised definition of the Bulk Electric System.
No
No, we do not agree that the scope of the SAR should be limited. The scope of the SAR should be to review standards applicable to GO/GOP and to limit the applicability based on the revised definition of the BES. Small generation regardless of type should be included in this review.
We agree with the list of standards to be reviewed. We would like to see flexibility in the scope of standards to be reviewed in the event that another standard is added during the standards development phase.
No.
No.
No other concerns.
Group
Duke Energy
Michael Lowman
Yes
Yes
(1) Duke Energy agrees that the scope of the SAR should be limited to Disperse Generation only.
(1) PRC-004-WECC-1 should also be included in this SAR with the same justification provided for the NERC Standard PRC-004-2
(1) Duke Energy is concerned that Dispersed Generation will have to be compliant with the BES definition Phase 1 prior to the Implementation of this Project and the implementation of Phase 2 of the BES definition. (2) Financial implications to registered entities should be considered and included in the Industry Need section of the SAR such as additional human resources required to maintain compliance if the standards are not revised for the applicability of dispersed generation resources at the point of aggregation to 75 MVA or greater.
Group
DTE Electric
Kathleen Black
Yes
Yes
Yes As stated in the background information, any relevant standard should be revised as necessary to insure that it is being applied at the point of aggregation.
No
No
No
Individual

Scott Langston
City of Tallahassee
Yes
Should the 75MVA be differentiated for Solar PV and other generating units that have both a DC and AC rating?
Yes
Dispersed generation should include intermittent power sources such as wind and solar, but also non-intermittent such as WTE, biogas and biomass generation sources.
Yes
No
No
No
Individual
Carla L. Holly
BP Wind Energy North America Inc.
Yes
Yes
The scope of the SAR should be limited to considering revisions necessary to address the unique technical and reliability aspects of dispersed generation resources as dispersed generation resources are unique and have operational characteristics that are not similar to most conventional generators, including generators that are considered to be classified as small.
Yes. We agree with the list of standards to be reviewed; however, we suggest more clarification about which specific IRO, MOD, PRC, and TOP standards would be considered as the SAR currently lists these categories generically.
No.
No.
No.
Individual
Karen Webb
City of Tallahassee
Yes
Should the 75MVA be differentiated for Solar PV and other generating units that have both a DC and AC rating?
Yes
Dispersed generation should include intermittent power sources such as wind and solar, but also non-intermittent such as waste-to-energy, biogas, and biomass generation sources.
Group
Southern Company: Southern Company Service, Inc.; Alabama Power Company; Georgia Power Company; Gulf Power Company; Mississippi Power Company; Southern Company Generation; Southern Company Generation and Energy Marketing
Wayne Johnson

Yes
No
We believe the scope should include consideration of changes to standards applicability for all small generation. In particular, individual generators < 75 MVA should be exempted from model validation requirements unless transmission planning studies demonstrate such individual generators are critical to BES reliability. This would significantly reduce the compliance burdens being imposed on many GOs and GOPs and improve the focus on generators that are critical to reliability.
No. Need to also add those included in the Generator Verification Standard suite, including PRC-019, PRC-024, MOD-025, MOD-026, MOD-027. We are concerned with how certain standard requirements such as VAR-002 R3 can be applied to facilities with multiple “mini” units operating in parallel. For example, in the case of small turbine-generators one or more units operating in manual regulator mode would not have the same impact to the BES as a single large unit. Similar issues exist when some of the other listed standard requirements are applied such as model validation of excitation systems and governors (MOD-026 & MOD-027, as noted above).
No
No
No
Individual
Peter A. Heidrich
Florida Reliability Coordinating Council, Inc.
No
The SAR should not be limited to dispersed power producing resources only. A significant issue that will prove to derail this project is the potential inequitable treatment of generation. The scope should include all small generators regardless of fuel source or prime mover force. The scope should further identify small package style units that are typically considered 'run to fail' units. Provisions with in the 'Applicability' of the appropriate Reliability Standards that take into account these types of units would significantly reduce the compliance obligations for units that simply are replaced (in whole)when a failure occurs.
No
The scope should include all small generators regardless of fuel source or prime mover force. The scope should further identify small package style units that are typically considered 'run to fail' units. The reliability benefit of a generating facility is based on the MVA output of the unit, not on the fuel source or the prime mover force. Within a generating facility that aggregates to >75 MVA, there is no difference in the reliability benefit of a single wind turbine or a single gas fired turbine with the same MVA nameplate rating.
No
No
Group
Bonneville Power Administration
Andrea Jessup
Yes
No
(a) BPA feels that the term “dispersed generation resource” is typically associated with facilities that produce electric power through cogeneration and through renewable resources — such as biomass, solar, hydro, wind, municipal waste, tidal, wave, geothermal, and energy storage. It doesn’t matter which type of resource is used to generate power; what matters is the aggregated output at the

point of interconnection, which may have an effect on the electric power system. IEEE Standard 1001-1988 (IEEE Guide for Interfacing Dispersed Storage and Generation Facilities with Electric Utility Systems) and IEEE Standard 1547 (IEEE Standard for Interconnecting distributed Resources with Electric Power Systems) provide information regarding the technical aspects of dispersed generation resources. (b) BPA feels that for PRC-005 & PRC-023, the SAR needs to include individual turbine equipment dynamic response, such that the aggregate collector system provides the required relay response, not just the protective devices from the point of aggregation. It serves no reliability purpose if each turbine internally trips for a system event that requires continuation of the generation in a coordinated manner. (c) BPA feels that FAC-008 requires documentation from the generator to the high side of the main step-up transformer. For dispersed generation, this is the transformer at the main collector transformer. The SAR needs to consider including documentation for the collector system capability. BPA has found that when reactive current was not considered in earlier projects, overloads on some collectors were possible, which limited response to system events. (d) BPA has been requiring a collector system study provided by the generator owner to determine the reactive losses of the generation project and to ensure that reactive requirements are met. BPA has recently developed a collector system performance requirement to demonstrate compliance with reactive capability requirements. BPA recommends that this be added to the scope of the SAR to ensure that the generation in aggregate responds as required for a BES generation project.
No. BPA feels that a review of PRC-024 (Generator Frequency and Voltage Protective Relay Settings) needs to be included in the scope of this SAR. Aggregated dispersed generation must be able to ride-through faults and system disturbances the same as other generation resources.
No.
No.
Yes. IRO, MODs TOPs should be reported in aggregate. Outage coordination requirements for non-dispatchable generation should be eased as the certainty of the generation is never precisely known. BPA feels focusing compliance activities at the point of aggregation to 75 MVA is acceptable; however, there are a couple areas where we need to be cautious. One area of concern is the issue of back feed. Regardless of the size of the dispersed generation resource, proper precautions must be in place to ensure that it does not unintentionally or unexpectedly feed back into the BES. This is a matter of safety for personnel who might be doing construction or maintenance activities on the BES. BPA's other area of concern is the ability of the dispersed resources to ride through faults and system disturbances. BPA's concern here is similar to the concern BPA had when large amounts of wind generation began to be integrated into the grid. Specifically, BPA is concerned that the settings on protection schemes might be set such that large numbers of them would drop off during an event. This would be the equivalent of a large, high-speed spike in load, which could make the event far worse.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Bulk Electric System Definition Reference Document

January, 2014

This draft reference document is posted for stakeholder comments prior to being finalized to support implementation of the Phase 2 Bulk Electric System definition.

RELIABILITY | ACCOUNTABILITY




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Table of Contents

Introduction

During the course of Project 2010-17 Definition of Bulk Electric System (DBES), several commenters requested that the Standard Drafting Team (SDT) create a reference document explaining how the revised definition should be applied. This document is intended to provide such a reference.

Disclaimer

This document is not an official position of NERC and will not be binding on enforcement decisions of the NERC Compliance Program. This reference document reflects the professional opinion of the DBES SDT, given in good faith for illustrative purposes only.

Background

On November 18, 2010 FERC issued Order No. 743 and directed NERC to revise the definition of the Bulk Electric System (BES) so that the definition encompasses all Elements and Facilities necessary for the reliable operation and planning of the interconnected bulk power system. Phase I of Project 2010-17 Definition of Bulk Electric System concluded on November 21, 2011 with stakeholder approval of a revised definition of BES and application form titled 'Detailed Information to Support an Exception Request' referenced in the Rules of Procedure Exception Process. The revised definition, modifications to the Rules of Procedure to provide a process for determining exceptions to the definition, and an application form to support that process, were approved by the NERC Board of Trustees for adoption and then filed with regulatory authorities for approval on January 25, 2012.

On December 20, 2012 the Federal Energy Regulatory Commission issued Order No. 773, approving the definition of BES filed as a result of Phase 1 of the Definition of Bulk Electric System project. In Order No. 773, as subsequently clarified in Order No. 773-A, the Commission directed NERC to: (1) modify the exclusions for radial systems (Exclusion E1) and local networks (Exclusion E3) so that they do not apply to tie-lines, i.e., generator interconnection facilities, for BES generators; and (2) modify the local network exclusion to remove the 100 kV minimum operating voltage.

In Order No. 773-A, the Commission noted that facilities below 100 kV can be a significant factor in a major blackout. The Commission cited the joint NERC and Commission staff report on the September 8, 2011, Arizona-Southern California blackout in support of its decision to include all facilities that have a material impact on the reliability of the Bulk-Power System. The Commission's analysis of the impact of the revisions to the definition of BES to address Order No. 773 directives reflects the intention that the revised definition would not dramatically impact the footprint of the BES.

Phase 2 of the project was initiated to develop appropriate technical justification to support refinements to the definition that were suggested by stakeholders during Phase I, and to refine the definition as technically justified. In addition, during Phase 2, the drafting team addressed FERC's directives from Orders No. 773 and 773-A.

Purpose

The purpose of this document is to assist the industry with the application of the revised definition. Examples are provided where appropriate but should not be considered as all-inclusive. The document is intended to provide clarification and explanations for the application of the revised definition in a consistent, continent-wide basis for the majority of BES Elements.

Summary

An understanding of the core definition and each Inclusion and Exclusion is necessary to accurately and consistently apply the BES definition. (It should be noted that the BES definition applies to AC and DC electrical facilities.) The application of the 'bright-line' BES definition is a three-step process that, when appropriately applied, will identify the vast majority of BES Elements in a consistent manner that can be applied on a continent-wide basis.

Commission (FERC) Order No. 773 directed implementation of the revised BES Definition to take into account the impact of sub-100 kV looped Facilities regardless of voltage level. This altered previous guidance on the evaluation of radial systems. The drafting team developed a technical justification setting a threshold of 50 kV as the value where looped facilities had potential impact on the BES, i.e., if a looped Facility was below 50 kV, an entity could still apply Exclusion E1 as it was shown that looped facilities below 50 kV had no impact on the reliability of the BES. Configurations as shown in the diagrams dealing with the radial system and local network exclusions as well as the system diagrams reflect this finding.

STEP 1: CORE DEFINITION: The core definition is used to establish the bright-line of 100 kV, the overall demarcation point between BES and Non-BES Elements. The core BES Definition identifies the Real Power and Reactive Power resources connected at 100 kV or higher, as included in the BES. To fully appreciate the scope of the core definition, an understanding of the term "Element" is needed. "Element" is defined in the NERC Glossary as: "Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An element may be comprised of one or more components."

STEP 2: INCLUSIONS: This step involves applying the specific Inclusions, provides additional clarification for the purposes of identifying specific Elements that are included in the BES. The Inclusions address Transmission Elements and Real Power and Reactive Power resources with specific criteria to provide for a consistent determination of whether an Element is classified as BES or non-BES. There are five Inclusions in the Definition. The facilities described in Inclusions I1, I2, I4 and I5 are each operated (if transformers – Inclusion I1) or connected (if generating resources, dispersed power producing resources or Reactive Power resources – Inclusions I2, I4 and I5) at or above the 100 kV threshold. Inclusion I3 encompasses Blackstart Resources identified in a Transmission Operator's restoration plan, which are necessary for the reliable operation of the interconnection transmission system and should be included in the BES regardless of their size (MVA) or the voltage at which they are connected.

STEP 3: EXCLUSIONS: This step evaluates specific situations for potential exclusion from the BES. The exclusion language is written to specifically identify Elements or groups of Elements for exclusion from the BES. Step three (3) should be applied in the following sequence:

Exclusion E2 (Behind the Meter Generation) provides for the specific exclusion of certain Real Power resources that reside behind-the-retail meter (on the customer's side) and supersedes the more general Inclusion I2 (Generating Resources). Behind-the-meter generation that meets these specific criteria do not affect reliability of the BES because the net capacity supplied to the BES is less than 75 MVA and the specific criteria impose obligations to support reliability when the resources are unavailable.

Exclusion E4 (Reactive Power Devices) provides for the specific exclusion of Reactive Power devices installed for the sole benefit of a retail customer(s) and supersedes the more general Inclusion I5 (Static or Dynamic Reactive Power Devices). Reactive Power devices installed for the sole benefit of a retail customer are, by definition, not required for operation of the interconnected transmission system.

Exclusion E3 (Local Networks) provides for the exclusion of local networks that meet the specific criteria identified in the exclusion language. Exclusion E3 does not allow for the exclusion of Real Power and Reactive Power resources captured by Inclusions I2 through I5. In instances where a transformer (under Inclusion I1) is an Element of a local network (under Exclusion E3), the transformer would be excluded pursuant to Exclusion E3. Exclusion E3 may not be used to exclude transmission Elements (captured by the core definition and Inclusion I1) when Real Power resources are present that are captured by Inclusion I2, I3, or I4. This assures that interconnection facilities for BES generators are not excluded.

Exclusion E1 (Radial Systems) provides for the exclusion of 'transmission Elements' from radial systems that meet the specific criteria identified in the exclusion language. Exclusion E1 does not allow for the exclusion of Real Power and Reactive Power resources captured by Inclusions I2 through I5. In instances where a transformer (under Inclusion I1) is an Element of a radial system (under Exclusion E1), the transformer would be excluded pursuant to Exclusion E1. Exclusion E1 may not be used to exclude transmission Elements (captured by the core definition and Inclusion I1) when Real Power resources are present that are captured by Inclusion I2, I3, or I4. This assures that interconnection facilities for BES generators are not excluded.

This Reference Document has been divided into sections to accurately illustrate how specific parts of the definition are applied, and then how the hierarchal application of the definition is accomplished. Section I is a list of figures. Sections II and III provide illustrative diagrams with accompanying text, where appropriate, describing the application of the BES definition, grouped according to the specific inclusion or exclusion. Section IV provides a series of system diagrams that depict the hierarchical application of the definition. Section V establishes the linkage to the Rules of Procedure Exception Process.

I. List of Figures

II. Inclusions

Each inclusion is shown below with both text and diagrams explaining how to apply the BES definition for the specific configuration shown. These examples are not to be considered all-inclusive, and simply reflect the professional opinion of the DBES SDT and are provided in good faith for illustrative purposes only. This document is not an official position of NERC and will not be binding on enforcement decisions of the NERC Compliance Program.

The section on Inclusion I3 does not include diagrams, as there are no application configuration issues associated with it. Blackstart Resources are included in the BES regardless of configuration or location.

Diagrams only show application of the definition to the specific Element in question. For example, in Figure I1-1 below, only the windings of the transformer are shown as being included in the BES. The lines coming out of the transformer are not delineated as BES or non-BES, as no assumptions are being made as to where and how those lines connect in the big picture.

Key to diagram color coding:

- **Blue** indicates that an Element is included in the BES
- **Green** indicates that an Element is not included in the BES
- **Orange** indicates 'points of connection'.
- **Black** indicates Elements that are not evaluated for the specific inclusion depicted in the individual diagrams being shown.

I1.1 BES Inclusion I1

I1. Transformers with the primary terminal and at least one secondary terminal operated at 100 kV or higher unless excluded under Exclusion E1 [radial] or E3 [local network].

Note: Figures I1-1 through I1-4 are depictions of the application of Inclusion I1 and are intended to assist the user during the full application of the BES definition.

Figures I1-1 through I1-4 depict various types of transformers and operating configurations typically utilized in the electric utility industry.

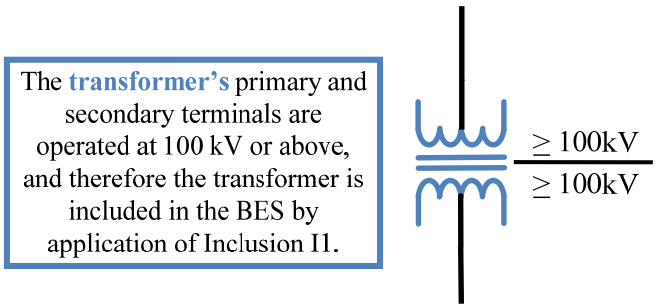


Figure I1-1: Typical Two Winding Transformer (BES)

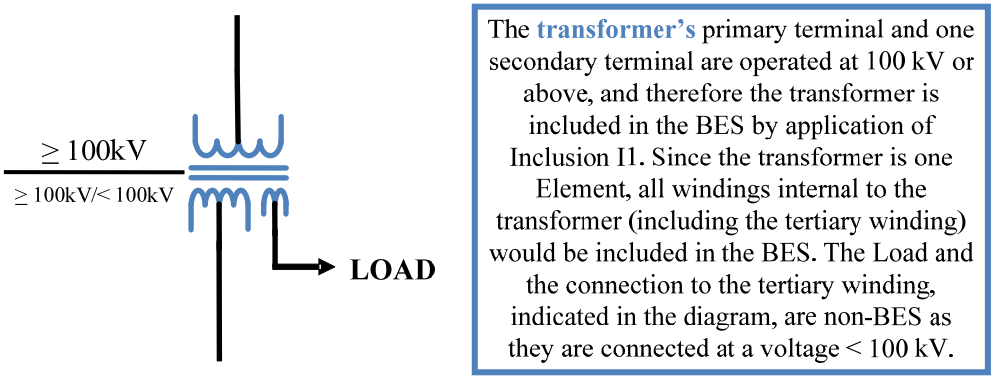


Figure I1-2: Typical Three Winding Transformer (BES)

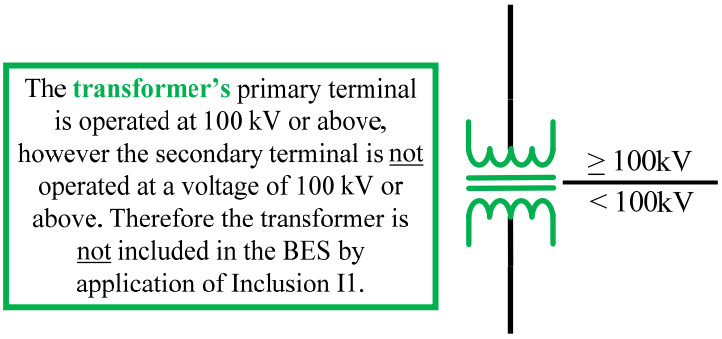


Figure I1-3: Typical Two Winding Transformer (non-BES)

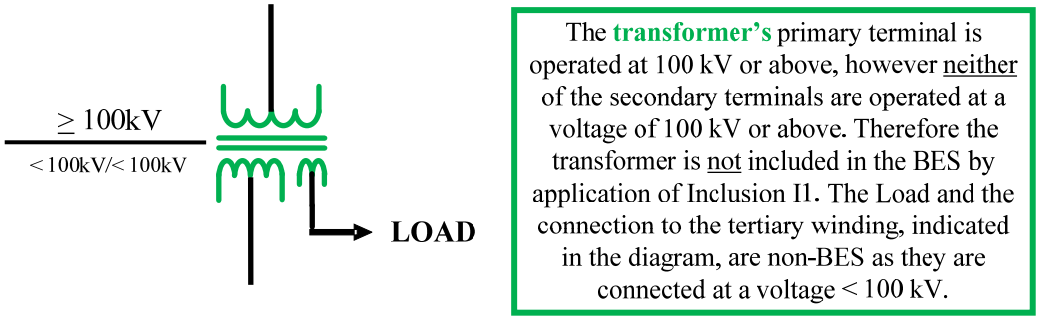


Figure I1-4: Typical Three Winding Transformer (non-BES)

11.2 BES Inclusion I2

I2. Generating resource(s) including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above with:

a) Gross individual nameplate rating greater than 20 MVA. Or,

b) Gross plant/facility aggregate nameplate rating greater than 75 MVA.

Note: Figures I2-1 through I2-6 are depictions of the application of Inclusion I2 and are intended to assist the user during the full application of the BES definition.

Interpretation of the "or" statement in the inclusion definition is a hierarchical operator that has several steps as shown in the following diagrams.

Figure I2-1 depicts a single unit with gross individual nameplate rating greater than 20 MVA connected through the high-side of the step-up transformer connected at a voltage of 100 kV or above. By application of Inclusion I2, this generating unit is identified as a BES Element.

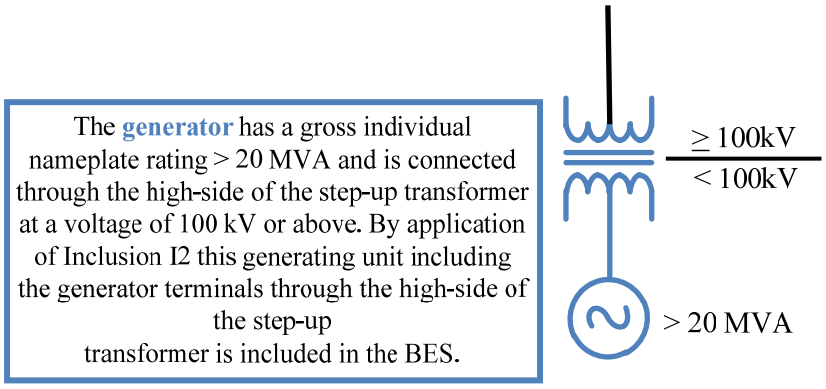


Figure I2-1: Single Generating Unit (BES)

Figure I2-2 depicts a single unit with gross individual nameplate rating less than 20 MVA connected through the high-side of the step-up transformer connected at a voltage of 100 kV or above. By application of I2, this unit is not a BES Element.

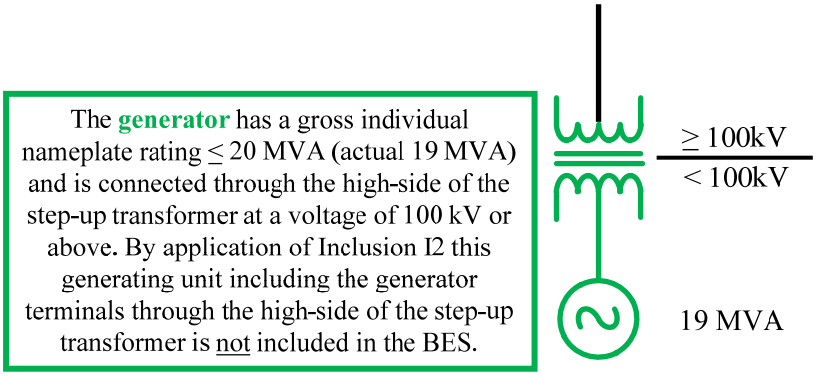


Figure I2-2: Single Generating Unit (non-BES)

Figure I2-3 depicts a site with multiple units connected through the high-side of the step-up transformer(s) at a voltage of 100 kV or above with a gross aggregate nameplate rating (connected @100 kV or above) greater than 75 MVA; therefore, by application of Inclusion I2, all of the units (connected @100 kV or above) are included in the BES.

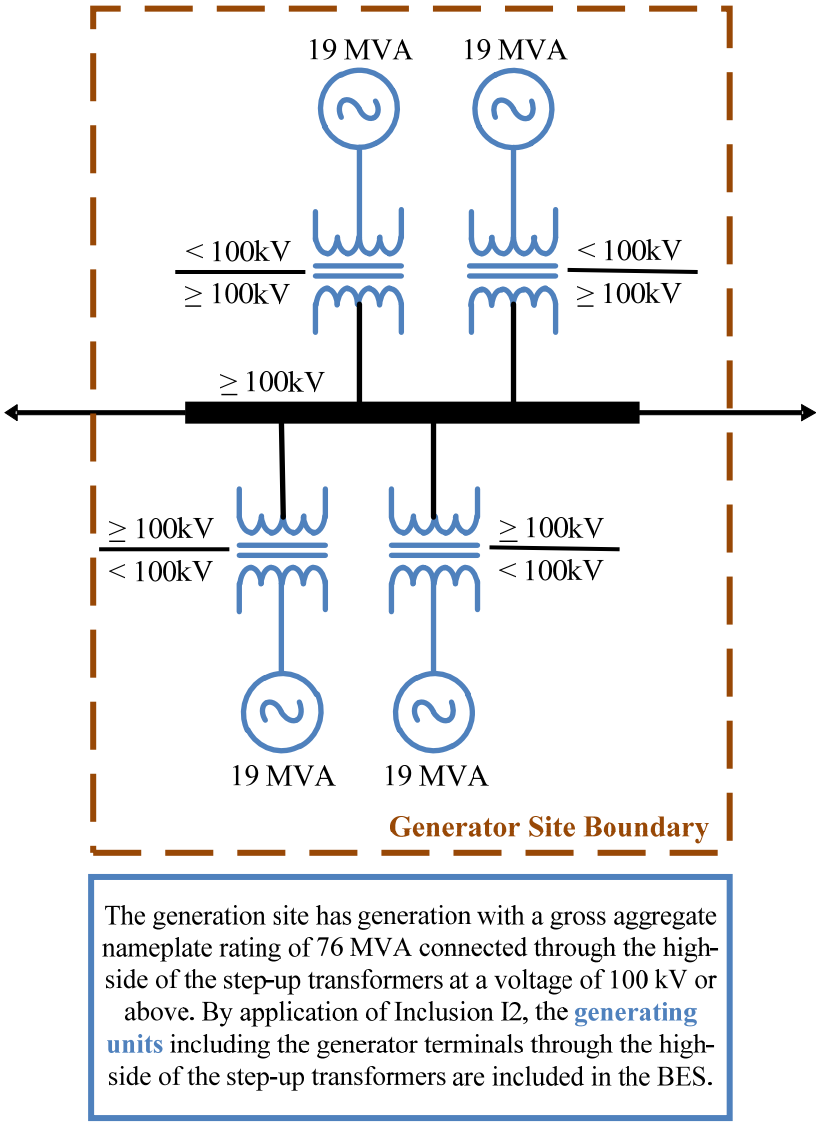


Figure I2-3: Multiple Unit Generating Site (BES)

Figure I2-4 depicts a site with multiple units connected through the high-side of the step-up transformer(s) at a voltage of 100 kV or above with an aggregate nameplate rating (connected @100 kV or above) less than 75 MVA. By application of Inclusion I2, only those units with a gross nameplate rating greater than 20 MVA connected through the high-side of the step-up transformer(s) at a voltage of 100 kV or above are included in the BES.

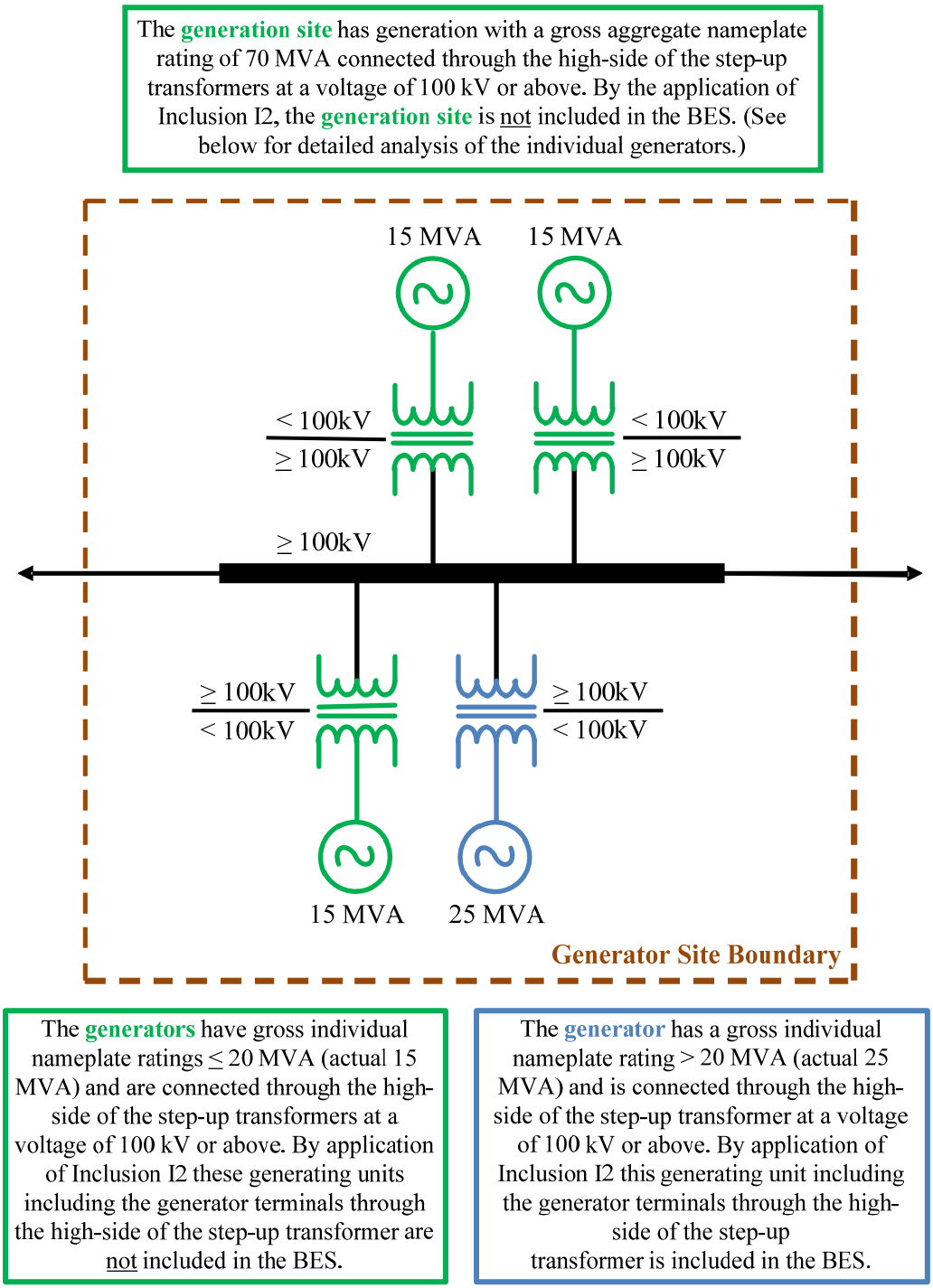


Figure I2-4: Multiple Unit Generating Site (BES & non-BES)

Figure I2-5 depicts a site with multiple units connected through the high-side of the step-up transformer(s) at a voltage of 100 kV or above with a gross aggregate nameplate rating (connected @100 kV or above) greater than 75 MVA. By application of Inclusion I2, all of these units (connected @100 kV or above) are included in the BES. In accordance with Inclusion I2, the generator, including the generator terminals through the multiple step-up transformers with a high-side connection voltage of 100 kV or above, are considered to be a single BES Element. The step-up transformers and the interconnecting bus work are installed for the purpose of stepping-up the voltage output of the generator to a voltage of 100 kV or above.

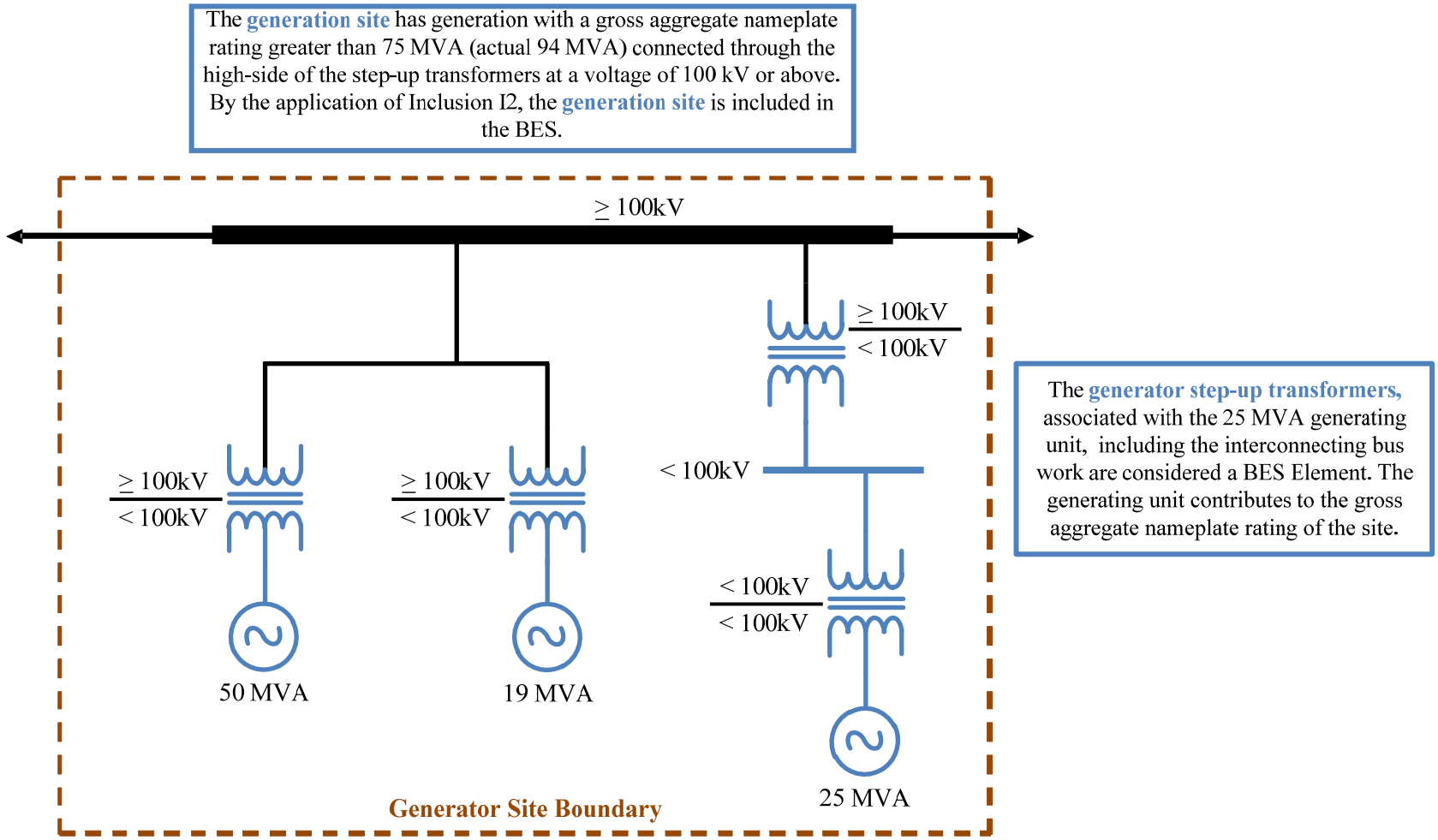


Figure I2-5: Multiple Unit Generating Site (BES)

Figure I2-6 depicts a site with multiple units connected through the high side of the step-up transformer(s) at a voltage of 100 kV or above with a gross aggregate nameplate rating (connected @100 kV or above) less than 75 MVA. Therefore, only the units that meet the single unit inclusion criteria of gross nameplate rating of greater than 20 MVA are included in the BES. The generator with the 25 MVA gross individual nameplate rating is not included in the BES or in the generation site total because the step-up transformers and the interconnecting bus work are installed for the purpose of serving Load. The NERC Glossary of Terms Used in NERC Reliability Standards defines Load as "an end-use device or customer that receives power from the electric system".

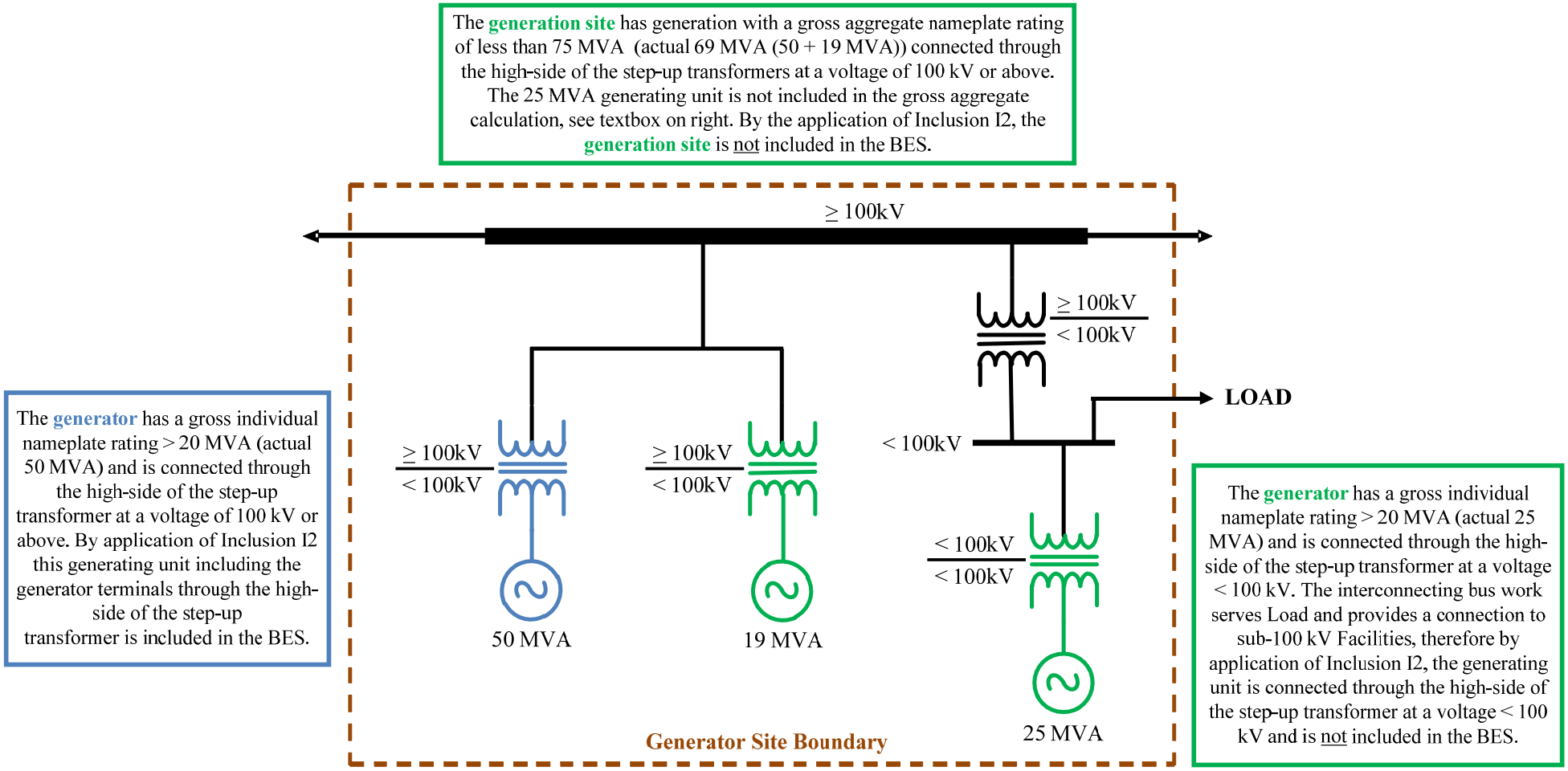


Figure I2-6: Multiple Unit Generating Site (BES & non-BES)

11.3 BES Inclusion I3

I3. Blackstart Resources identified in the Transmission Operator's restoration plan.
Inclusion I3 includes Blackstart Resources identified in the Transmission Operator's restoration plan. Blackstart Resources are included in the BES regardless of configuration or location.

The NERC Glossary of Terms Used in NERC Reliability Standards defines Blackstart Resource as follows:

> "A generating unit(s) and its associated set of equipment which has the ability to be started without support from the System or is designed to remain energized without connection to the remainder of the System, with the ability to energize a bus, meeting the Transmission Operator's restoration plan needs for real and reactive power capability, frequency and voltage control, and that has been included in the Transmission Operator's restoration plan."

The Transmission Operator's restoration plan refers to the restoration plan identified in Reliability Standard EOP-005 System Restoration from Blackstart Resources.
Figures were not developed for Inclusion I3 due to the simplicity of the language in the inclusion.

11.4 BES Inclusion I4

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.

Note: Figures I4-1 through I4-4 are depictions of the application of Inclusion I4 and are intended to assist the user during the full application of the BES definition.

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

Common Point of Connection

The common point of connection is where the individual transmission Element(s) of the collector system is connected to the 100 kV or higher Transmission system. (Note: This point is typically specified in the respective Transmission Owner and Generator Operator Interconnection Agreements.)

Collector Systems

FERC Orders No. 773 and 773-A identified a concern that the Commission expressed regarding dispersed power collector systems. The SDT has addressed collector systems in a clear fashion that leaves no room for arbitrary determinations and eliminates the unintended consequences of categorically including as part of the BES, assets that may include local distribution facilities.

The basis of this determination takes into account the significant differences in collector system configurations that exist today that do not lend themselves to a continent-wide bright-line determination. This resulted in properly identifying the portions of the collector system which consistently provide a reliability benefit to the interconnected transmission network. The result identifies the point of aggregation of 75 MVA and above and the interconnecting facilities to the interconnected transmission network. The aggregation threshold is consistent with the aggregation of capacity in Inclusion I4 and recognizes that the loss of those facilities would represent a loss of 75 MVA capacity to the BES.

Figure I4-1 depicts a dispersed generation site and substation design with a single transformation of voltage.

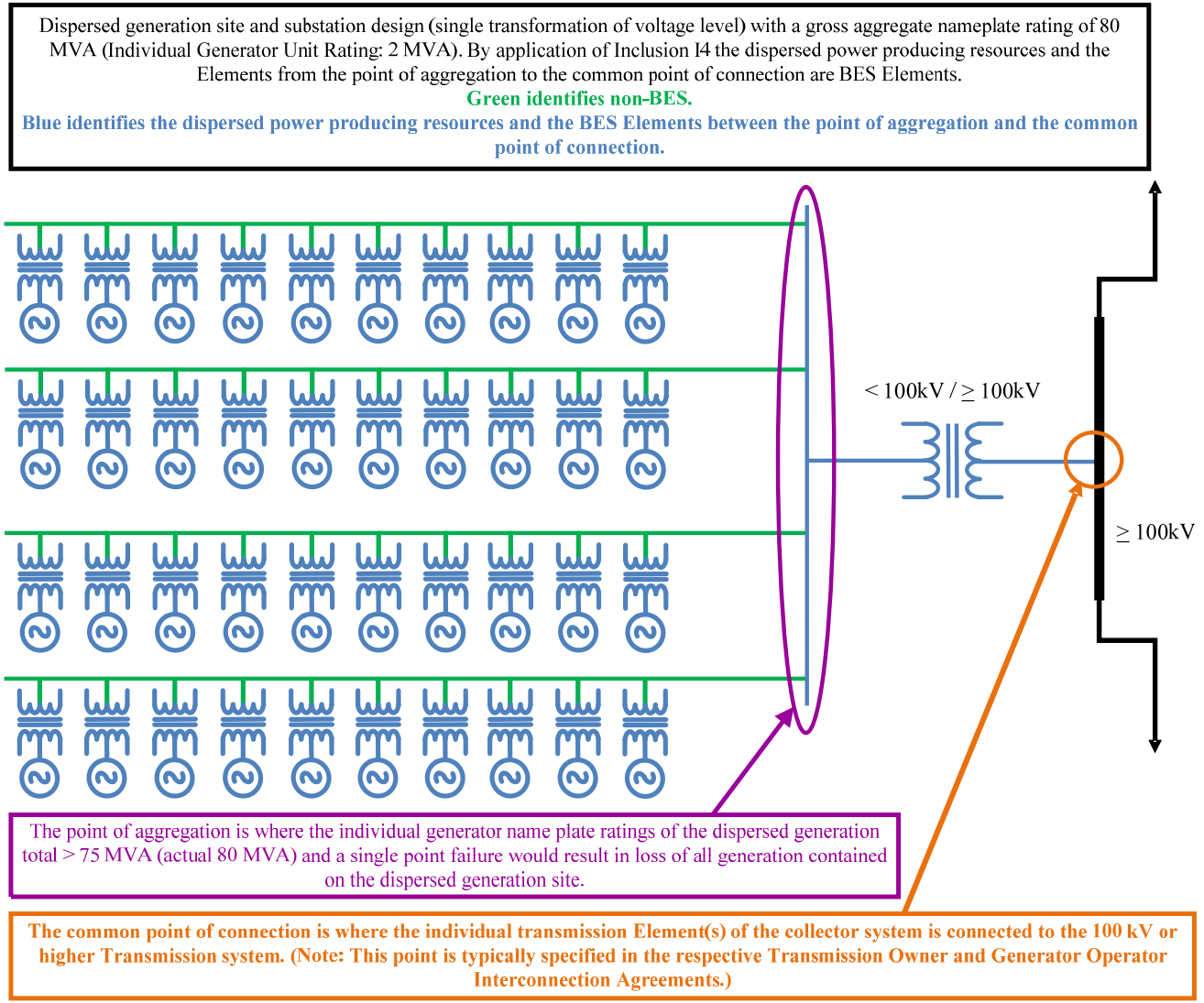


Figure I4-1: Dispersed Generation Site (Single Voltage Transformation) – Wind Farm

Figure I4-2 depicts a dispersed generation site and substation design with unknown collector system configuration.

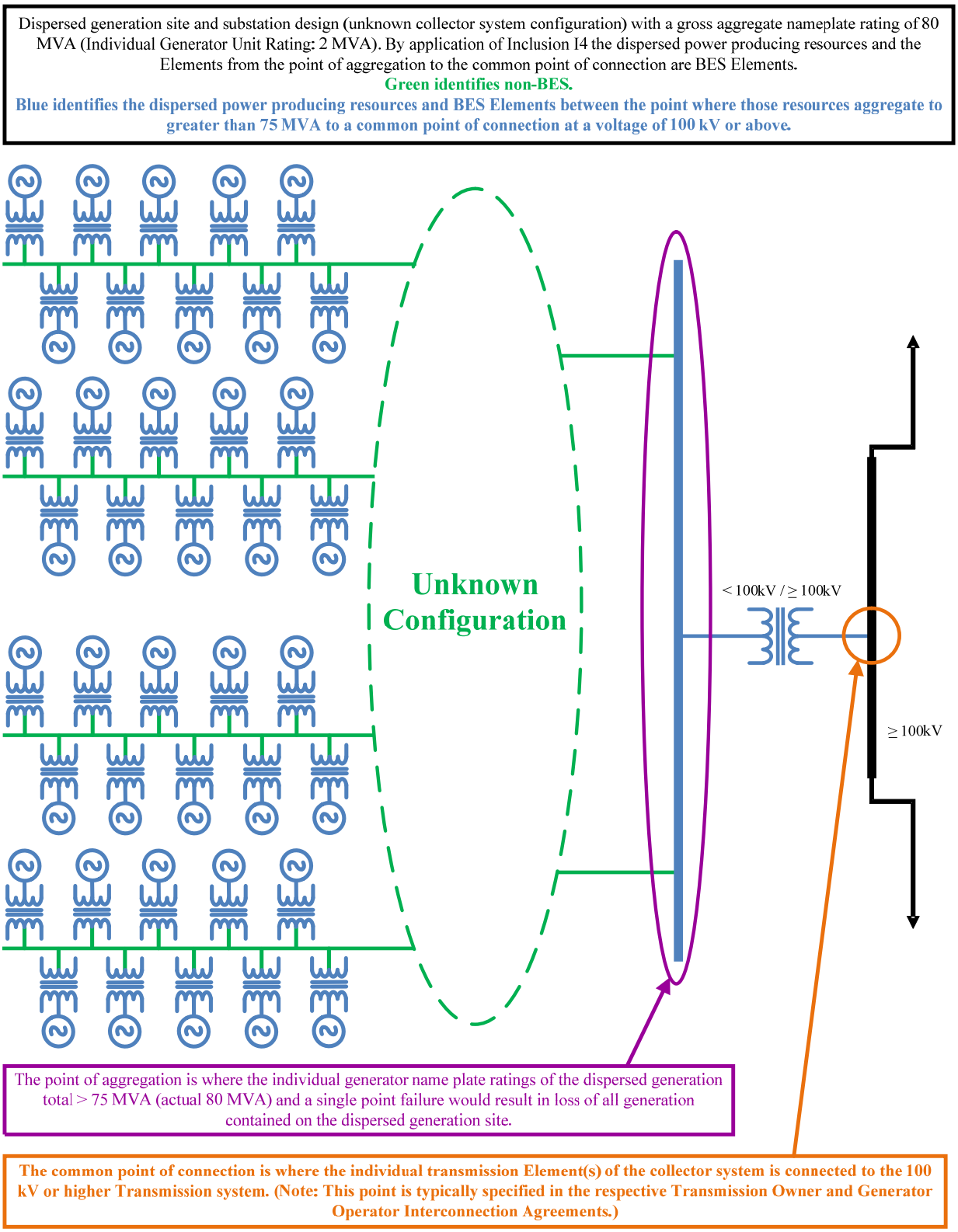


Figure I4-2: Dispersed Generation Site (Unknown Collector System Configuration) – Wind Farm

Figure I4-3 depicts a dispersed generation site and substation design with a single transformation of voltage.

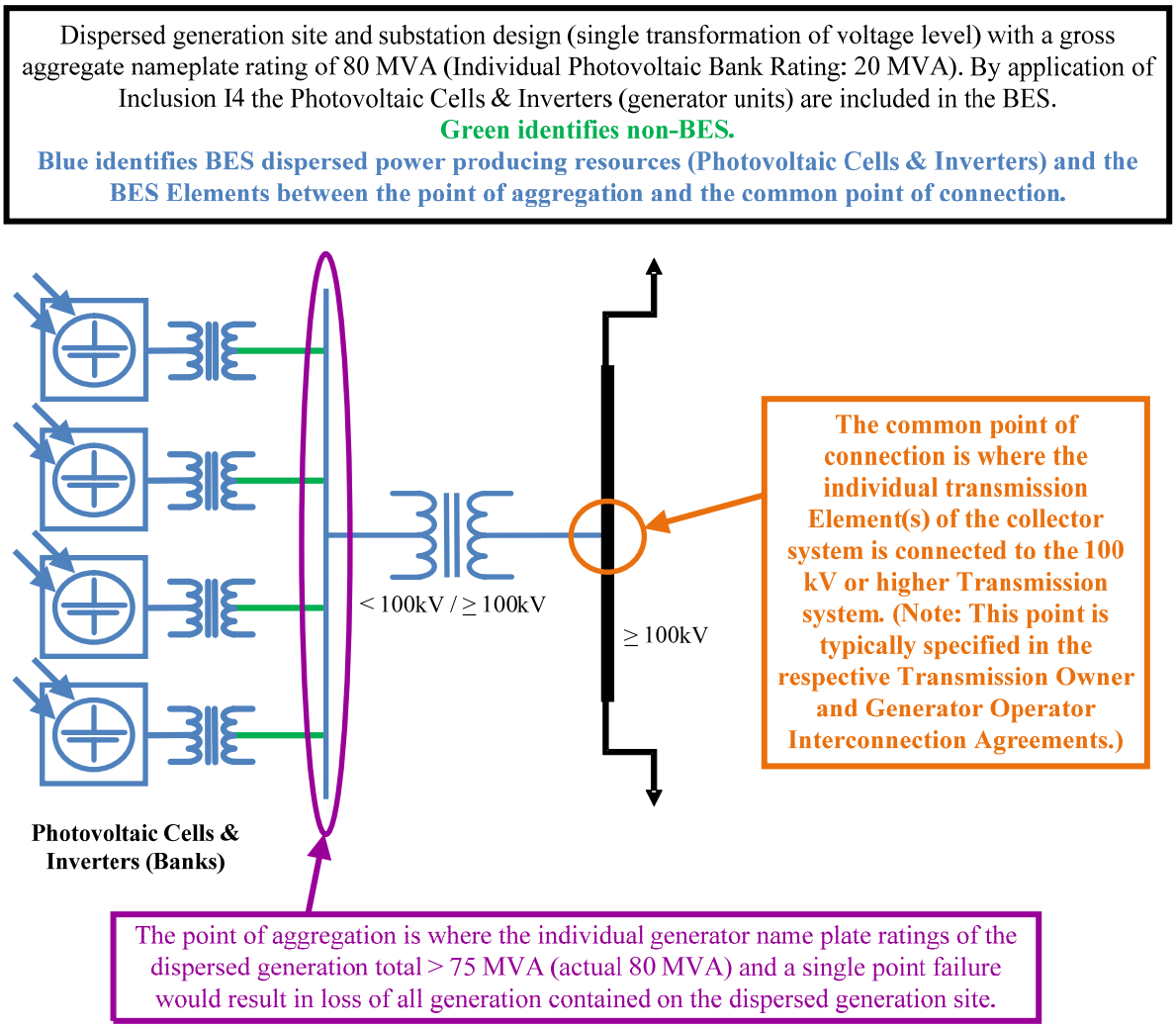


Figure I4-3: Dispersed Generation Site (Single Voltage Transformation) – Solar Array

Figure I4-4 depicts a dispersed generation site and substation design with multiple levels of voltage transformation.

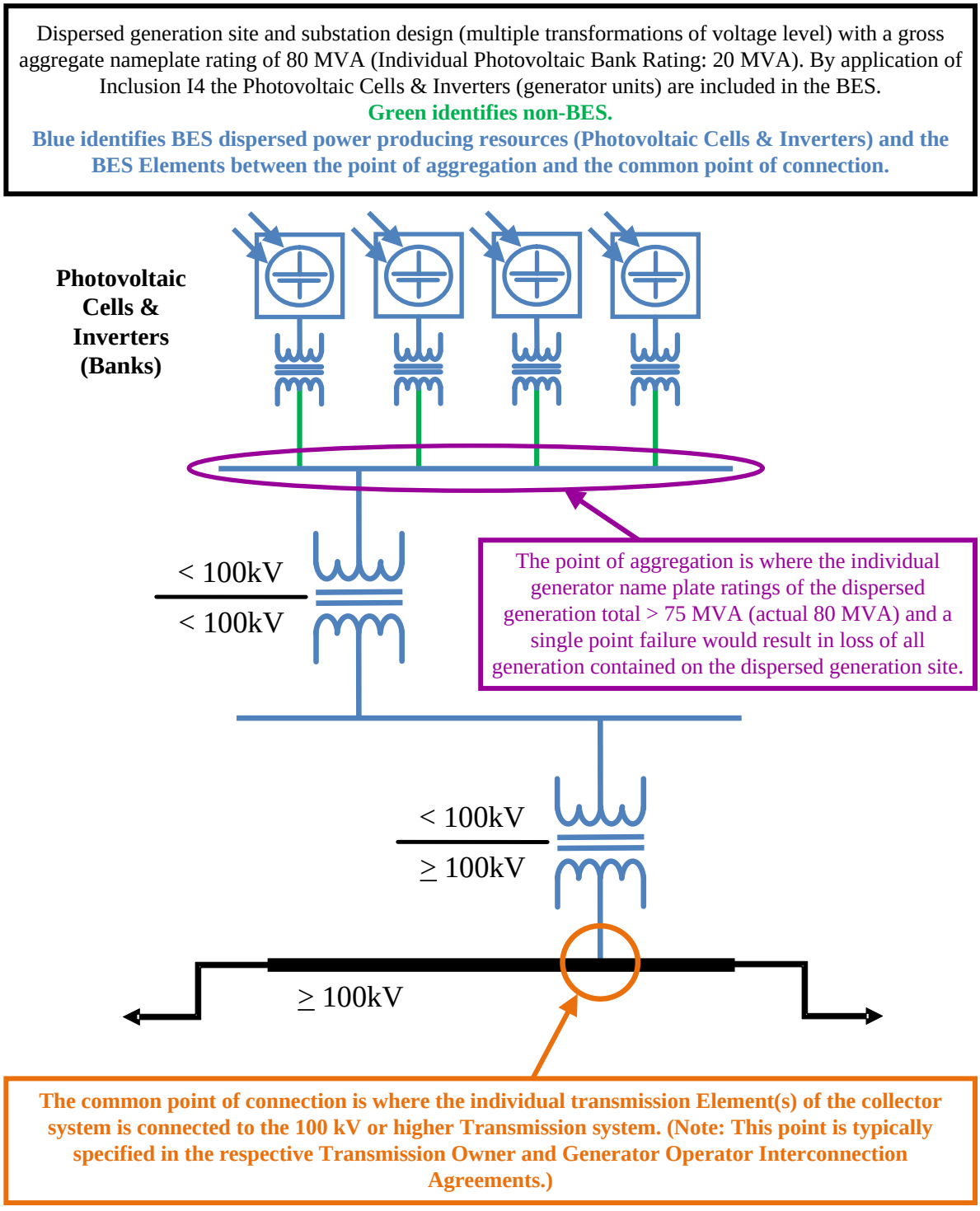


Figure I4-4: Dispersed Generation Site (Multiple Voltage Transformations) – Solar Array

II.4 BES Inclusion I5

I5. Static or dynamic devices (excluding generators) dedicated to supplying or absorbing Reactive Power that are connected at 100 kV or higher, or through a dedicated transformer with a high-side voltage of 100 kV or higher, or through a transformer that is designated in Inclusion I1.

Inclusion I5 identifies static or dynamic devices connected via any of the methods identified by the qualifiers regardless of the amount of Reactive Power output/input. It is important to note Inclusion I5 identifies only those static or dynamic "devices" to be included by meeting the qualifying connection criteria, and does not include any of the associating qualifiers (i.e., associated dedicated transformers). In the following examples, several reactive resources (electrically depicted as capacitors) are identified with various connection methods.

Note: Figure I5-1 depicts the application of Inclusion I5 and is intended to assist the user during the full application of the BES definition.

Figure I5-1 depicts several different methods of connecting reactive resources typically utilized in the electric utility industry

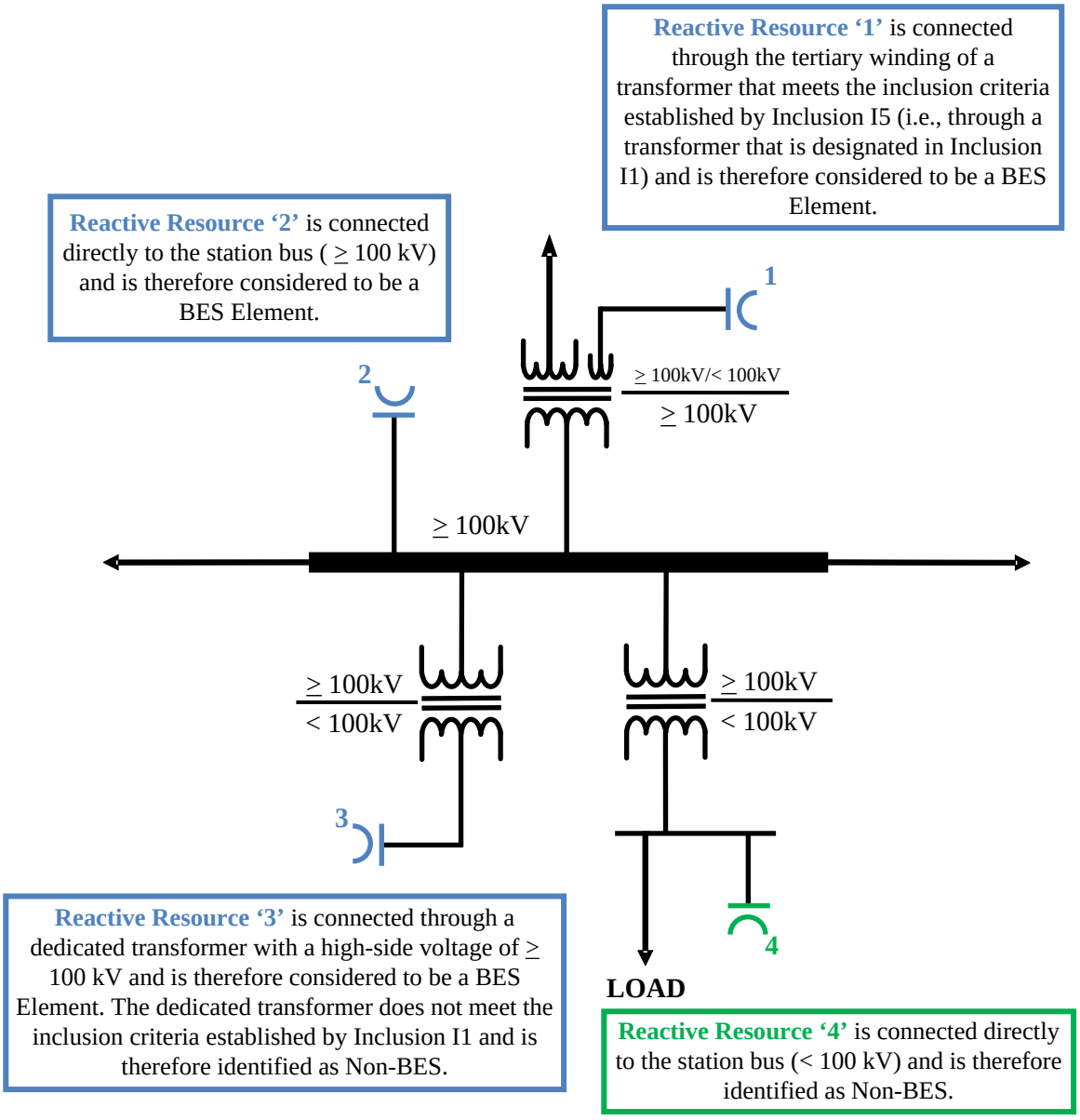


Figure I5-1: Reactive Resources (BES & non-BES)

III. Exclusions

Each exclusion, with the exception of Exclusion E4, is shown below with both text and diagrams explaining how to apply the BES definition for the specific configuration shown. These examples are not to be considered all-inclusive, and simply reflect the professional opinion of the DBES SDT and are provided in good faith for illustrative purposes only. This document is not an official position of NERC and will not be binding on enforcement decisions of the NERC Compliance Program.

The section on Exclusion E4 does not include diagrams, as there are no application configuration issues associated with it.

Diagrams only show application of the definition to the specific Element in question, as previously explained.

Key to diagram color coding:

- **Blue** indicates that an Element is included in the BES.
- **Green** indicates that an Element is not included in the BES.
- **Orange** indicates 'points of connection'.
- **Black** indicates Elements that are not evaluated for the specific exclusion depicted in the individual diagrams being shown.

III.1 BES Exclusion E1

E1. Radial systems: A group of contiguous transmission Elements that emanates from a single point of connection of 100 kV or higher and:

a.) Only serves Load. Or,

b.) Only includes generation resources, not identified in Inclusions I2, I3, or I4, with an aggregate capacity less than or equal to 75 MVA (gross nameplate rating). Or,

c.) Where the radial system serves Load and includes generation resources, not identified in Inclusions I2, I3, or I4, with an aggregate capacity of non-retail generation less than or equal to 75 MVA (gross nameplate rating).

Note 1 - A normally open switching device between radial systems, as depicted on prints or one-line diagrams for example, does not affect this exclusion.

Note 2 – The presence of a contiguous loop, operated at a voltage level of 50 kV or less, between configurations being considered as radial systems, does not affect this exclusion.

Single point of connection

The "single point of connection of 100 kV or higher" is where the radial system will begin if it meets the criteria of Exclusion E1, including parts a, b, or c. For example, the start of the radial system may be a hard tap of the Transmission line, or could be the tap point within a ring or breaker and a half bus configuration.

The connection to the radial system must be from only one point at 100 kV or higher. Any group of contiguous transmission Elements that have multiple connections at 100 kV or higher do not qualify for Exclusion E1.

Normally open switching devices between radial systems, will not disqualify a radial system from this exclusion.

Commission (FERC) Order No. 773 directed implementation of the revised BES Definition to take into account the impact of sub-100 kV looped Facilities regardless of voltage level altering previous guidance on the evaluation of radial systems. This meant that if there was a connection at the sub-100 kV level between two systems that would previously have been considered as radial, said systems could not be evaluated for possible radial system exclusion. However, the drafting team developed a technical justification establishing 50 kV as a threshold value for sub-100 kV looped facilities. If the sub-100 kV loop is 50 kV or less, it was shown that it would not have an impact on the BES and thus an entity could still apply Exclusion E1 to the configuration. If the loop in question was greater than 50 kV, then an entity could not consider the systems as radial and would need to evaluate them under the criteria of Exclusion E3 if seeking to exclude the Facilities from the BES.

The evaluation of sub-100 kV loops associated with the evaluation of Elements under the E1 exclusion is used as a "qualifier" for the potential exclusion of the Elements that operate at or above 100 kV.

- Failure to not meet the "bright-line" criteria established by Exclusion E1 does not result in the inclusion of the sub-100 kV loops in the BES.

- Order No. 773, paragraph 155 states:
  "Thus, the Commission, while disagreeing with NERC's interpretation, does not propose to include the below 100 kV elements in figure 3 in the bulk electric system, unless determined otherwise in the exception process."

- Order No. 773-A, paragraph 36 states:
  "Moreover, as noted in the Final Rule, the sub-100 kV elements comprising radial systems and local networks will not be included in the bulk electric system, unless determined otherwise in the exception process."

Evaluation of single points of connection within radial systems under consideration

If the radial system being evaluated for exclusion emanates from a single point of connection of 100 kV or higher but does not meet the criteria established in Exclusion E1, including parts a, b, or c, then the radial system does not qualify for exclusion from the BES as a radial system described in Exclusion E1 and its parts. However, further evaluation of the underlying Elements within the original radial system may be appropriate. Underlying radial systems, which emanate from a single point of connection of 100 kV or higher, may qualify for exclusion as radial systems of contiguous transmission Elements within the original area of consideration if the criterion established in Exclusion E1, including parts a, b, or c, is met for these Facilities. Such evaluations are not shown in the figures in this section which concentrate on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

"transmission Element"

The word transmission is not capitalized and is used as a qualifier to the word Element and is meant to differentiate between the types of Elements that are identified in the NERC Glossary of Terms Used in NERC Reliability Standards definition of Element.

Element (NERC Glossary of Terms):

> "Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An element may be comprised of one or more components."

The use of the words: "a group of contiguous transmission Elements," means Elements at 100 kV or higher that are connected in a contiguous manner. This group of contiguous transmission Elements serves the radial system but does not include the Elements that are operated below 100 kV.

Non-retail Generation

Non-retail generation is any generation that is not behind a retail customer's meter. The radial system is limited to less than 75 MVA of non-retail generation.

Retail generation is behind the meter generation with all or some of the generation serving Load. The NERC Glossary of Terms Used in NERC Reliability Standards defines Load as "an end-use device or customer that receives power from the electric system".

For retail generation meeting the criteria established by Exclusion E2, the retail generation not consumed on site can flow to the BES provided the net capacity to the BES does not exceed 75 MVA.

The MVA nameplate rating of retail generation can affect the ability of an entity to utilize Exclusion E1 (See E1.b).

Reactive Resources

Exclusion E1 provides for the exclusion of 'transmission Elements' from radial systems that meet the specific criteria identified in the exclusion language. This does not allow for the exclusion of Reactive Power resources captured by Inclusion I5. Exclusion E1 only speaks to the transmission component of the radial system.

Generation Limits

There are two conditions under which generation resources can prevent a radial system from qualifying for Exclusion E1:

1. Any generation within the radial system in question is identified in Inclusion I2, I3, or I4; or
2. The aggregate nameplate capacity of the non-retail generation capacity within the radial system in question exceeds 75 MVA.

If either of these conditions applies, the radial system does not qualify for Exclusion E1.

Exclusion E1 allows for the exclusion of contiguous transmission Elements (i.e., transformers, circuit breakers, bus sections, Transmission lines, etc.) emanating from a single point of connection at a voltage of 100 kV or higher.

Note: Figures E1-1 through E1-20 are depictions of the application of Exclusion E1, and are intended to assist the user during the full application of the BES definition.

E1.a–Serves Load Only

Figure E1-1 depicts a radial system that contains only Load. There is no limit to the amount of Load within the radial system.

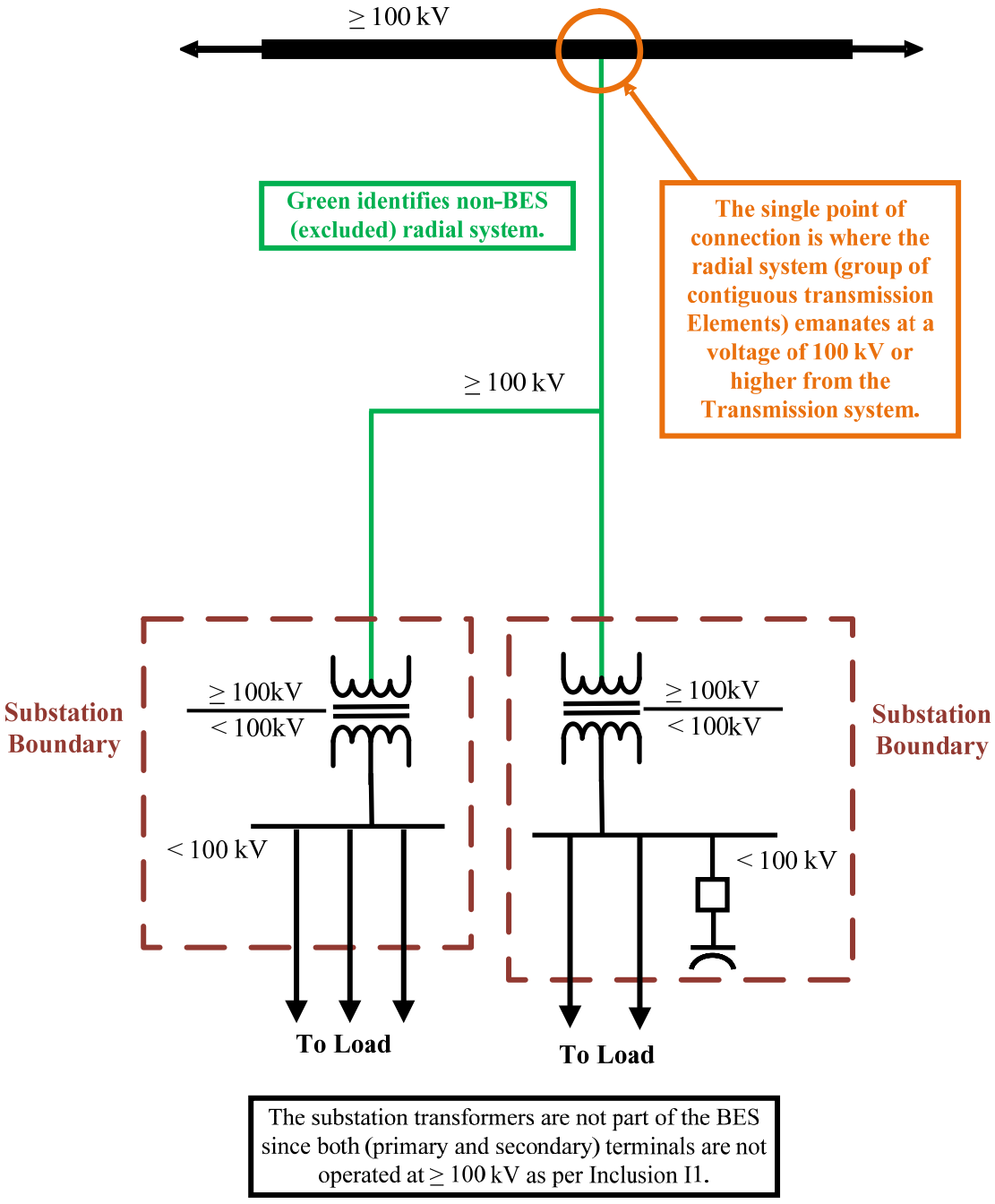


Figure E1-1: Radial System: Serving Only Load

Figure E1-2 depicts a configuration that contains two separate radial systems due to the underlying loop operating at a voltage of ≤ 50 kV.

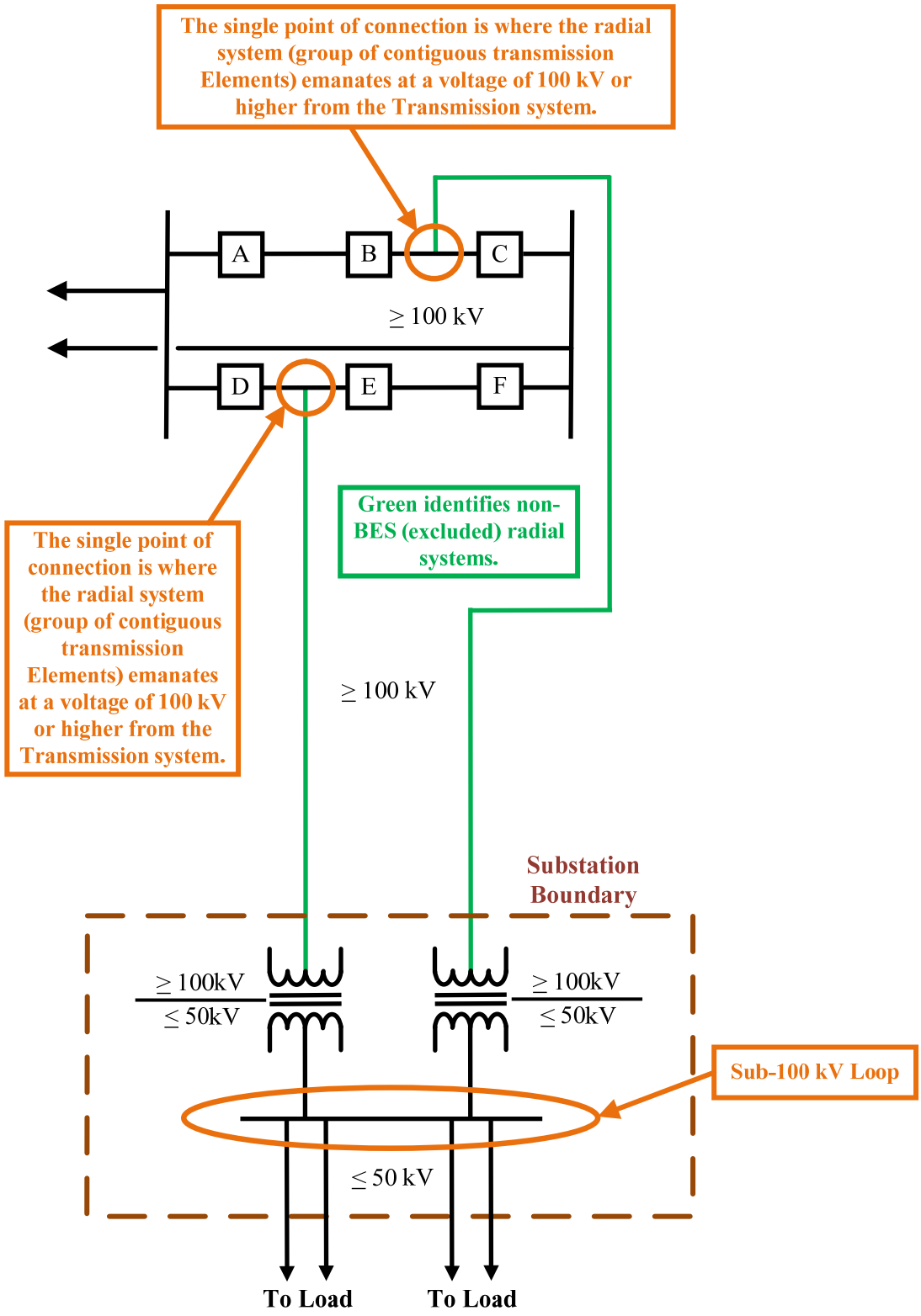


Figure E1-2: Multiple Radial Systems (Underlying Loop Facilities ≤ 50 kV)

Figure E1-3 depicts a configuration that contains a sub-100 kV loop (greater than 50 kV), thus requiring evaluation based on the criteria established in Exclusion E3 (See diagram E3-4).

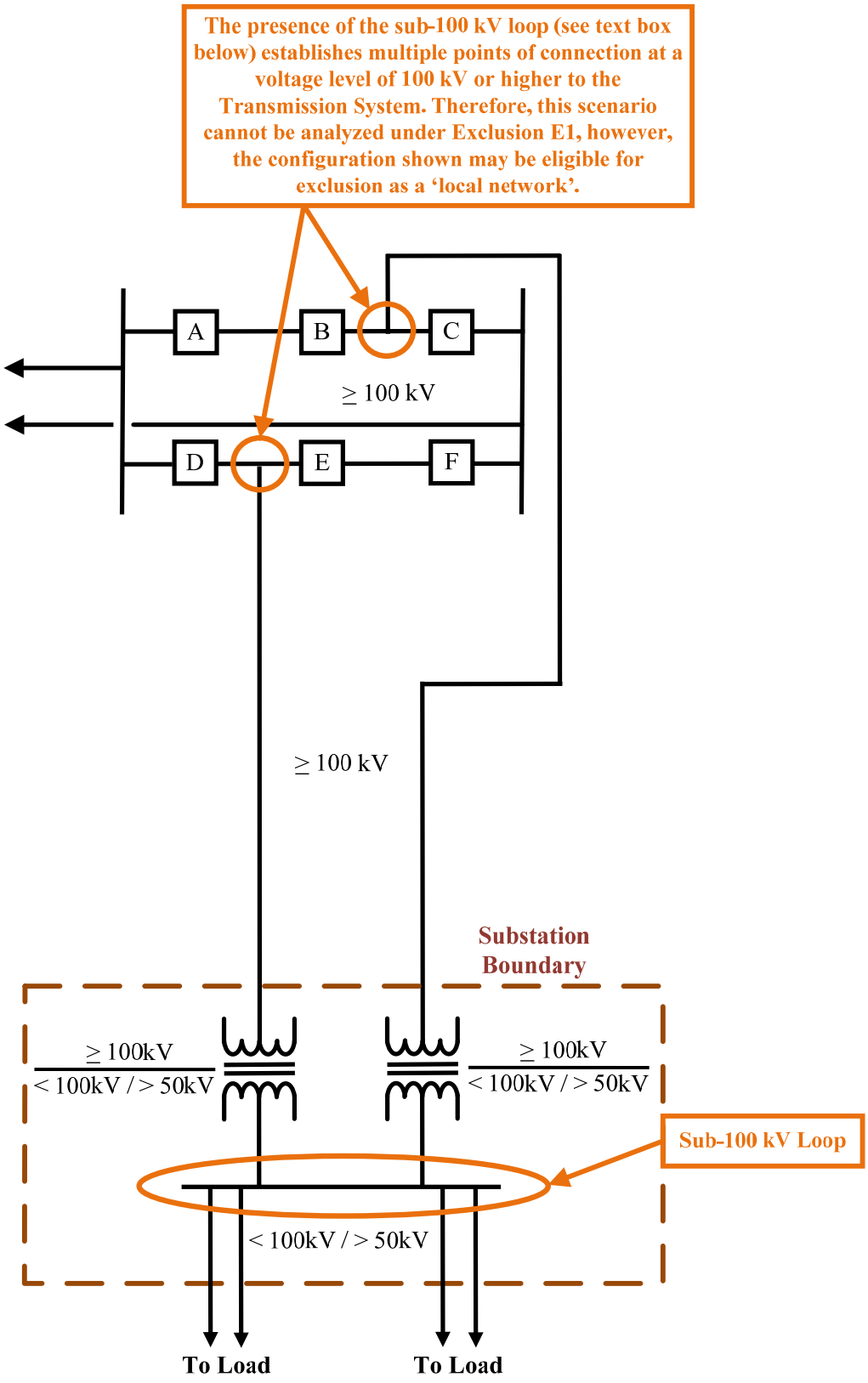


Figure E1-3: Impact of Sub-100 kV Looped Facilities

E1.b–Generation Only

Figure E1-4 depicts a radial system with a single generation resource (non-retail) and no Load.

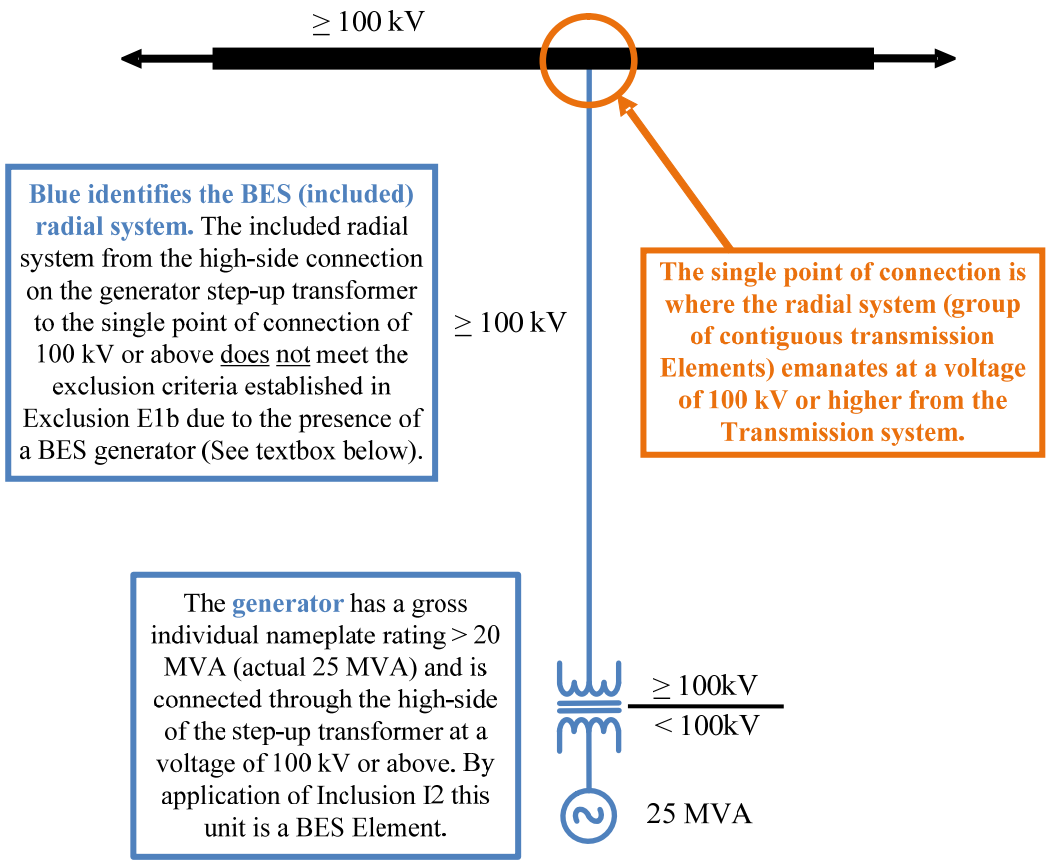


Figure E1-4: Radial System: Single BES Generation Resource

Figure E1-5 depicts a radial system with a single generation resource (non-retail) and no Load.

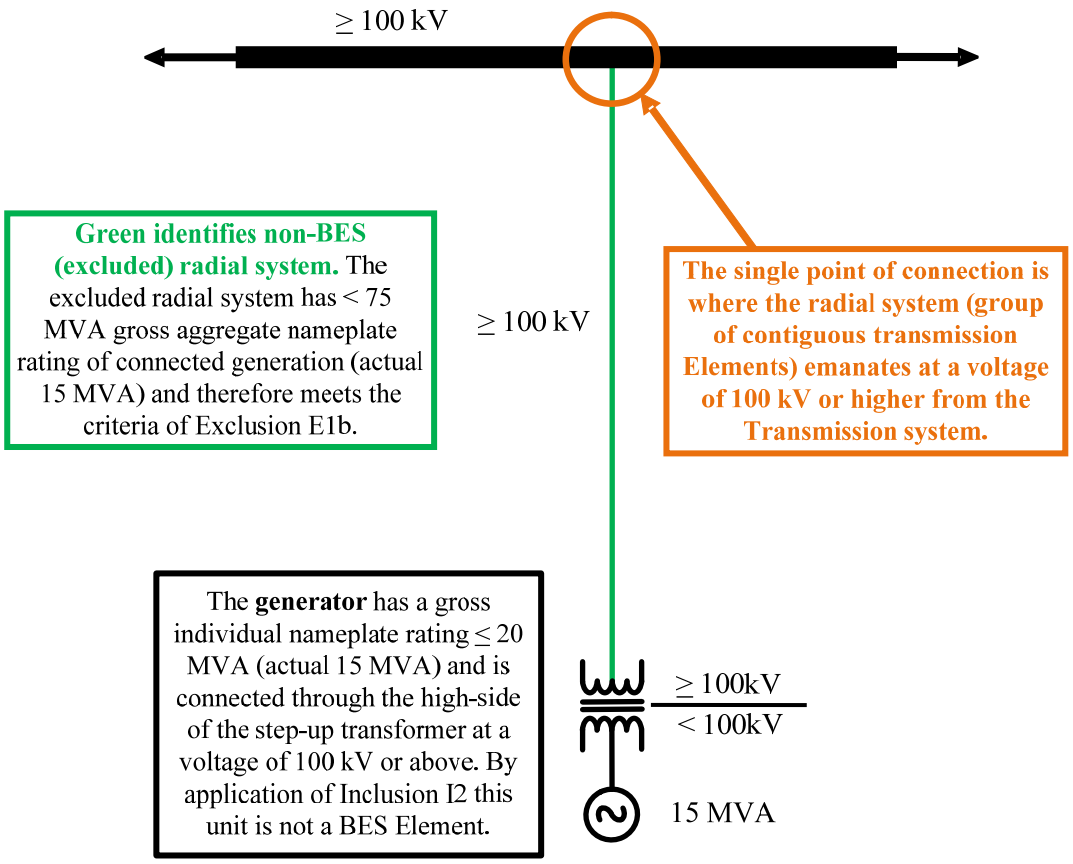


Figure E1-5: Radial System: Single non-BES Generation Resource

Figure E1-6 depicts a radial system with a Blackstart Resource, and no Load. The Radial System does not meet the exclusion criteria of E1.b due to the presence of the Blackstart Resource.

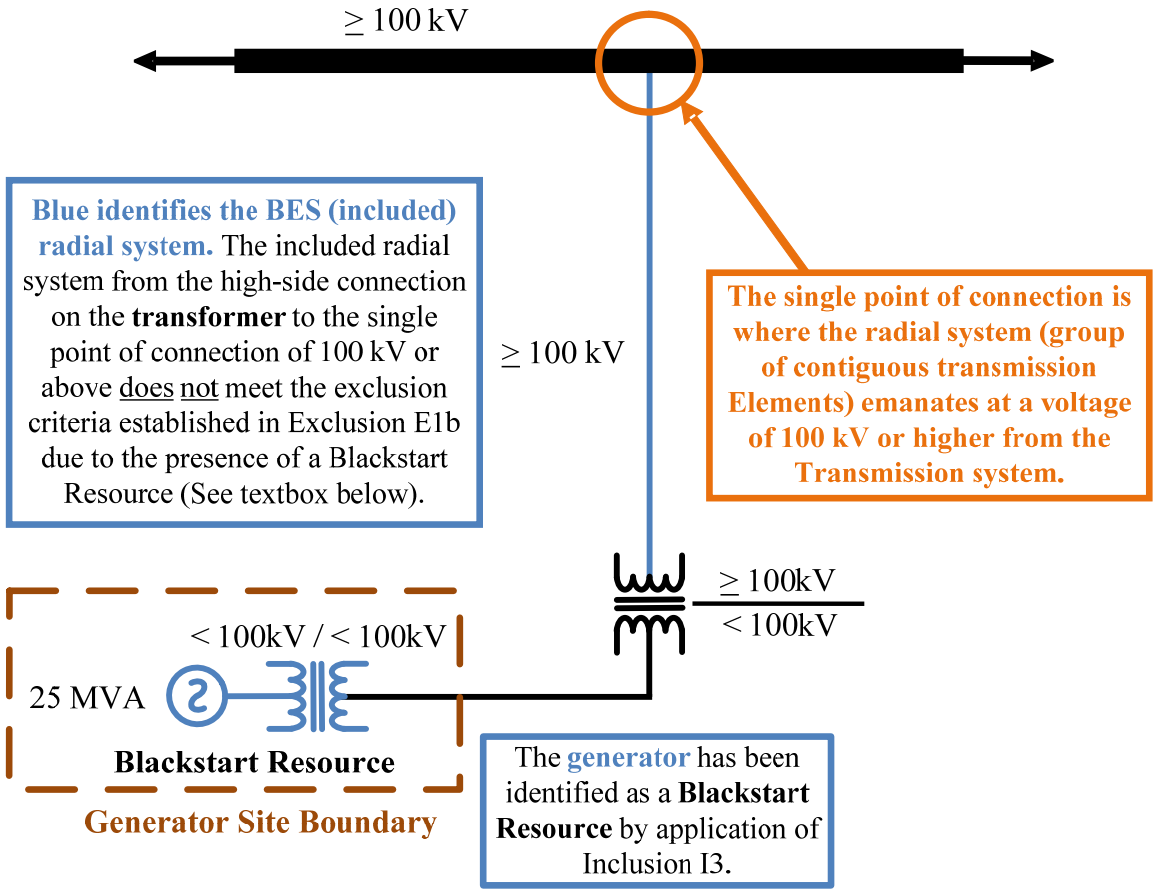


Figure E1-6: Radial System: Blackstart Resource

Figure E1-7 depicts a radial system with multiple generation resources (non-retail) and no Load. Since the area under consideration does not meet the criteria established by Exclusion E1.b, further evaluation of the underlying Elements may be appropriate. Each underlying Element must meet the criteria established by Exclusion E1, including parts a, b, or c, to qualify for exclusion from the BES. Such evaluations are not shown in Figure E1-6, which concentrates on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

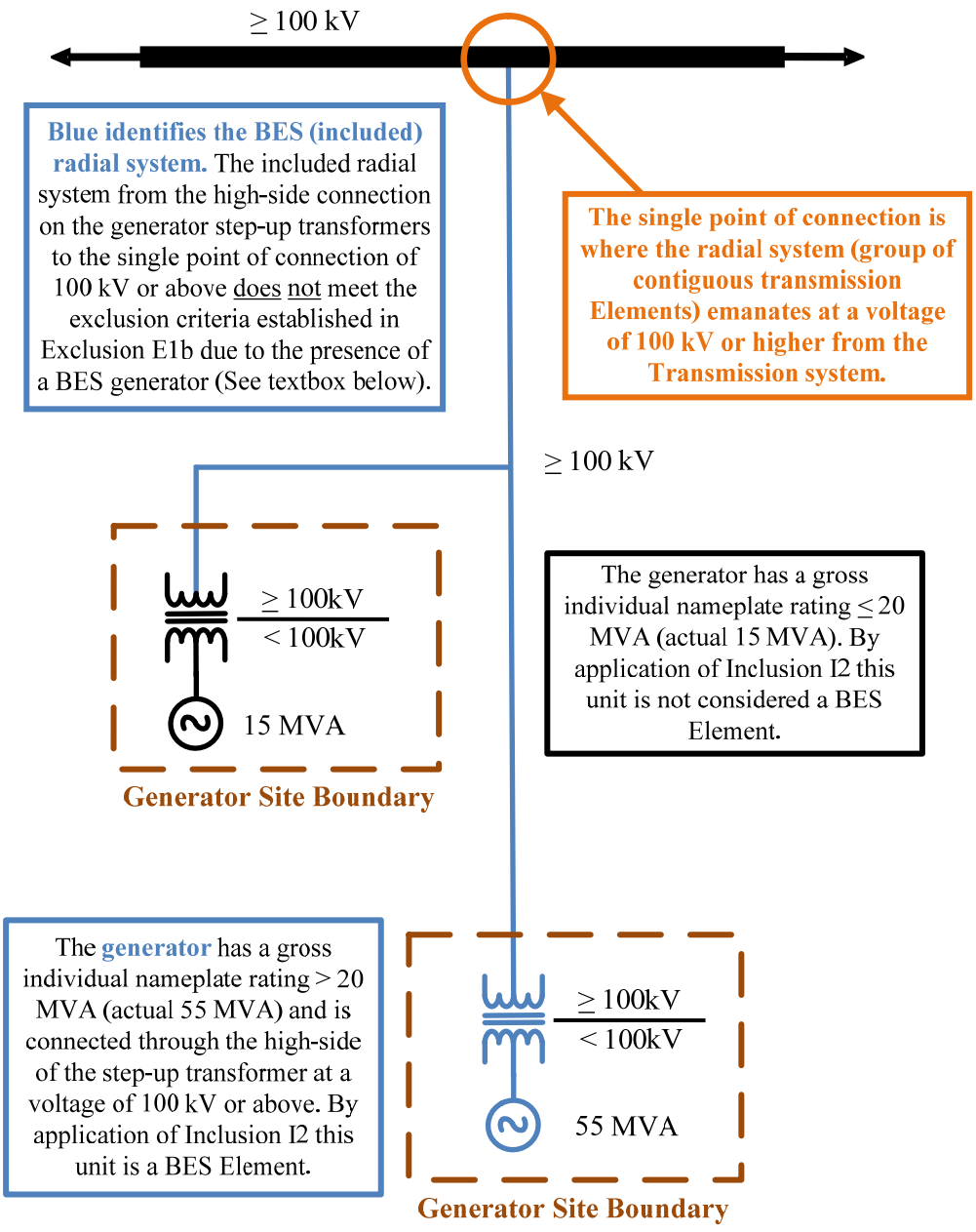


Figure E1-7: Radial System: Multiple (BES & non-BES) Generation Resources (Non-Retail)

Figure E1-8 depicts a radial system with multiple generation resources and no Load. The aggregate gross nameplate values of the generation resources exceed the 75 MVA threshold established by Exclusion E1.b. Since the area under consideration does not meet the criteria established by Exclusion E1.b, further evaluation of the underlying Elements may be appropriate. Each underlying Element must meet the criteria established by Exclusion E1, including parts a, b, or c, to qualify for exclusion from the BES. Such evaluations are not shown in Figure E1-8, which concentrates on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

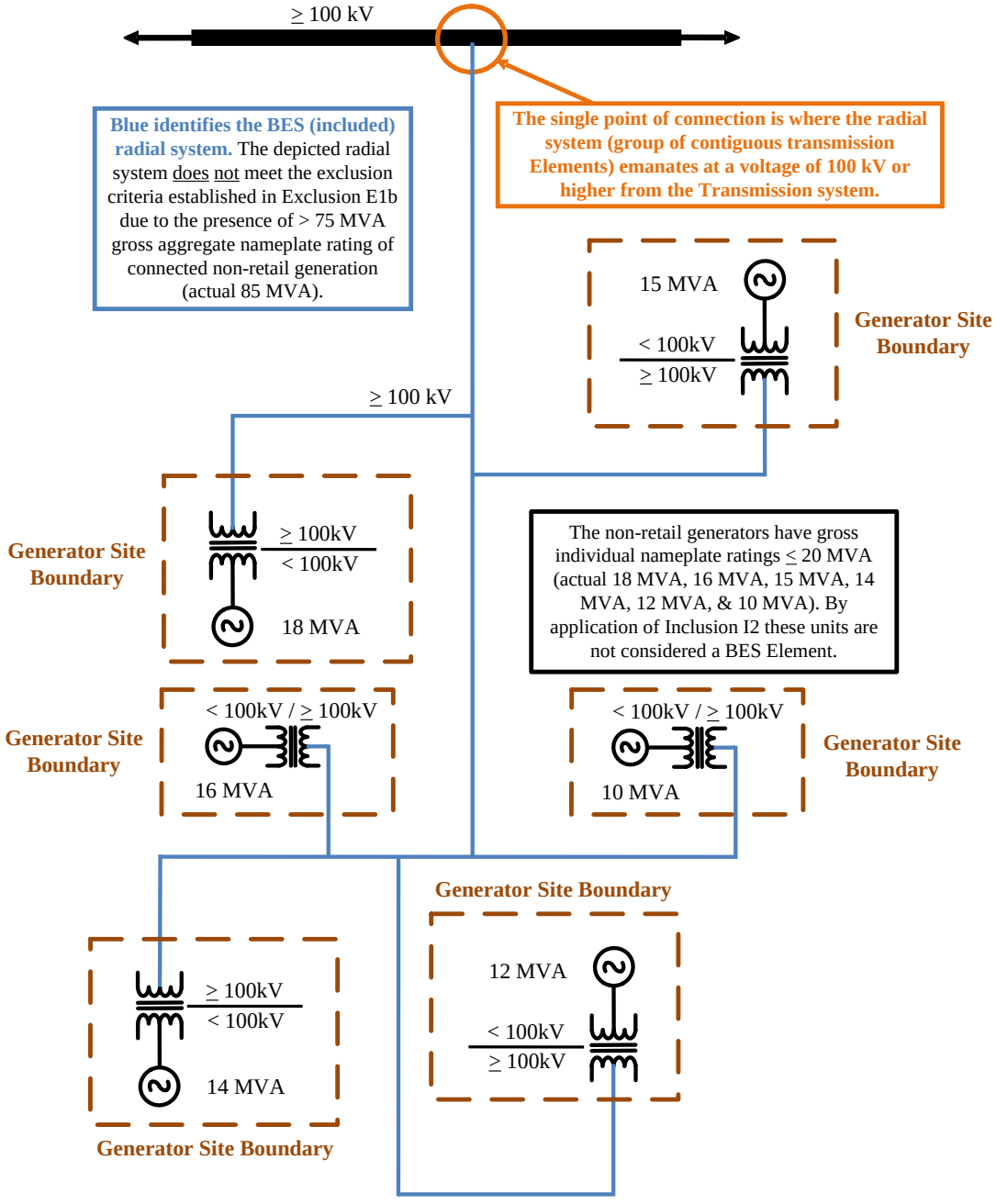


Figure E1-8: Radial System: Multiple (non-BES) Generation Resources (Non-Retail)

Figure E1-9 depicts a radial system with multiple generation resources and no Load.

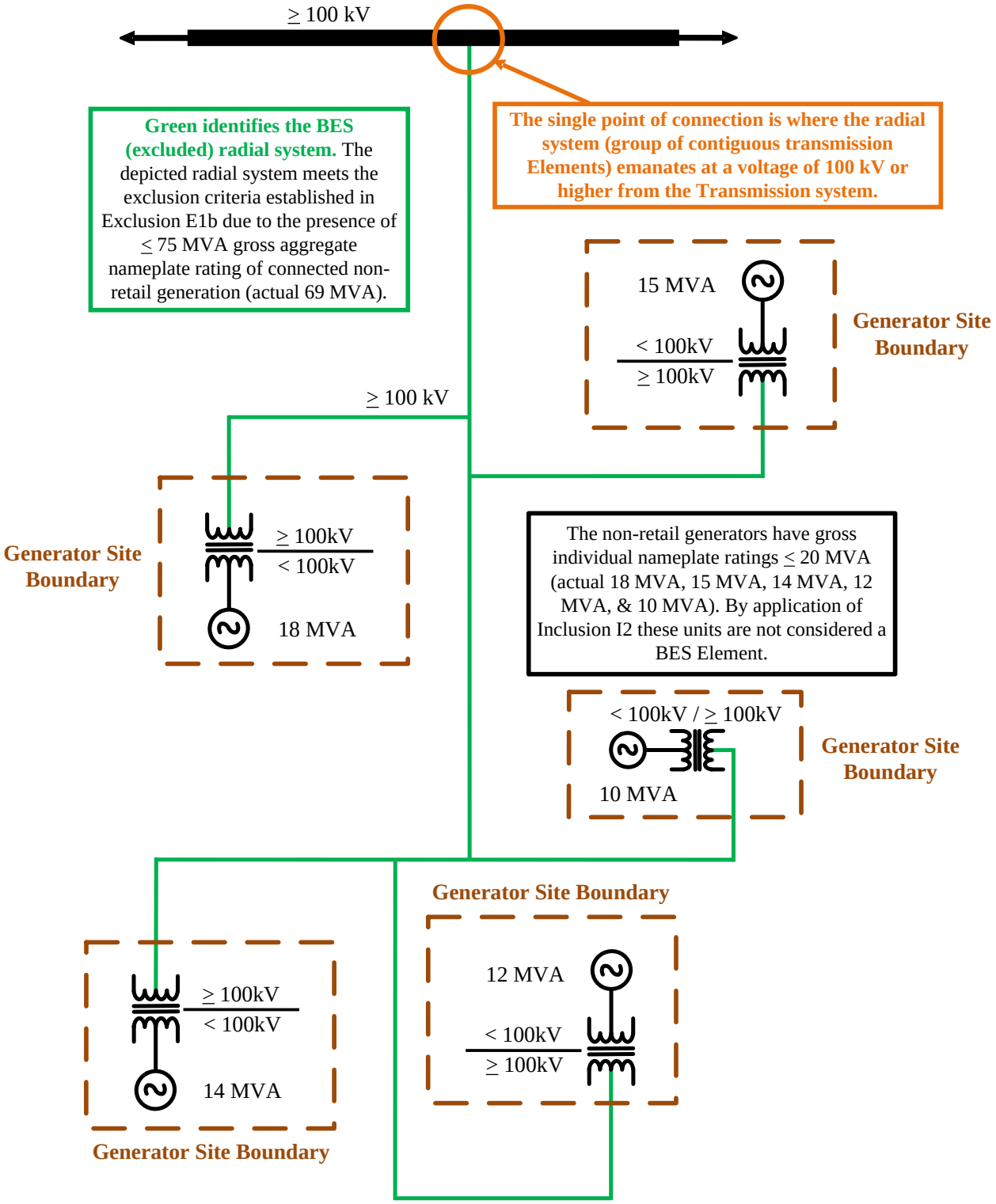


Figure E1-9: Radial System: Multiple (non-BES) Generation Resources (Non-Retail)

Figure E1-10 depicts a radial system with multiple generation resources (retail and non-retail) and no Load. The customer owned generation (retail) and associated customer owned equipment are excluded from the BES by application of Exclusion E2 and is not considered a component of the aggregated total generation within the radial system.

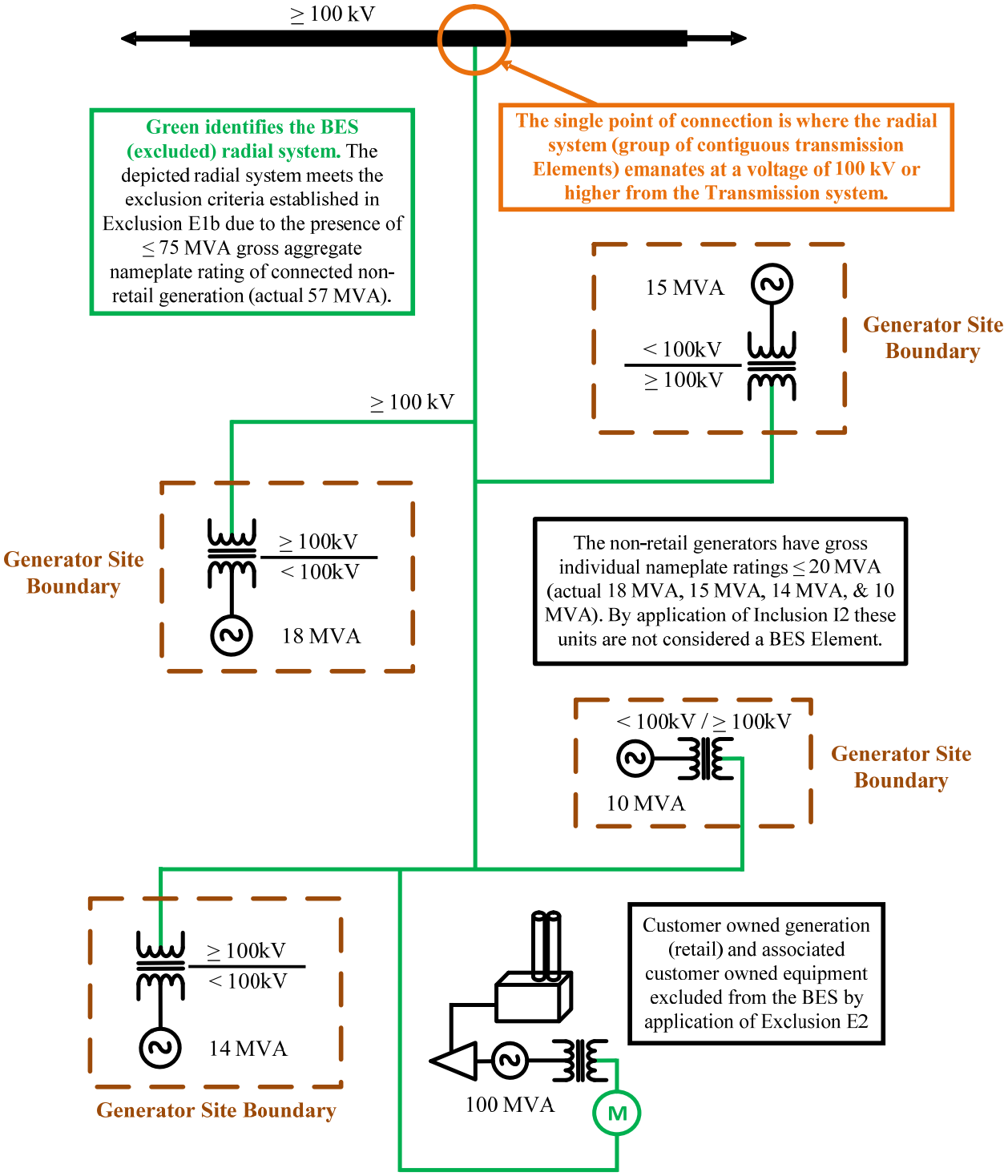


Figure E1-10: Radial System: Multiple (non-BES) Generation Resources (Retail & Non-Retail)

E1.c - Generation and Serves Load

Figure E1- 11 depicts a radial system with generation resources (non-retail) that also serves Load. Since the area under consideration does not meet the criteria established by Exclusion E1.c, further evaluation of the underlying Elements may be appropriate. Each underlying Element must meet the criteria established by Exclusion E1, including parts a, b, or c, to qualify for exclusion from the BES. Such evaluations are not shown in Figure E1-11, which concentrates on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

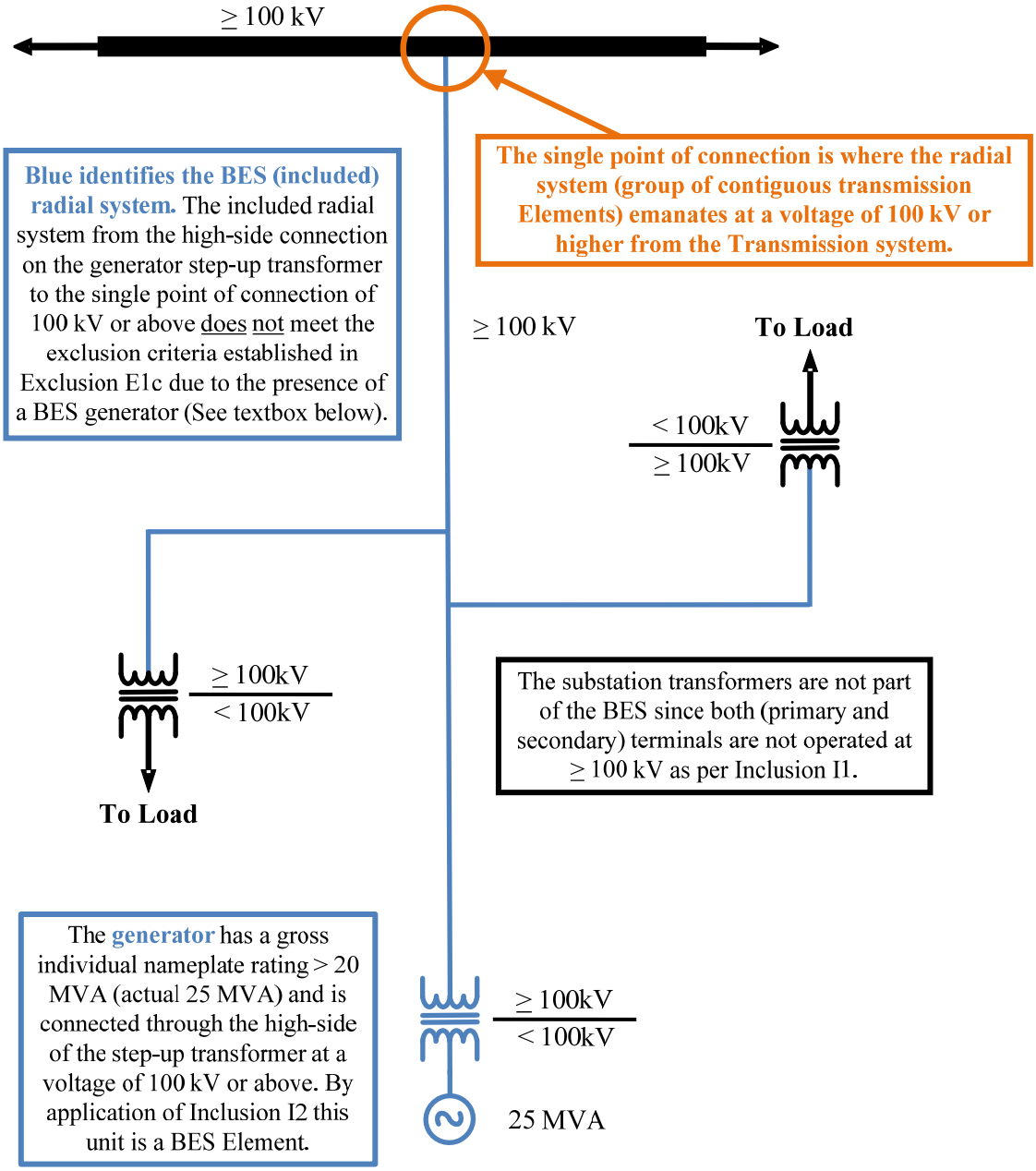


Figure E1-11: Radial System: Generation Resource (Non-Retail) & Serving Load

Figure E1- 12 depicts a radial system with generation resources (non-retail) that also serves Load.

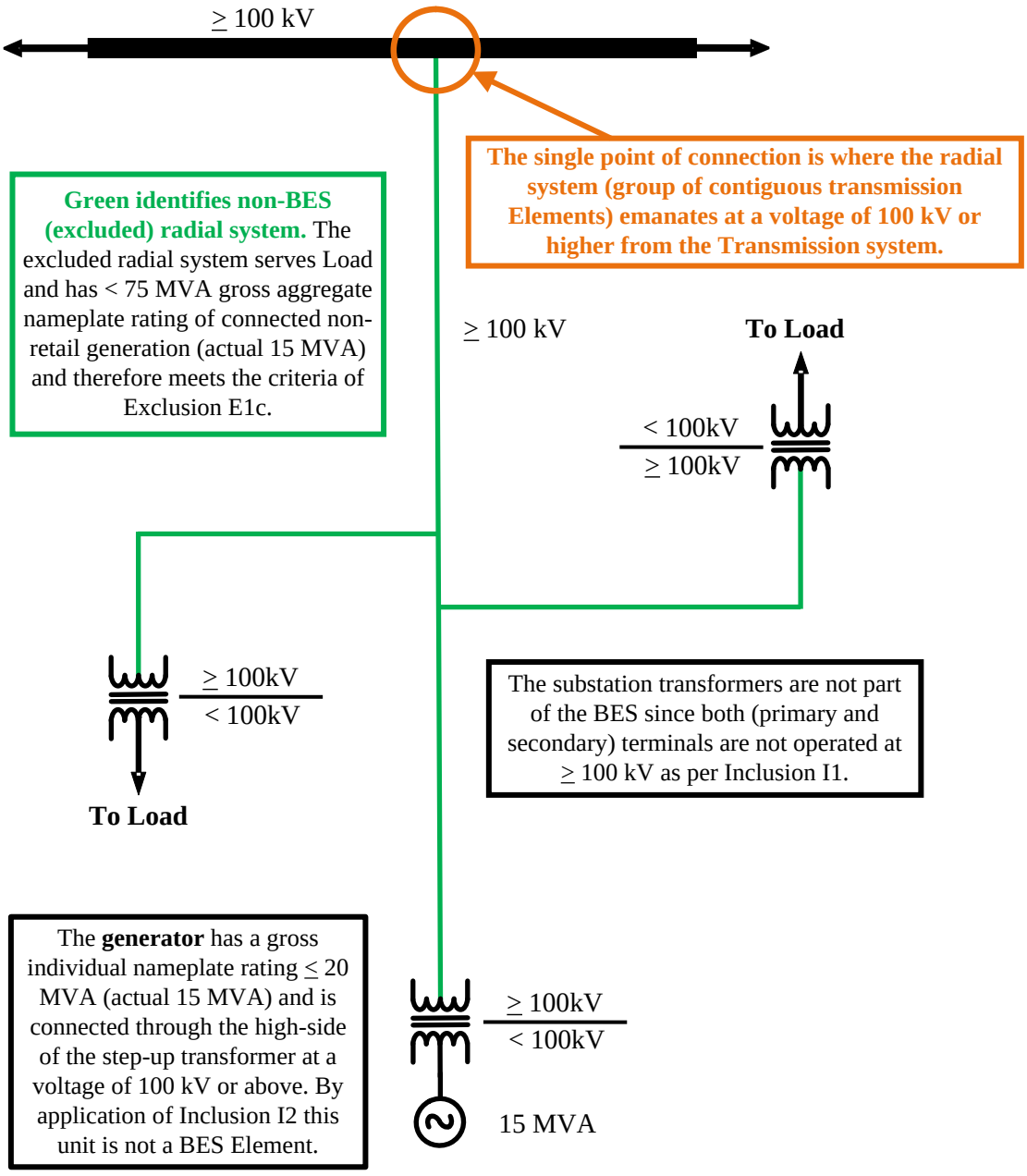


Figure E1-12: Radial System: Generation Resource (Non-Retail) & Serving Load

Figure E1- 13 depicts a radial system with generation resources (non-retail) that also serves Load. Since the area under consideration does not meet the criteria established by Exclusion E1.c, further evaluation of the underlying Elements may be appropriate. Each underlying Element must meet the criteria established by Exclusion E1, including parts a, b, or c, to qualify for exclusion from the BES. Such evaluations are not shown in Figure E1-13, which concentrates on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

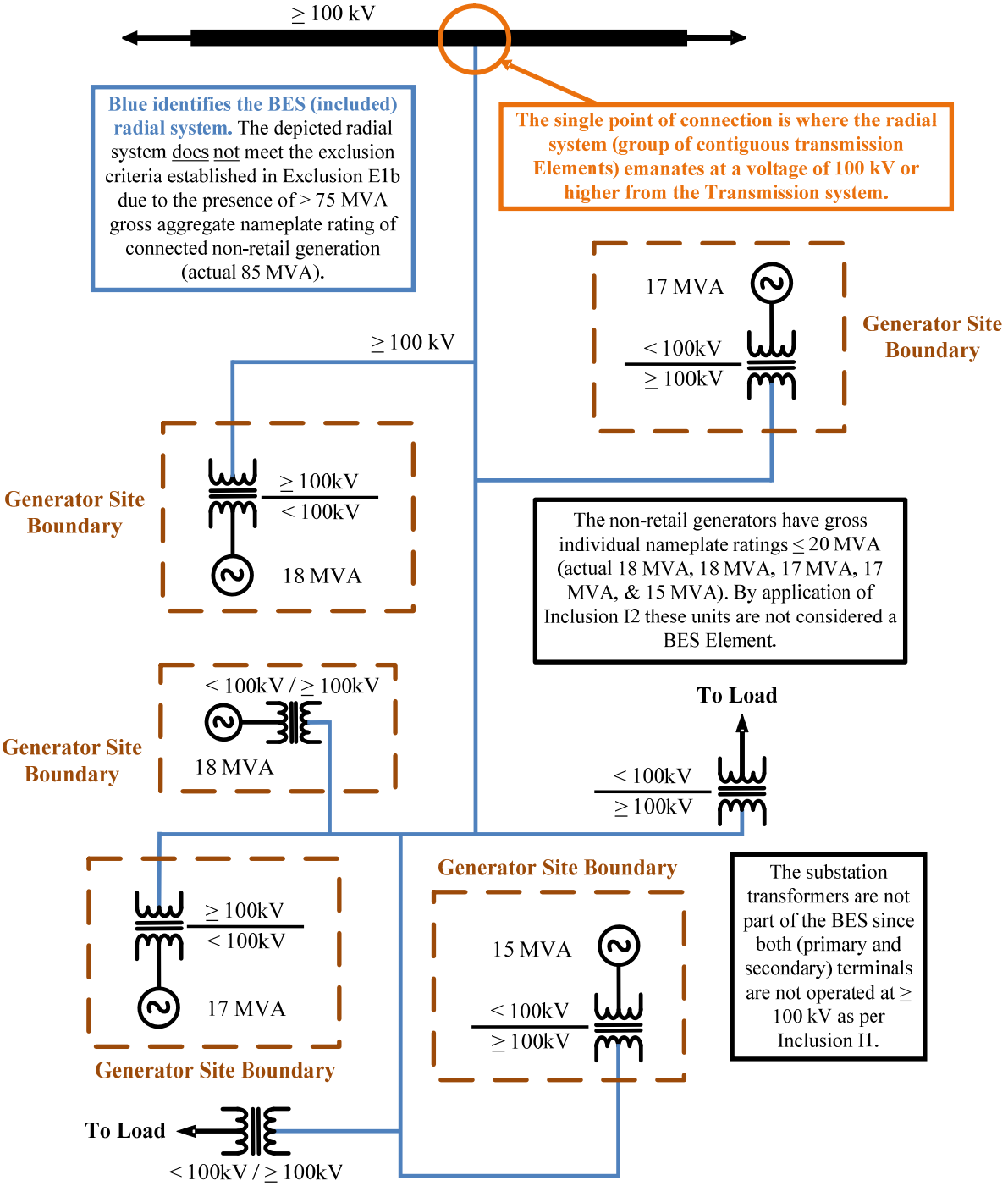


Figure E1-13: Radial System: Generation Resource (Non-Retail) & Serving Load

Figure E1- 14 depicts a radial system with generation resources (non-retail) that also serves Load.

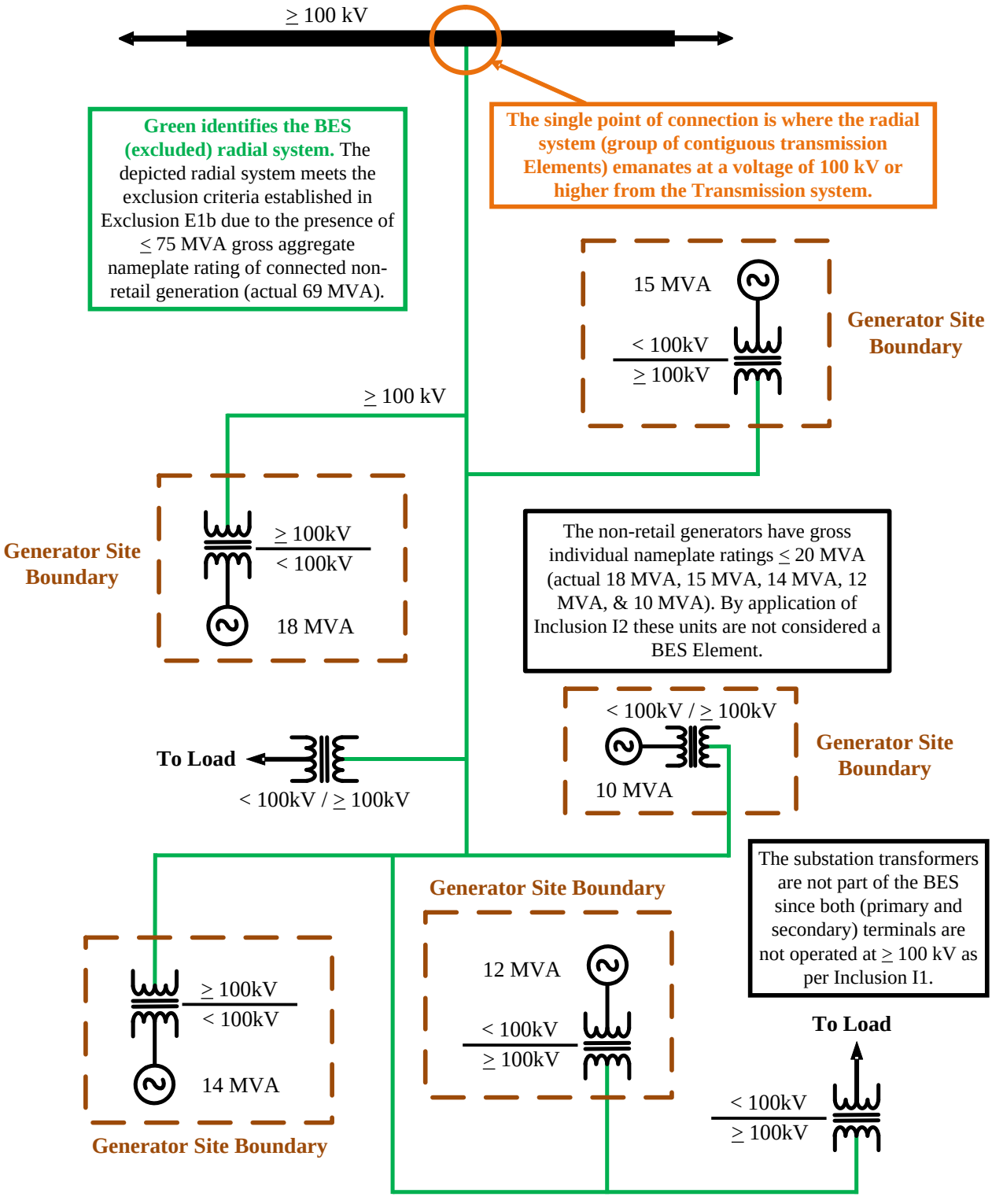


Figure E1-14: Radial System: Generation Resource (Non-Retail) & Serving Load

Figure E1- 15 depicts a radial system with generation resources (retail and non-retail) that also serves Load.

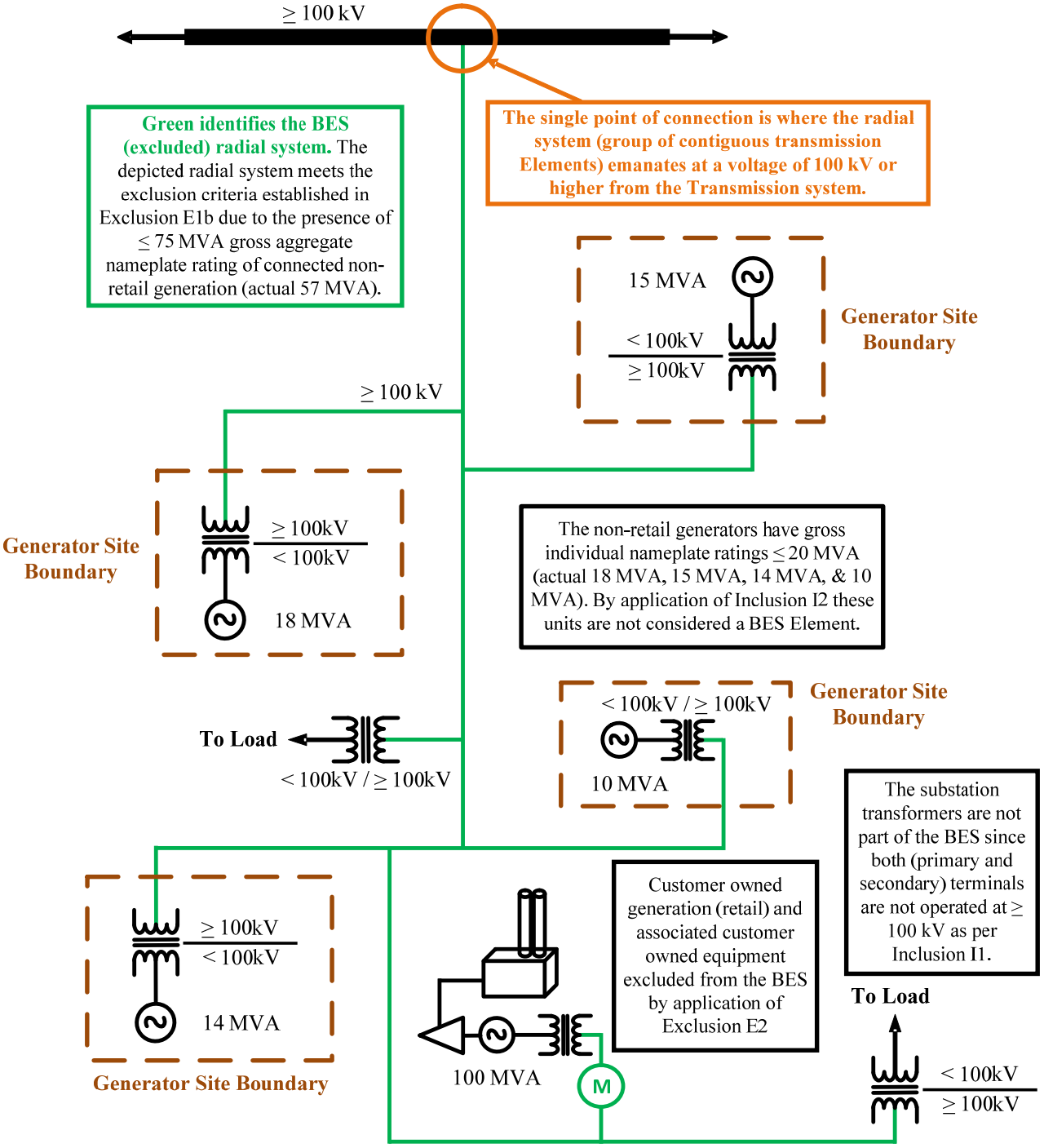


Figure E1-15: Radial System: Generation Resource (Retail & Non-Retail) & Serving Load

Normally open switching device

Radial systems should be assessed with all normally open (N.O.) devices in the open position. N.O. devices installed at any voltage level will not prevent the owner or operator from using this exclusion. The N.O. device(s) must be identified as such on prints and one-line diagrams that are used by the operating entity.

Figure E1-16 depicts multiple radial systems separated by a N.O. switching device operated at 100 kV or above.

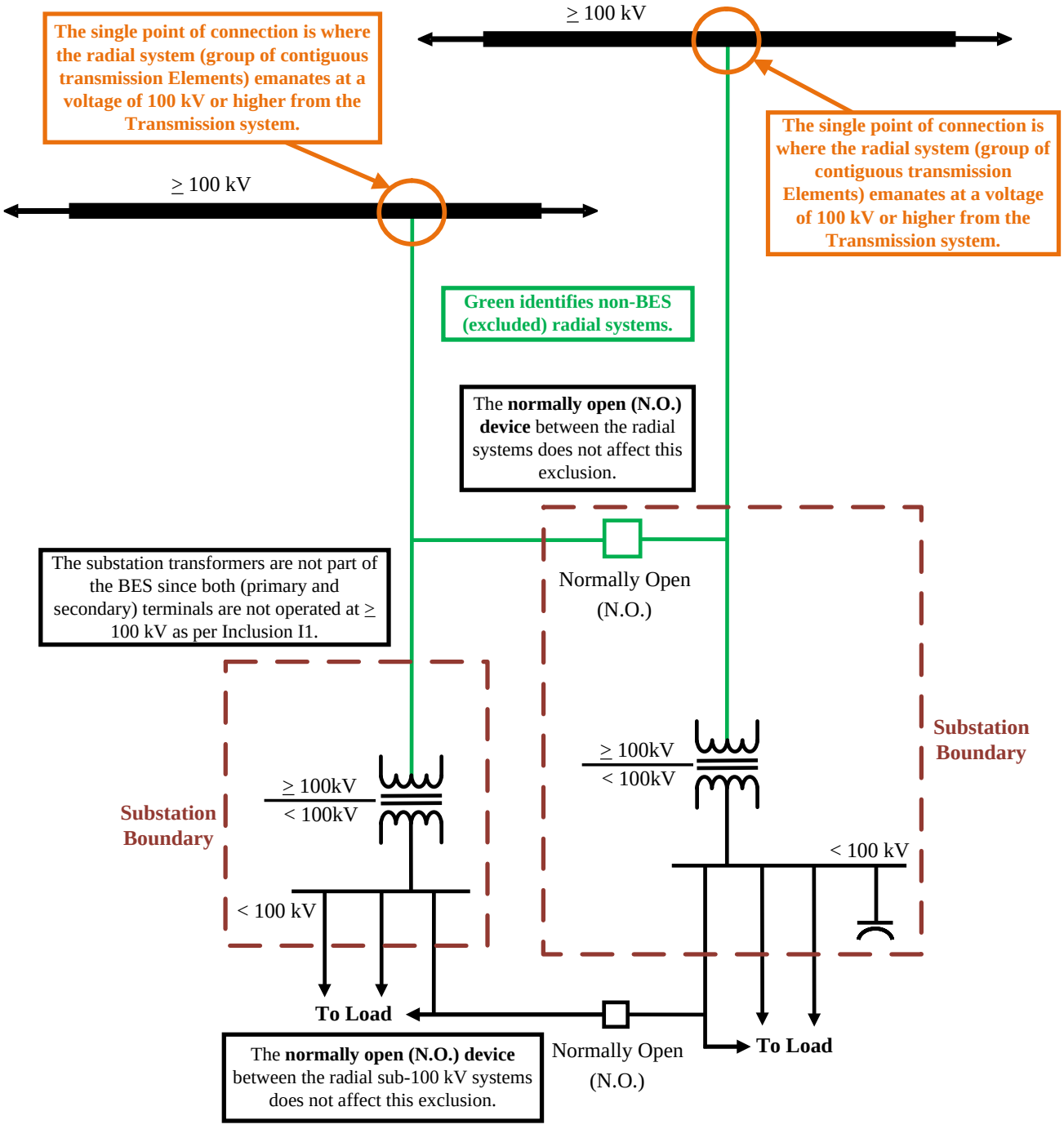


Figure E1-16: Radial System: Normally Open Switching Device between Load Serving Radial Systems

Commission (FERC) Order No. 773 directed implementation of the revised BES Definition to take into account the impact of sub-100 kV looped Facilities regardless of voltage level altering previous guidance on the evaluation of radial systems. This meant that if there was a connection at the sub-100 kV level between two systems that would previously have been considered as radial, said systems could not be evaluated for possible radial system exclusion. However, the drafting team developed a technical justification establishing 50 kV as a threshold value for sub-100 kV looped facilities. If the sub-100 kV loop is 50 kV or less, it was shown that it would not have an impact on the BES and thus an entity could still apply Exclusion E1 to the configuration. If the loop in question was greater than 50 kV, then an entity could not consider the systems as radial and would need to evaluate them under the criteria of Exclusion E3 if seeking to exclude the Facilities from the BES.

The evaluation of sub-100 kV loops associated with the evaluation of Elements under the E1 exclusion is used as a "qualifier" for the potential exclusion of the Elements that operate at or above 100 kV.

- Failure to not meet the "bright-line" criteria established by Exclusion E1 does not result in the inclusion of the sub-100 kV loops in the BES.

- Order No. 773, paragraph 155 states:
  "Thus, the Commission, while disagreeing with NERC's interpretation, does not propose to include the below 100 kV elements in figure 3 in the bulk electric system, unless determined otherwise in the exception process."

- Order No. 773-A, paragraph 36 states:
  "Moreover, as noted in the Final Rule, the sub-100 kV elements comprising radial systems and local networks will not be included in the bulk electric system, unless determined otherwise in the exception process."

Note: Figures E1-17 through E1-20 depict scenarios that require evaluation based on the criteria established in the BES definition as revised by the Commission (FERC) Order and described above.

Figure E1-17 depicts multiple radial systems separated by a N.O. switching device operated at 100 kV or above with an underlying loop operating at voltages less or equal to 50 kV.

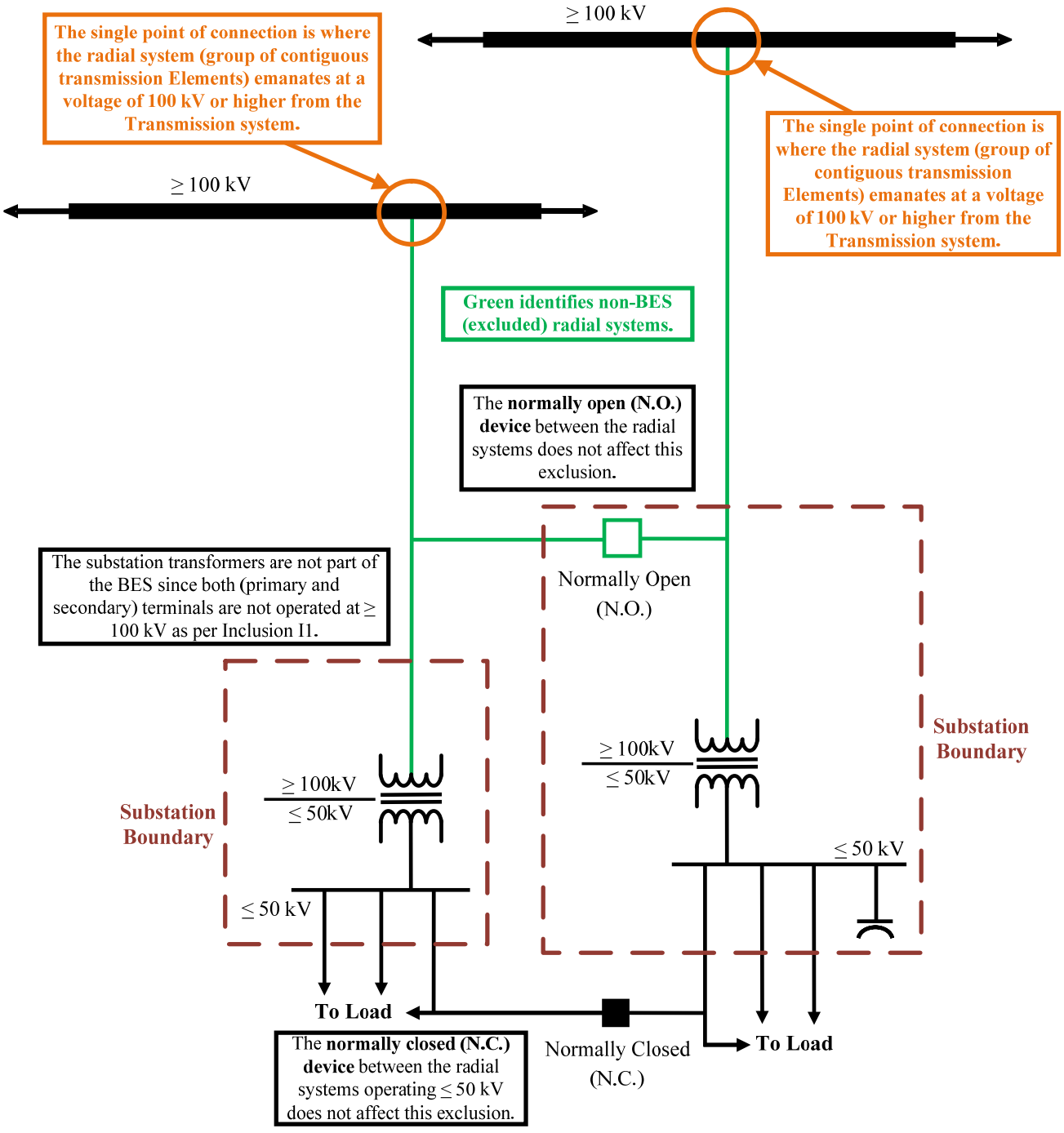


Figure E1-17: Radial System: Normally Open Switching Device between Load Serving Radial Systems with a ≤ 50 kV Loop

Figure E1-18 depicts a situation which requires evaluation based on the Exclusion E3 criteria since the underlying loop is ≥ 50 kV (see Figure E3-6).

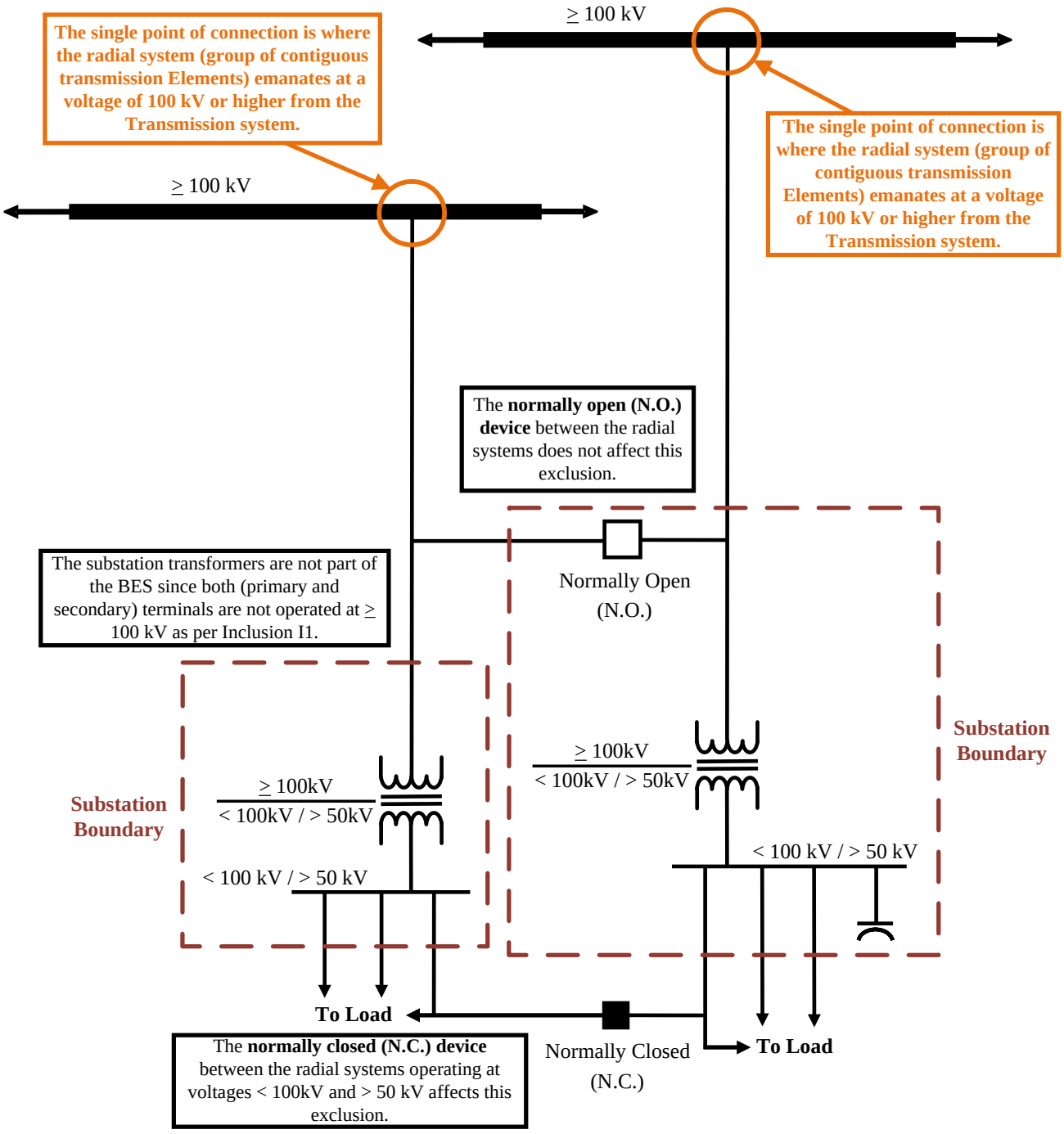


Figure E1-18: Impact of Sub-100 kV Looped Facilities (Switching Devices Identified N.O. ≥ 100 kV & N.C. < 100 kV & > 50 kV)

Figure E1-19 depicts multiple radial systems with a N.C. switching device operated at 100 kV or above with an underlying loop operating at voltages less or equal to 50 kV.

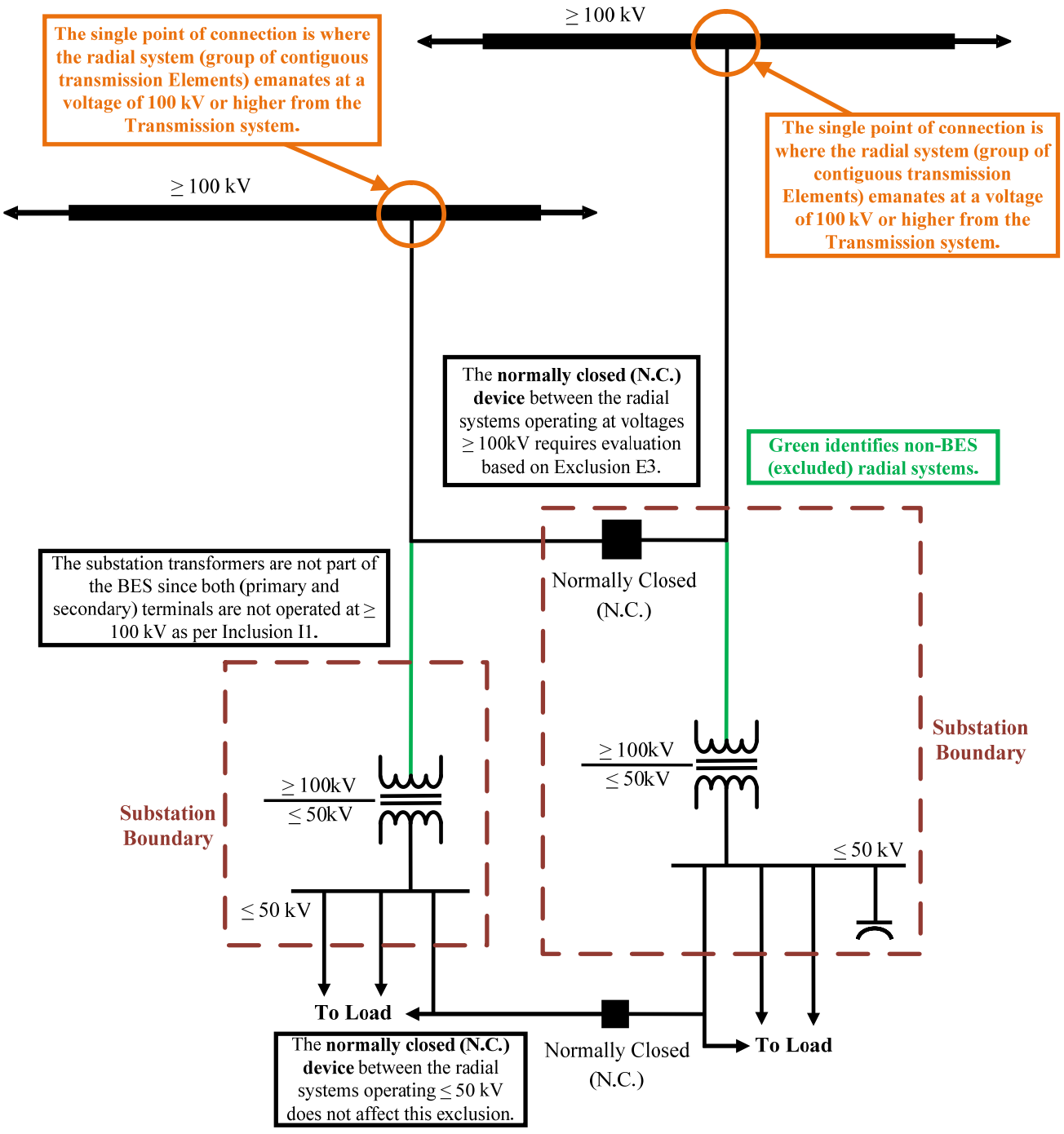


Figure E1-19: Radial System: Normally Closed Switching Device (≥ 100 kV) between Load Serving Radial Systems with a ≤ 50 kV Loop

Figure E1-20 depicts a situation which requires evaluation based on the Exclusion E3 criteria since the underlying loop is > 50 kV (see Figures E3-8).

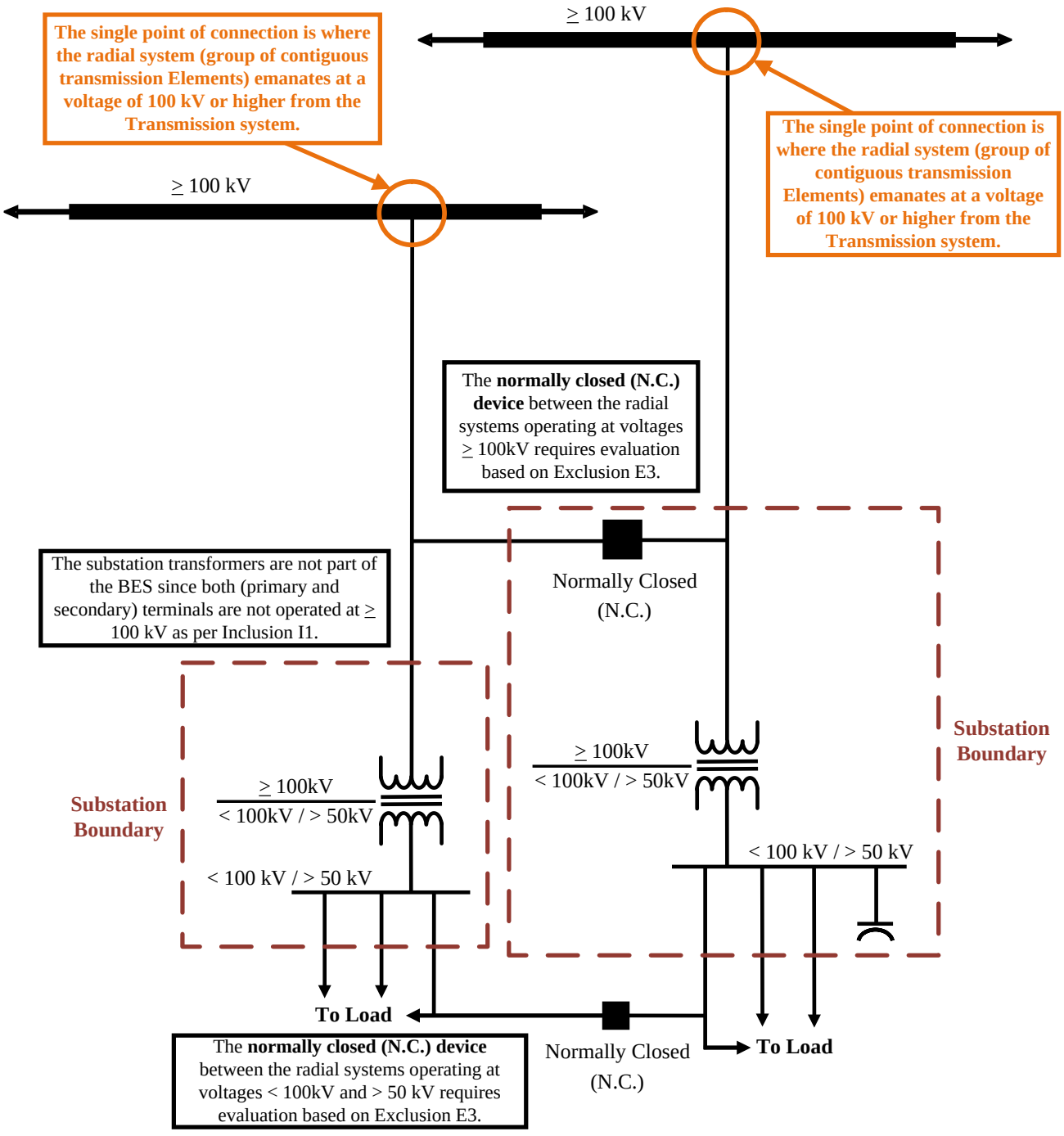


Figure E1-20: Impact of Sub-100 kV Looped Facilities (Switching Devices Identified N.C. ≥ 100 kV & N.C. < 100 kV & > 50 kV)

III.2 BES Exclusion E2

E2. A generating unit or multiple generating units on the customer's side of the retail meter that serve all or part of the retail customer Load with electric energy on the customer's side of the retail meter if: (i) the net capacity provided to the BES does not exceed 75 MVA, and (ii) standby, back-up, and maintenance power services are provided to the generating unit or multiple generating units or to the retail Load by a Balancing Authority, or provided pursuant to a binding obligation with a Generator Owner or Generator Operator, or under terms approved by the applicable regulatory authority.

Exclusion E2 provides for the exclusion of the Real Power resources that reside behind the retail meter (on the customer's side) and supersedes Inclusion I2. The exclusion is a restatement of the exclusion in Section III.c.4 of the ERO *Statement of Compliance Registry Criteria* (v.5), as clarified by the SDT in response to industry comments and recommendations:

> "As a general matter, a customer-owned or operated generator/generation that serves all or part of retail load with electric energy on the customer's side of the retail meter may be excluded as a candidate for registration based on these criteria if (i) the net capacity provided to the bulk power system does not exceed the criteria above or the Regional Entity otherwise determines the generator is not material to the bulk power system and (ii) standby, back-up and maintenance power services are provided to the generator or to the retail load pursuant to a binding obligation with another generator owner/operator or under terms approved by the local regulatory authority or the Federal Energy Regulatory Commission, as applicable."

Exclusion E2 is dedicated to the situation faced by behind-the-meter (i.e., retail customer owned) generation that are qualifying facilities as defined by the Public Utility Regulatory Policies Act (PURPA) in the US (e.g., see 18 CFR Part 292 for the regulations that are applicable in the US), and similarly situated facilities in Canada. These facilities—often referred to as combined heat and power (CHP) facilities—are commonly employed at petroleum refineries, chemical and food processing plants, pulp and paper mills, steel mills, and large commercial applications requiring both electrical and thermal energy.

The primary purpose of retail customer owned generation in the context of Exclusion E2 is the integrity of steam production that supports a manufacturing process. The electrical Load of that host process does not exist without steam. However, Exclusion E2 might apply to other situations as well.

Exclusion E2 references the net generation (in MWs) since that is how the generation is operated, and the residual ("net") amount exported to the BES is what is deemed relevant to the exclusion and reliability, not the nameplate rating in MVA. The Real Power (physical) export is subject to a 75 MVA threshold. Condition (ii) in Exclusion E2 is derived from FERC or provincial regulations applicable to qualifying cogeneration and small power production facilities (i.e., QFs). For example, see 18 CFR §292.101 and §292.305(b) for the requirements specific to the US. Condition (ii) requires that the generation serving the retail customer Load self-provide reserves (i.e., standby, backup, and maintenance power), and is essential for the integrity of the exclusion. These reserves

maintain steam generation and the load to sustain the manufacturing process. In the US, the terms and conditions of standby, backup, and maintenance services are defined and administered by State Public Service Commissions (PSC) (i.e., the "applicable regulatory authority" in the US) subject to FERC oversight. These services are provided under contract or tariff with Generator Owners, Generator Operators, or Balancing Authorities in regions that do not have Independent System Operators (ISOs) or Regional Transmission Operators (RTOs), and provided by ISOs and RTOs where "organized markets" operate. These terms and conditions will be understood in Balancing Authority Areas where it is applicable, as it reflects existing industry practice.

Multiple connection points to the BES do not preclude the use of Exclusion E2.

Net capacity

The net capacity determination for Exclusion E2 is the net flow to the BES as measured by integrated hourly revenue metering for the most recent 12 month period. Periods of net capacity to the BES that exceed the threshold value when directed by the applicable Balancing Authority does not preclude the ability to utilize this exclusion.

Note: Figures E2-1 and E2-2 are depictions of the application of Exclusion E2 and are intended to assist the user during the full application of the BES definition.

Figure E2-1 depicts customer owned generation residing behind the retail meter. The cogeneration operation is resulting in a net capacity to the BES of 50 MVA.

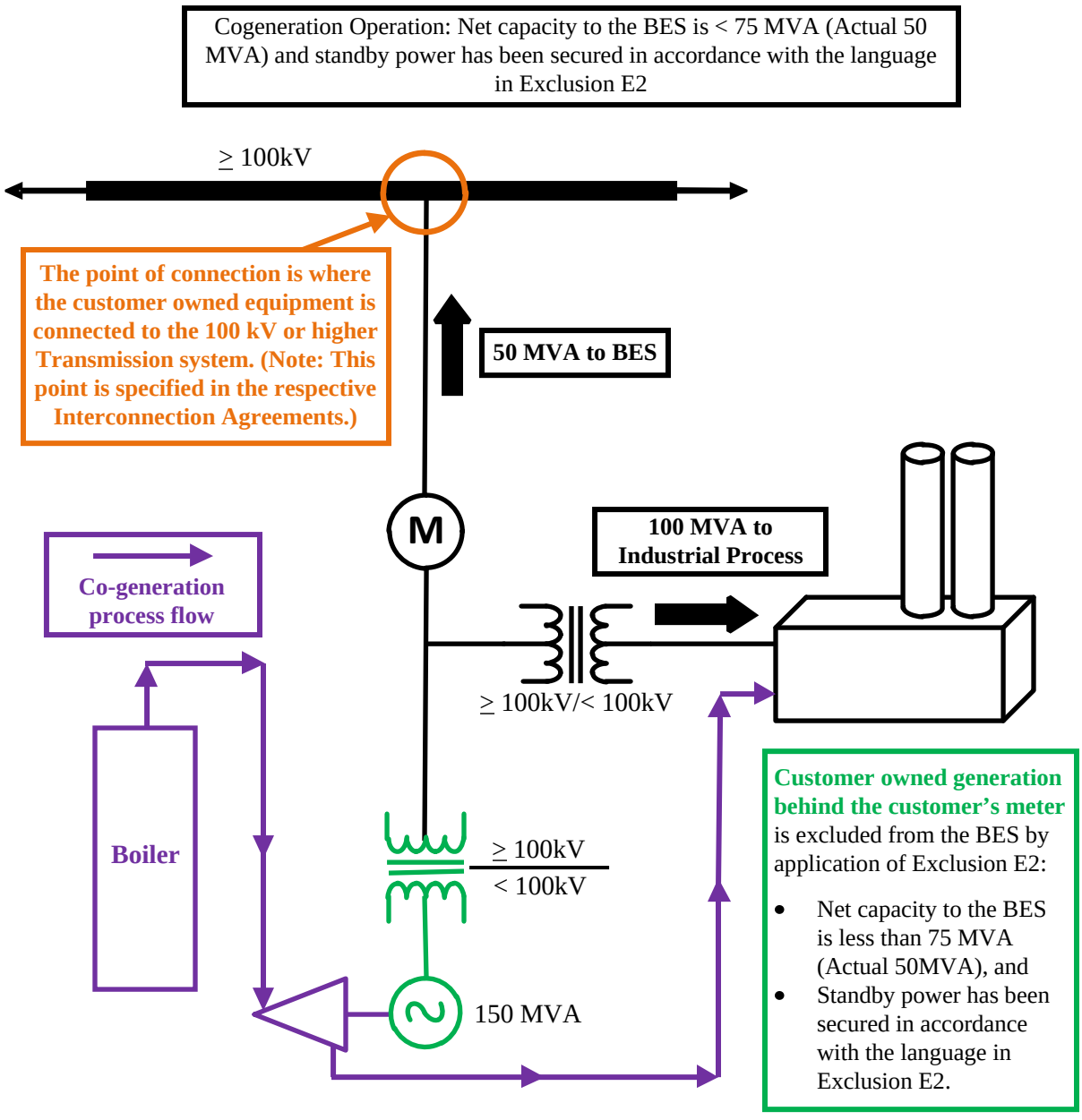


Figure E2-1: Behind-the-Meter Generation: Net Capacity to the BES Less Than 75 MVA

Figure E2-2 depicts customer owned generation residing behind the retail meter. The cogeneration operation is resulting in a net capacity to the BES of 100 MVA.

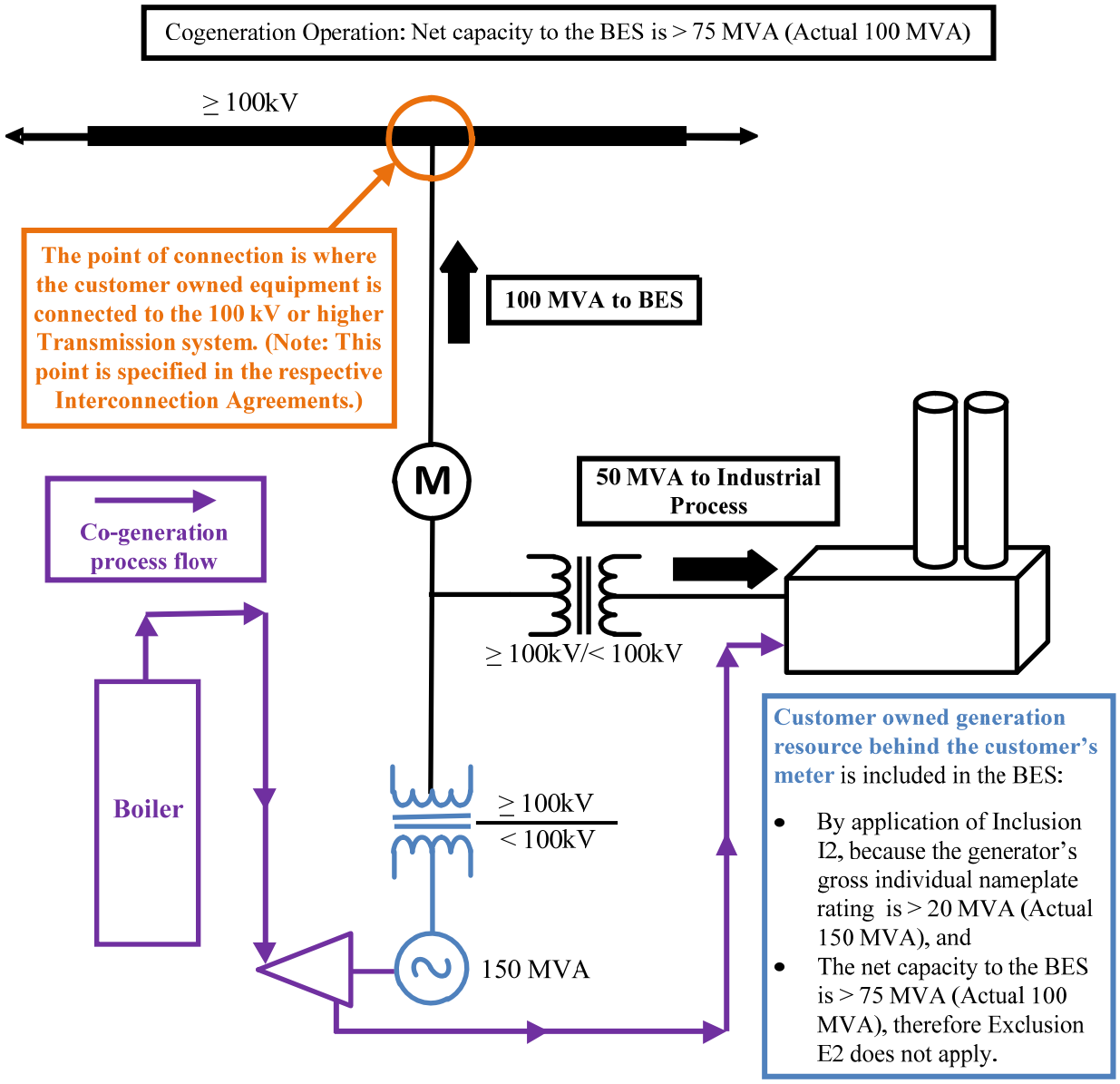


Figure E2-2: Behind-the-Meter Generation: Net Capacity to the BES Greater Than 75 MVA

III.3 BES Exclusion E3

E3. Local networks (LN): A group of contiguous transmission Elements operated at less than 300 kV that distribute power to Load rather than transfer bulk power across the interconnected system. LN's emanate from multiple points of connection at 100 kV or higher to improve the level of service to retail customers, and not to accommodate bulk power transfer across the interconnected system. The LN is characterized by all of the following:

a.) Limits on connected generation: The LN and its underlying Elements do not include generation resources identified in Inclusions I2, I3, or I4, and do not have an aggregate capacity of non-retail generation greater than 75 MVA (gross nameplate rating);

b.) Real Power flows only into the LN and the LN does not transfer energy originating outside the LN for delivery through the LN; and

c.) Not part of a Flowgate or transfer path: The LN does not contain any part of a permanent Flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection, or a comparable monitored Facility in the ERCOT or Quebec Interconnections, and is not a monitored Facility included in an Interconnection Reliability Operating Limit (IROL).

Exclusion E3 is an exclusion for the contiguous transmission Elements that operate at or above 100 kV but less than 300 kV and emanate from multiple points of connection at 100 kV or higher. The local network exclusion is not dependent on the existence of a switching device at the points of connection to the BES (i.e., automatic interrupting device, manual disconnects, etc.). Generation resources connected within the local network, power flow criteria, and Element classification (i.e., Flowgate, transfer path) are qualifiers for this exclusion.

Exclusion E3 does not allow for the exclusion of generation resources that meet the criteria for generation resources as described in Inclusions I2, I3, and I4. Reactive resources that meet the criteria described in Inclusion I5 cannot be excluded by application of Exclusion E3. The presence of Reactive resources does not preclude the ability to invoke Exclusion E3. Exclusion E3 allows for the exclusion of contiguous transmission Elements (i.e., transformers, circuit breakers, bus sections, and transmission lines) emanating from multiple points of connection at a voltage of 100 kV or higher. The power flow criterion describes the Real-time operational characteristics of the local network. And, by definition the local network, cannot be part of a designated Flowgate or transfer path.

Commission (FERC) Order No. 773 directed implementation of the revised BES Definition to take into account the impact of sub-100 kV looped Facilities regardless of voltage level altering previous guidance on the evaluation of local networks. This meant that if there was a connection at the sub-100 kV level between two systems that would previously have been considered as radial, said systems could not be evaluated for possible radial system exclusion. However, the drafting team developed a technical justification establishing 50 kV as a threshold value for sub-100 kV looped facilities. If the sub-100 kV loop is 50 kV or less, it was shown that it would not have an impact on the BES and thus an entity could still apply Exclusion E1 to the configuration. If the loop in question was greater than 50 kV, then an entity could not consider the systems as radial and would need to evaluate them under the criteria of Exclusion E3 if seeking to exclude the Facilities from the BES.

The evaluation of sub-100 kV loops associated with the evaluation of Elements under the E3 exclusion is used as a "qualifier" for the potential exclusion of the Elements that operate at or above 100 kV.

- Failure to not meet the "bright-line" criteria established by Exclusion E3 does not result in the inclusion of the sub-100 kV loops in the BES.

- Order No. 773, paragraph 155 states:
  "Thus, the Commission, while disagreeing with NERC's interpretation, does not propose to include the below 100 kV elements in figure 3 in the bulk electric system, unless determined otherwise in the exception process."

- Order No. 773-A, paragraph 36 states:
  "Moreover, as noted in the Final Rule, the sub-100 kV elements comprising radial systems and local networks will not be included in the bulk electric system, unless determined otherwise in the exception process."

Entities should be prepared to justify local network determinations.

Reactive Resources

Reactive resources that meet the criteria described in Inclusion I5 cannot be excluded by application of Exclusion E3. The presence of reactive resources does not preclude the ability to invoke Exclusion E3.

Generation Limits

There are two conditions under which generation resources can prevent a network from qualifying for Exclusion E3:

1. The aggregate nameplate capacity of the non-retail generation capacity within the network in question exceeds 75 MVA; or
2. Any generation within the local network in question is identified in Inclusion I2, I3, or I4.

If either of these conditions applies, the network does not qualify for Exclusion E3.

Power Flow at BES Interface

An entity who determines that all or a portion of its Facilities meet the local network exclusion should be able to demonstrate, by inspection of actual system data, that flow of power is always into the local network at each point of interface with the BES at all times. The SDT's intent was that hourly integrated power flow values over the course of the most recent two-year period would be sufficient to make such a demonstration.

In order for transmission Elements to qualify for Exclusion E3, power flow direction at all points of BES interface must be into the local network. Therefore, the second characteristic of Exclusion E3 (E3.b) that: "… the LN does not transfer energy originating outside the LN for delivery through the LN" will also be satisfied in that energy is not being transferred through the local network.

Voltage Thresholds

The local network exclusion applies to electric transmission Elements operated below 300 kV, and cannot extend to any Facilities operated above 300 kV. Facilities operated below 100 kV are excluded from the BES by application of the core definition.

If the candidate local network does not qualify for Exclusion E3, then further evaluation of the underlying Elements may be appropriate based on other criteria within the definition. Each underlying Element must meet the criteria established by Exclusion E3, including parts a, b, and c, to qualify for exclusion from the BES. Such evaluations are not shown in Figures E3-1 through E3-9, which concentrate on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

Note: Figures E3-1 through E3-9 are depictions of the application of Exclusion E3 and are intended to assist the user during the full application of the BES definition.

Figure E3-1 depicts an excluded local network which contains retail and non-retail generation resources and also serves Load. The local network operates at a voltage of 138 kV and has non-retail generation resources with an aggregate nameplate rating of 40 MVA and power only flows into the local network at each point of connection.

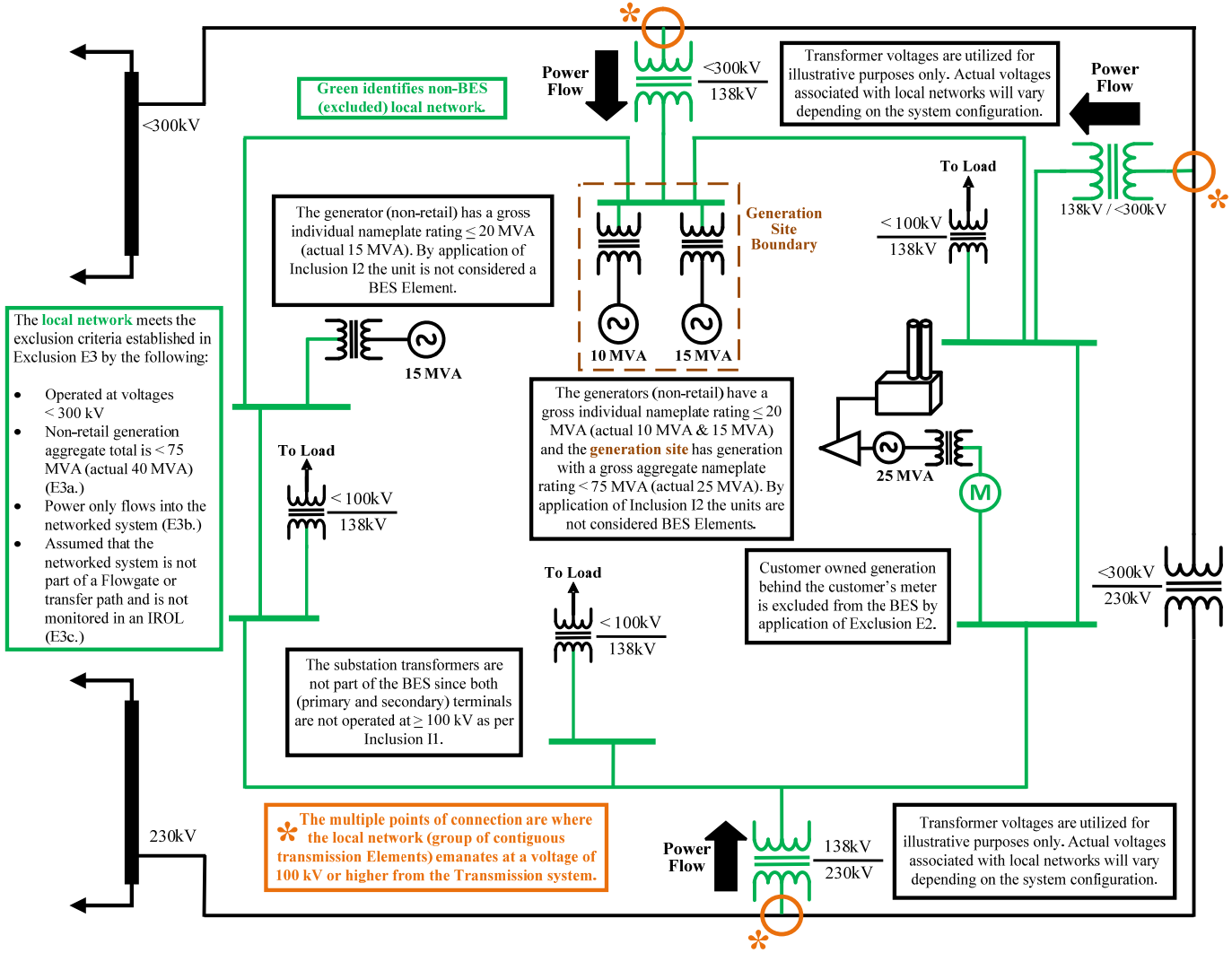


Figure E3-1: Local Network (non-BES) with Retail & Non-Retail Generation Resources & Serving Load

Figure E3-2 shows how the presence of a BES generator affects the status of a potential local network. Note that further evaluation of underlying elements may be required to complete the full application of the definition. As noted above, such evaluation is not shown in the individual sections of this document but may be seen in the system diagrams

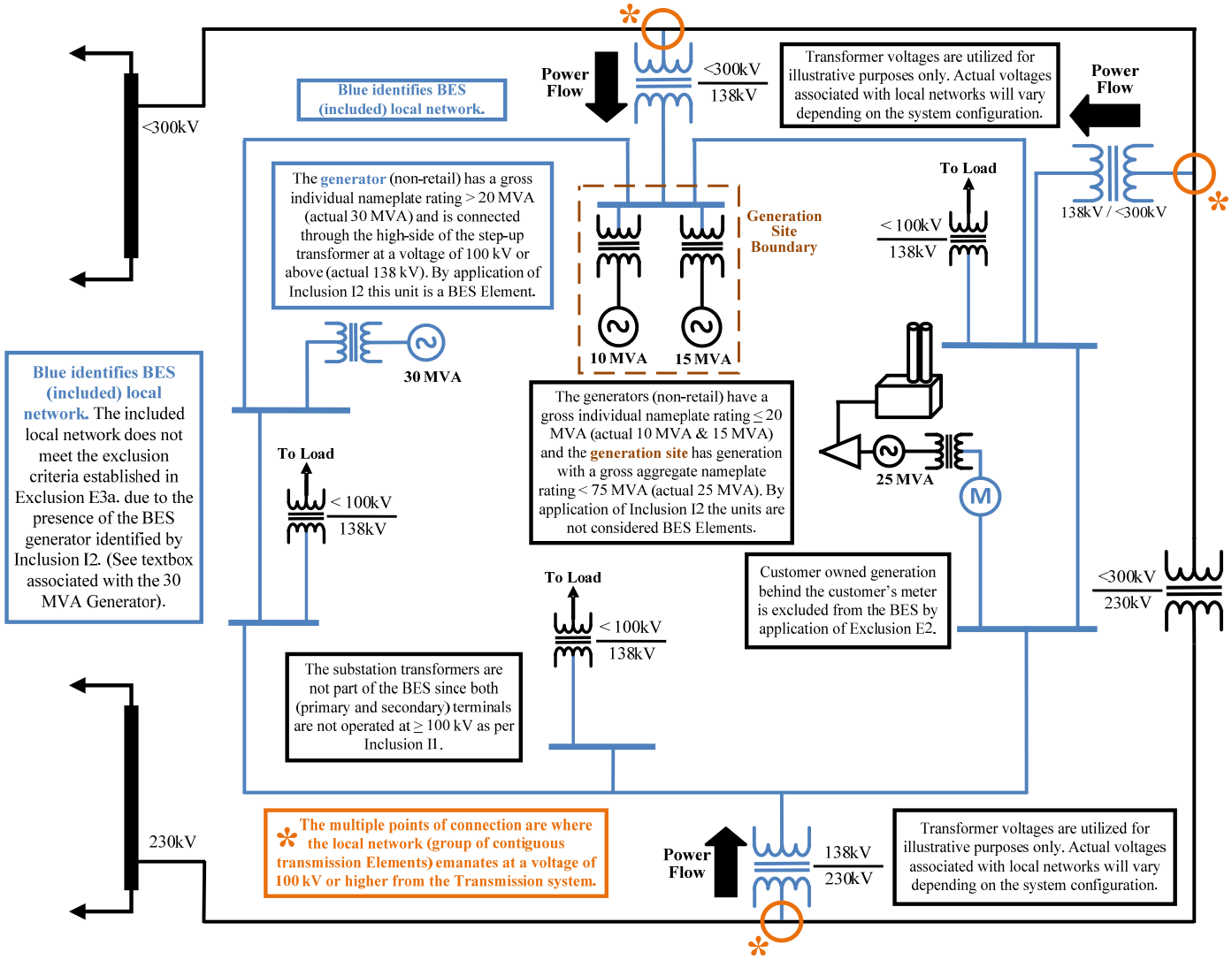


Figure E3-2: Local Network (non-BES) with Retail & Non-Retail Generation Resources & Serving Load

Figure E3-3 depicts a local network which contains retail and non-retail generation resources and also serves Load. The local network does not meet the criteria established by Exclusion E3 in that power flows out of the local network at one of the points of connection to the interconnected Transmission system. Note that further evaluation of underlying elements may be required to complete the full application of the definition. As noted above, such evaluation is not shown in the individual sections of this document but may be seen in the system diagrams.

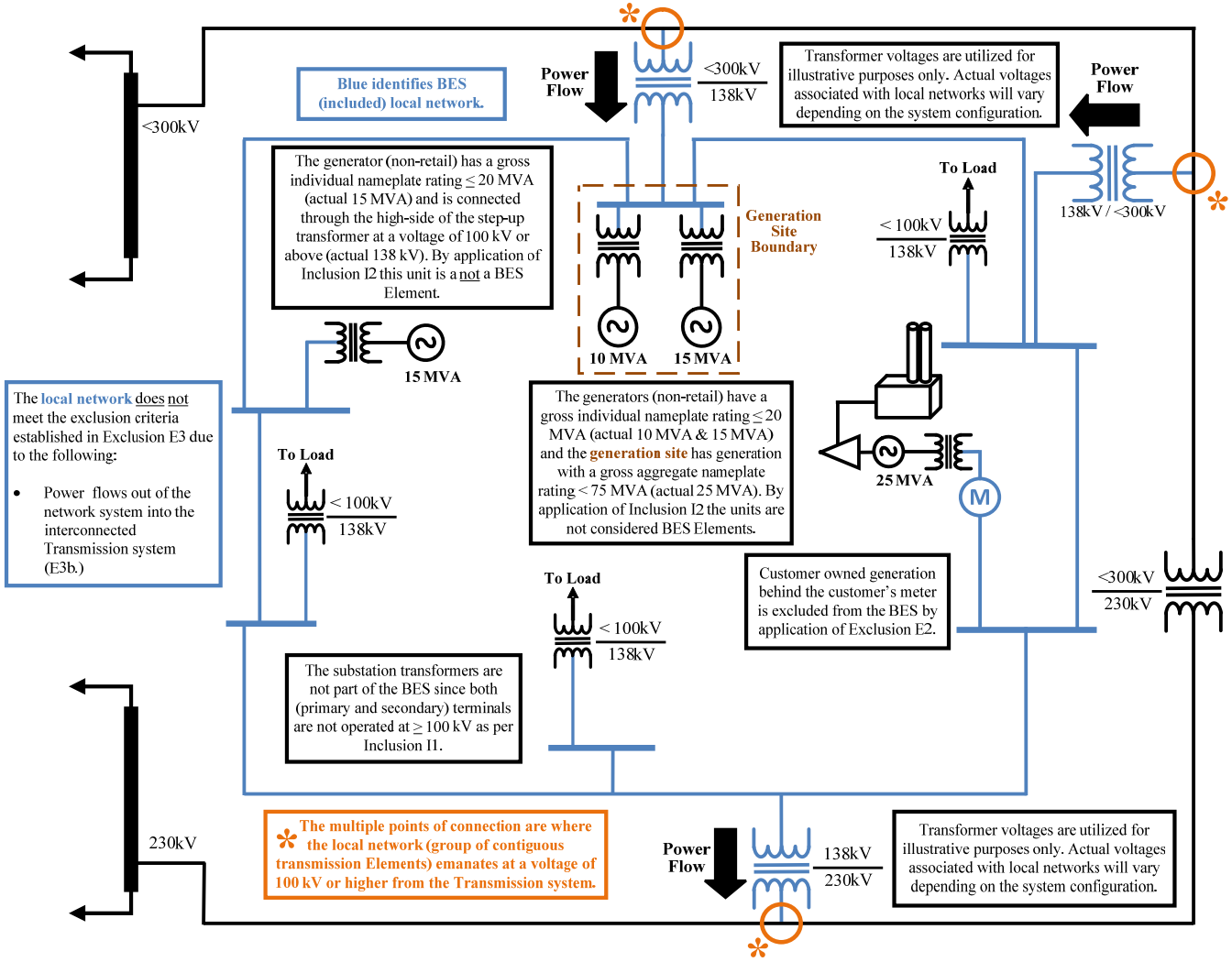


Figure E3-3: Local Network (BES) with Retail & Non-Retail Generation Resources & Serving Load

Commission (FERC) Order No. 773 directed implementation of the revised BES Definition to take into account the impact of sub-100 kV looped Facilities regardless of voltage level altering previous guidance on the evaluation of radial systems. This meant that if there was a connection at the sub-100 kV level between two systems that would previously have been considered as radial, said systems could not be evaluated for possible radial system exclusion. However, the drafting team developed a technical justification establishing 50 kV as a threshold value for sub-100 kV looped facilities. If the sub-100 kV loop is 50 kV or less, it was shown that it would not have an impact on the BES and thus an entity could still apply Exclusion E1 to the configuration. If the loop in question was greater than 50 kV, then an entity could not consider the systems as radial and would need to evaluate them under the criteria of Exclusion E3 if seeking to exclude the Facilities from the BES.

The evaluation of sub-100 kV loops associated with the evaluation of Elements under the E3 exclusion is used as a "qualifier" for the potential exclusion of the Elements that operate at or above 100 kV.

- Failure to not meet the "bright-line" criteria established by Exclusion E3 does not result in the inclusion of the sub-100 kV loops in the BES.

- Order No. 773, paragraph 155 states:
  "Thus, the Commission, while disagreeing with NERC's interpretation, does not propose to include the below 100 kV elements in figure 3 in the bulk electric system, unless determined otherwise in the exception process."

- Order No. 773-A, paragraph 36 states:
  "Moreover, as noted in the Final Rule, the sub-100 kV elements comprising radial systems and local networks will not be included in the bulk electric system, unless determined otherwise in the exception process."

Note: Figures E3-4 through E3-9 depict scenarios that require evaluation based on the criteria established in the BES definition as revised by the Commission (FERC) Order and described above.

Figure E3-4 depicts a situation which requires evaluation based on the Exclusion E3 criteria (see Figure E1-3).

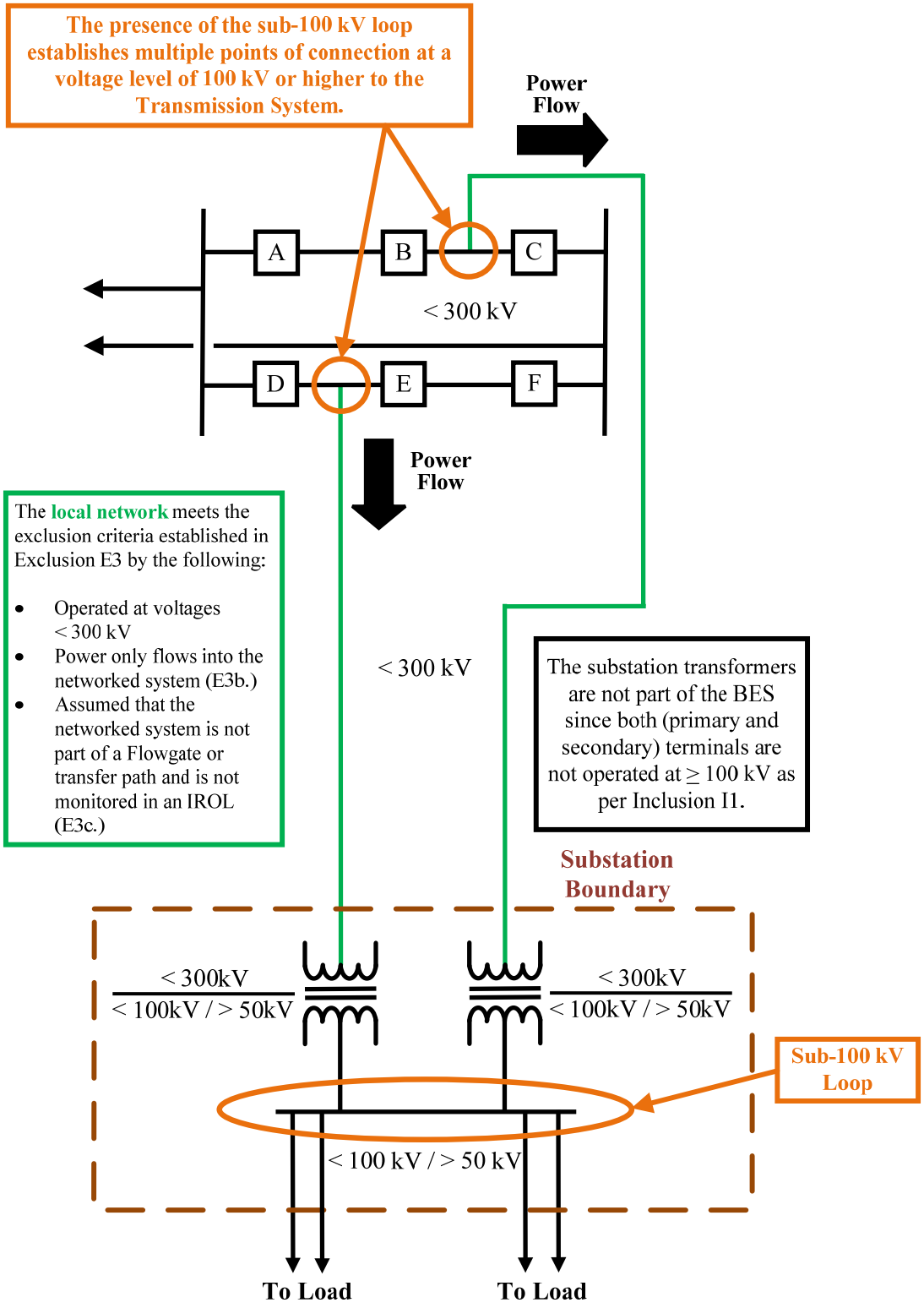


Figure E3-4: Local Network (non-BES) with Sub-100 kV Loop

Figure E3-5 duplicates the configuration of Figure E3-4, however since power is flowing out of the potential local network, this configuration does not qualify as a local network based on the Exclusion E3 criteria.

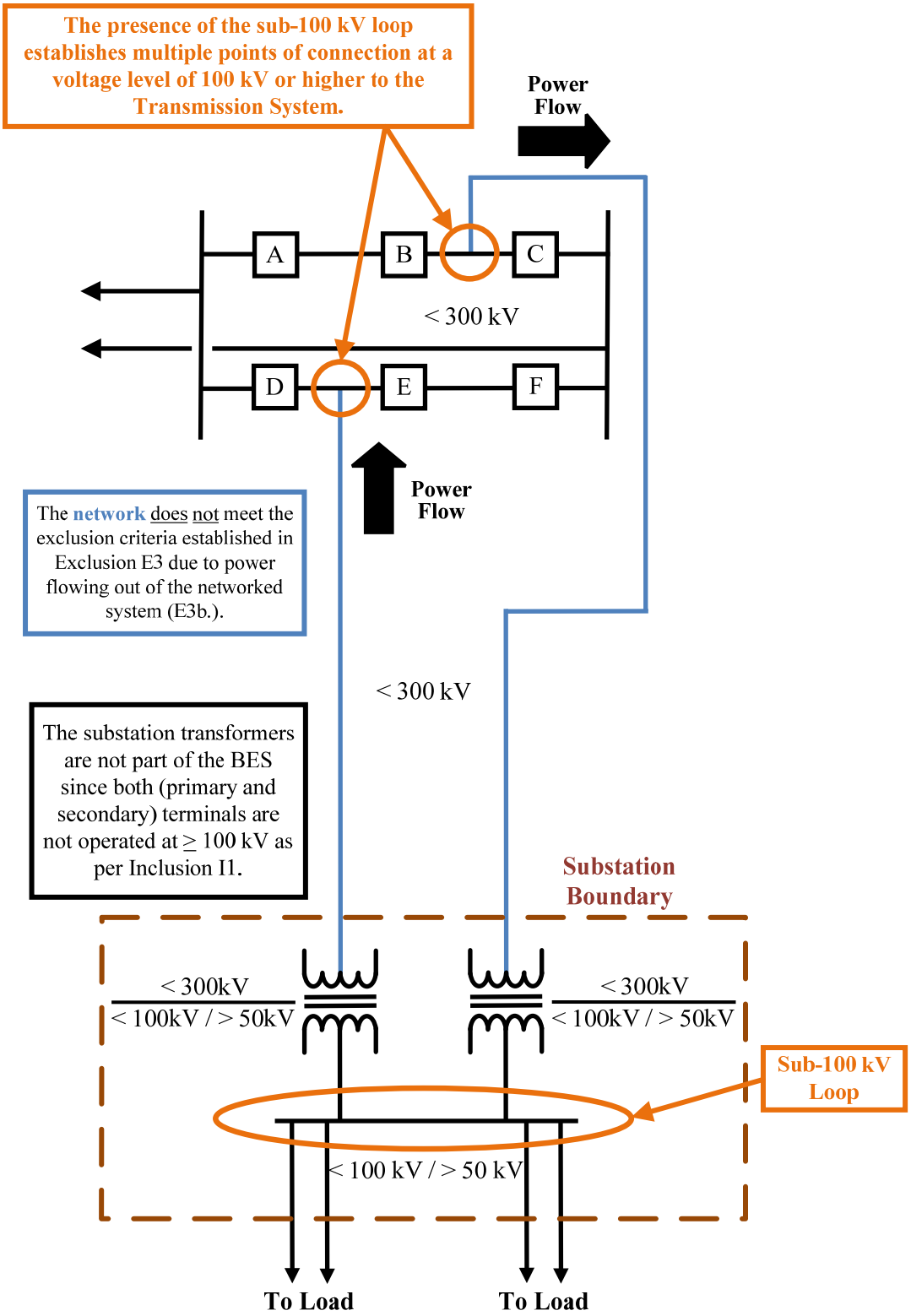


Figure E3-5: Local Network (BES) with Sub-100 kV Loop

Figure E3-6 depicts a situation which requires evaluation based on the Exclusion E3 criteria (see Figure E1-18).

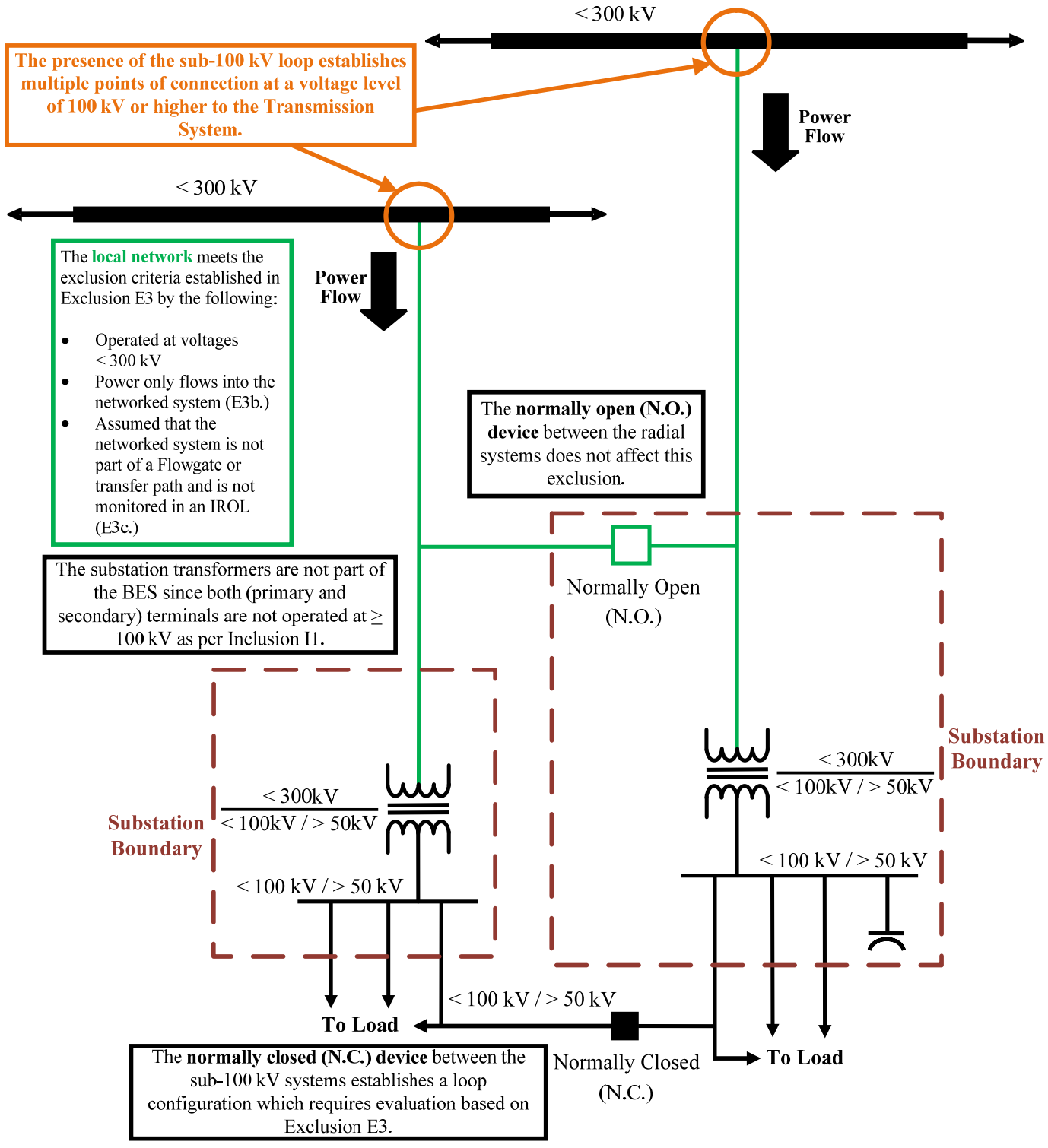


Figure E3-6: Local Network (non-BES) with Sub-100 kV Looped Facilities (Switching Devices Identified: N.O. ≥ 100 kV & N.C. < 100 kV/> 50 kV)

Figure E3-7 duplicates the configuration of Figure E3-6, however since power is flowing out of the potential local network, this configuration does not qualify as a local network based on the Exclusion E3 criteria. Since the area under consideration does not meet the criteria established by Exclusion E3, further evaluation of the underlying Elements may be appropriate. Each underlying Element must meet the criteria established by Exclusion E3, including parts a, b, or c, to qualify for exclusion from the BES. Such evaluations are not shown in Figure E3-9, which concentrates on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

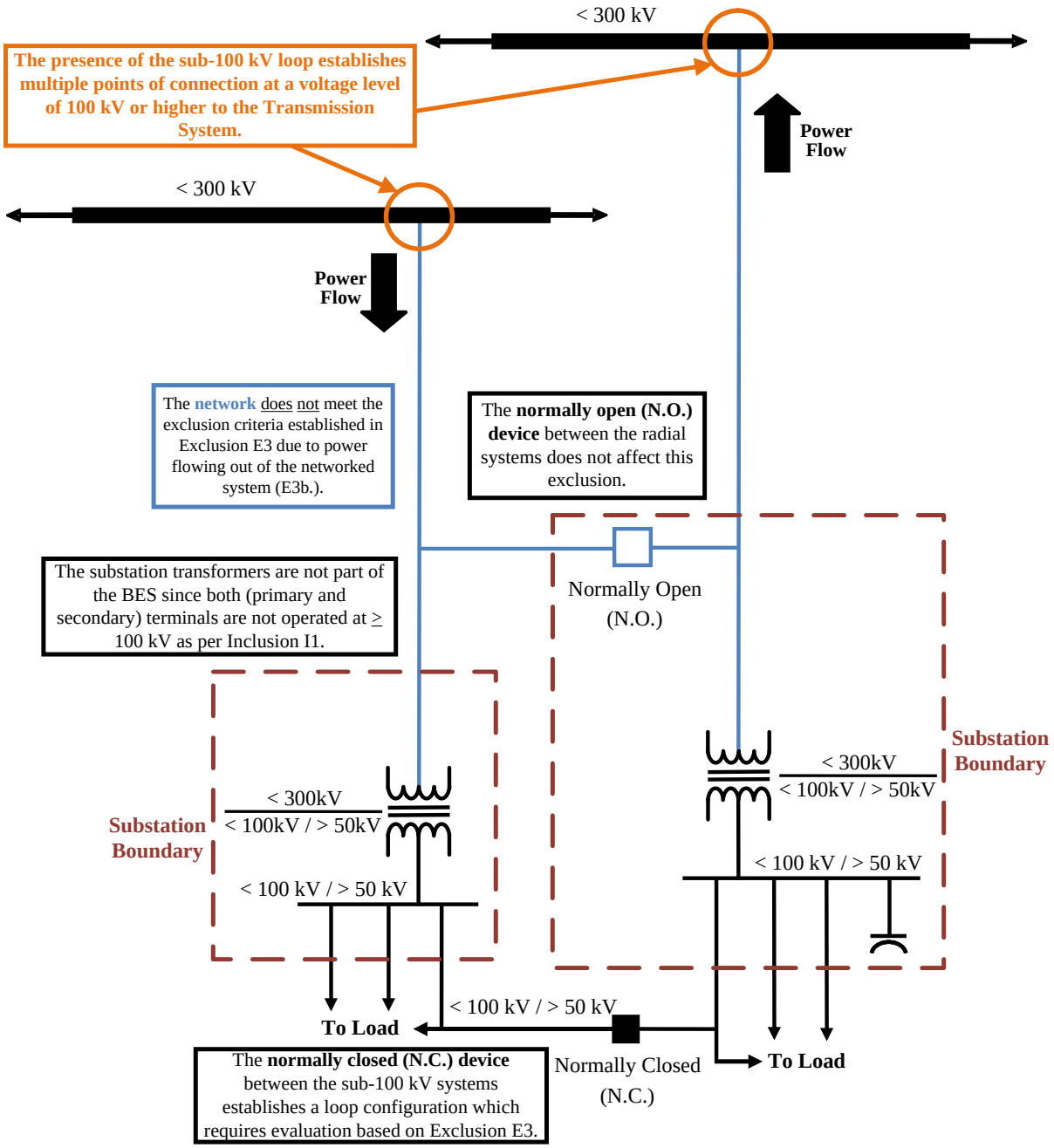


Figure E3-7: Local Network (BES) with Sub-100 kV Looped Facilities (Switching Devices Identified: N.O. ≥ 100 kV & N.C. < 100 kV/< 50 kV)

Figure E3-8 depicts a situation where the configuration establishes multiple loops that require evaluation based on the Exclusion E3 criteria (see Figure E1-20).

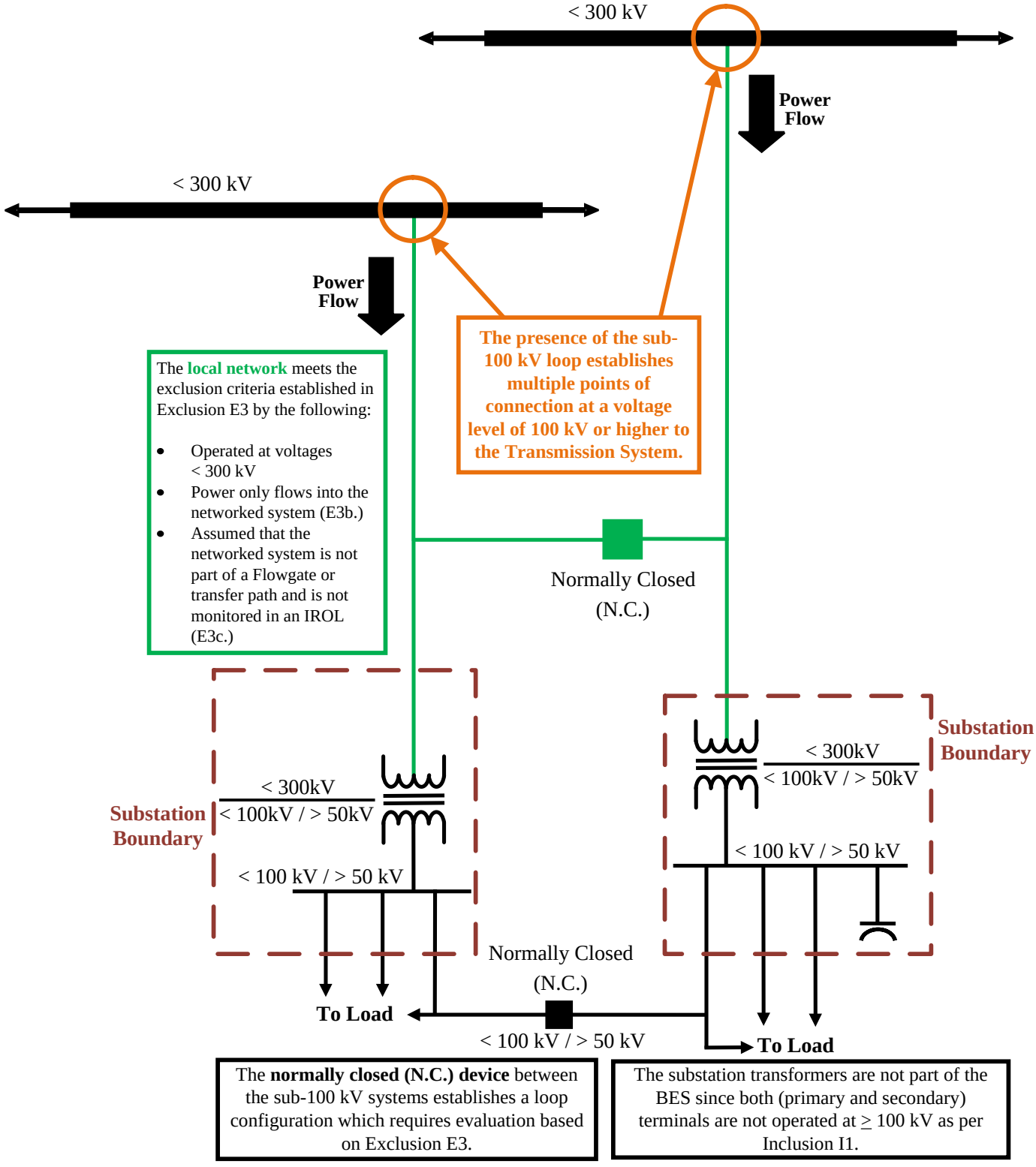


Figure E3-8: Local Network (non-BES) with Sub-100 kV Looped Facilities (Switching Devices Identified: N.C. ≥ 100 kV & N.C. < 100 kV/> 50 kV)

Figure E3-9 depicts a situation where the configuration establishes multiple loops that require evaluation based on the Exclusion E3 criteria. Since the area under consideration does not meet the criteria established by Exclusion E3, further evaluation of the underlying Elements may be appropriate. Each underlying Element must meet the criteria established by Exclusion E3, including parts a, b, or c, to qualify for exclusion from the BES. Such evaluations are not shown in Figure E3-9, which concentrates on the bigger picture, but are detailed in the summary diagrams in Section IV where the hierarchical application of the definition is described and shown.

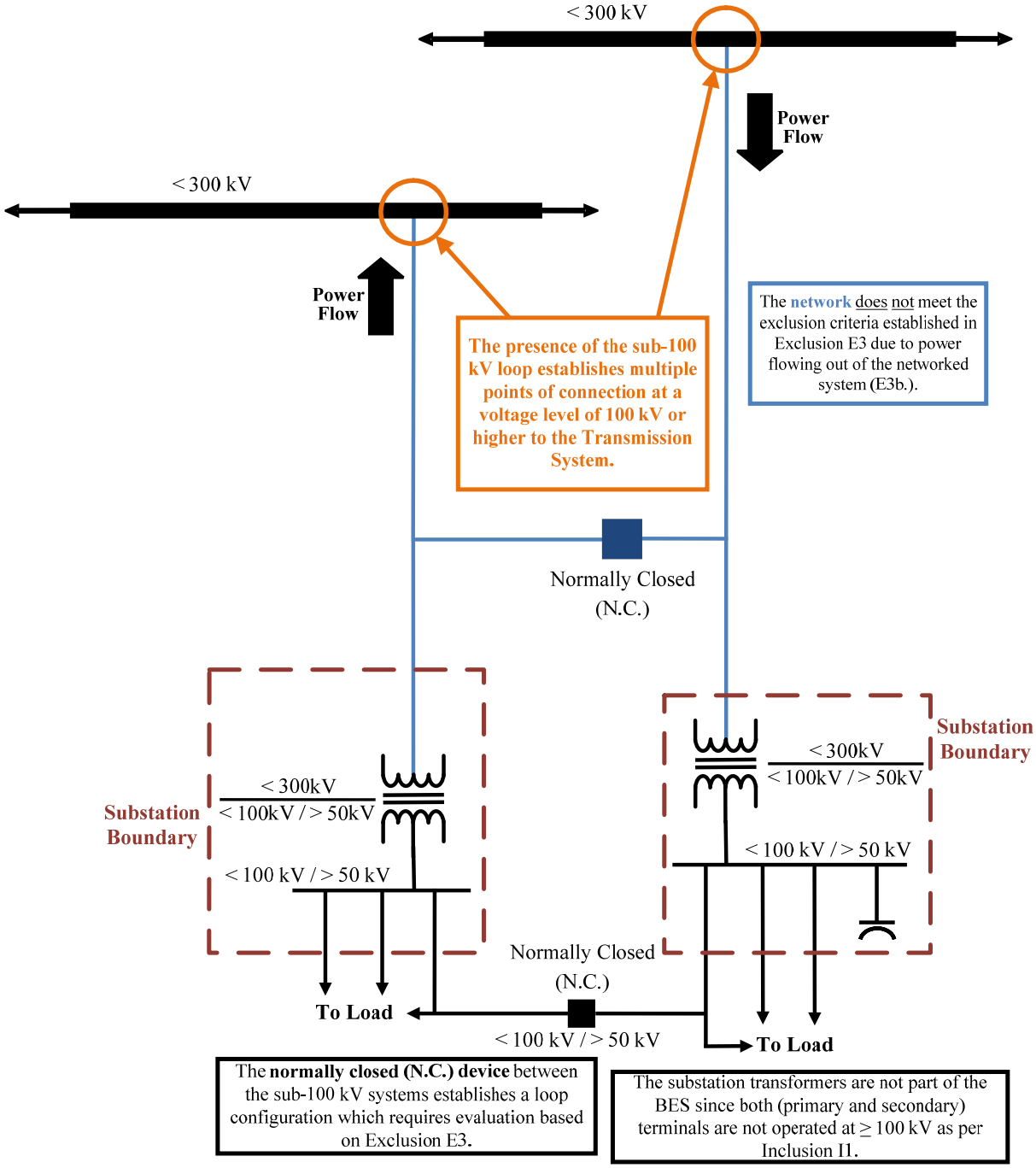


Figure E3-9: Local Network (BES) with Sub-100 kV Looped Facilities (Switching Devices Identified: N.C. ≥ 100 kV & N.C. < 100 kV/> 50 kV)

III.4 BES Exclusion E4

E4. Reactive Power devices installed for the sole benefit of a retail customer(s).

Exclusion E4 is dependent on the intended function of the Reactive Resource; therefore, figures were not developed for Exclusion E4 due to the simplicity of the language in the exclusion.

IV. Hierarchical Application of the Definition

The hierarchical application of the definition is depicted in a series of diagrams based on a fictional system configuration and follows the sequenced application of the definition described below.

The application of the 'bright-line' BES definition is a three-step process that, when appropriately applied, will identify the vast majority of BES Elements in a consistent manner that can be applied on a continent-wide basis.

STEP 1: CORE DEFINITION: The core definition is used to establish the bright-line of 100 kV, the overall demarcation point between BES and Non-BES Elements. The core BES Definition identifies the Real Power and Reactive Power resources connected at 100 kV or higher, as included in the BES. To fully appreciate the scope of the core definition, an understanding of the term "Element" is needed. "Element" is defined in the NERC Glossary as: "Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An element may be comprised of one or more components."

STEP 2: INCLUSIONS: This step involves applying the specific Inclusions, provides additional clarification for the purposes of identifying specific Elements that are included in the BES. The Inclusions address Transmission Elements and Real Power and Reactive Power resources with specific criteria to provide for a consistent determination of whether an Element is classified as BES or non-BES. There are five Inclusions in the Definition. The facilities described in Inclusions I1, I2, I4 and I5 are each operated (if transformers – Inclusion I1) or connected (if generating resources, dispersed power producing resources or Reactive Power resources – Inclusions I2, I4 and I5) at or above the 100 kV threshold. Inclusion I3 encompasses Blackstart Resources identified in a Transmission Operator's restoration plan, which are necessary for the reliable operation of the interconnection transmission system and should be included in the BES regardless of their size (MVA) or the voltage at which they are connected.

STEP 3: EXCLUSIONS: This step evaluates specific situations for potential exclusion from the BES. The exclusion language is written to specifically identify Elements or groups of Elements for exclusion from the BES. Step three (3) should be applied in the following sequence:

Exclusion E2 (Behind the Meter Generation) provides for the specific exclusion of certain Real Power resources that reside behind-the-retail meter (on the customer's side) and supersedes the more general Inclusion I2 (Generating Resources). Behind-the-meter generation that meets these specific criteria do not affect reliability of the BES because the net capacity supplied to the BES is less than 75 MVA and the specific criteria impose obligations to support reliability when the resources are unavailable.

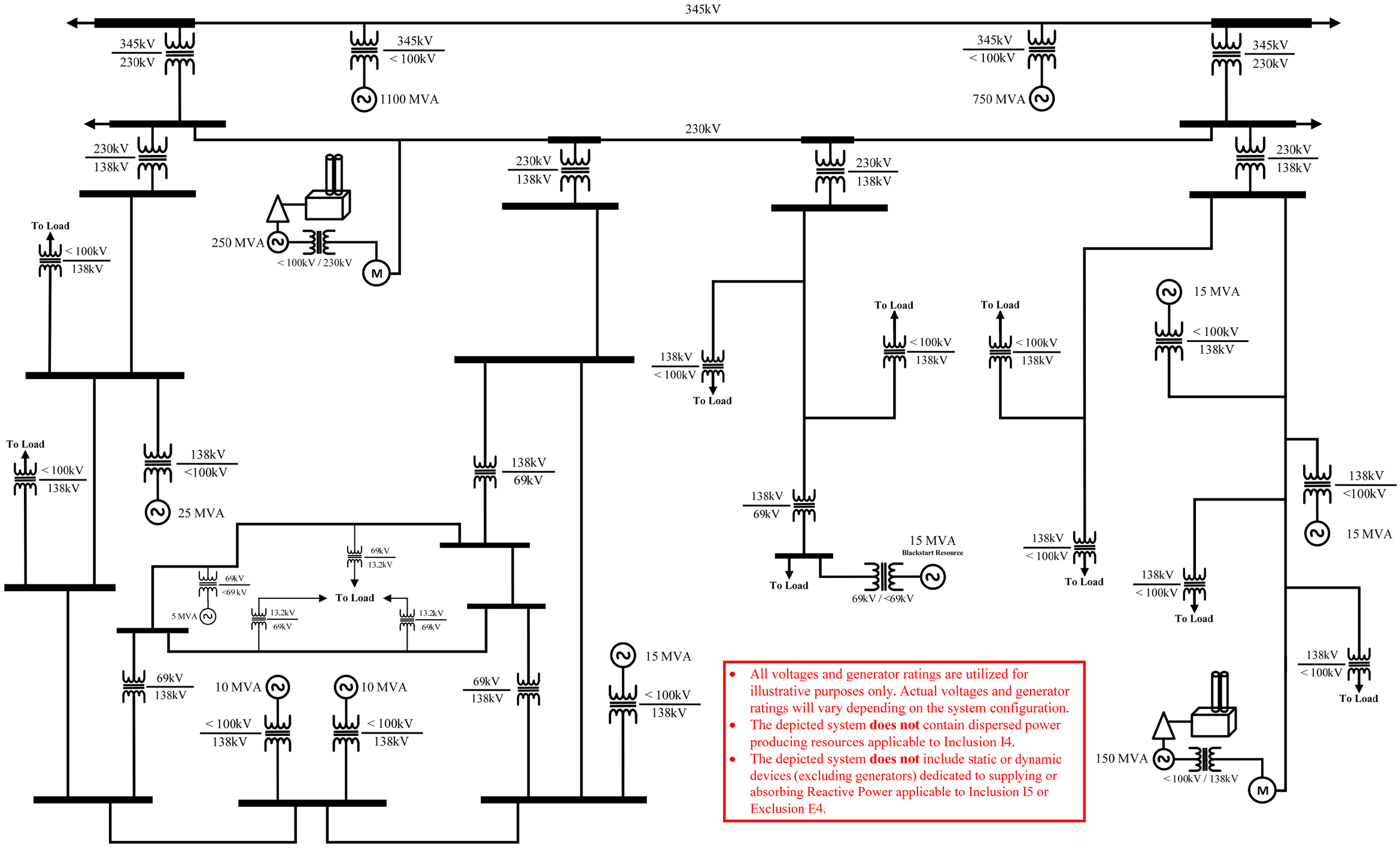
Exclusion E4 (Reactive Power Devices) provides for the specific exclusion of Reactive Power devices installed for the sole benefit of a retail customer(s) and supersedes the more general Inclusion I5 (Static or Dynamic Reactive Power Devices). Reactive Power devices installed for the sole benefit of a retail customer are, by definition, not required for operation of the interconnected transmission system.

Exclusion E3 (Local Networks) provides for the exclusion of local networks that meet the specific criteria identified in the exclusion language. Exclusion E3 does not allow for the exclusion of Real Power and Reactive Power resources captured by Inclusions I2 through I5. In instances where a transformer (under Inclusion I1) is an Element of a local network (under Exclusion E3), the transformer would be excluded pursuant to Exclusion E3. Exclusion E3 may not be used to exclude transmission Elements (captured by the core definition and Inclusion I1) when Real Power resources are present that are captured by Inclusion I2, I3, or I4. This assures that interconnection facilities for BES generators are not excluded.

Exclusion E1 (Radial Systems) provides for the exclusion of 'transmission Elements' from radial systems that meet the specific criteria identified in the exclusion language. Exclusion E1 does not allow for the exclusion of Real Power and Reactive Power resources captured by Inclusions I2 through I5. In instances where a transformer (under Inclusion I1) is an Element of a radial system (under Exclusion E1), the transformer would be excluded pursuant to Exclusion E1. Exclusion E1 may not be used to exclude transmission Elements (captured by the core definition and Inclusion I1) when Real Power resources are present that are captured by Inclusion I2, I3, or I4. This assures that interconnection facilities for BES generators are not excluded.

Key to diagram color coding:

- **Blue** indicates that an Element is included in the BES
- **Green** indicates that an Element is not included in the BES
- **Orange** indicates 'points of connection'.
- **Black** indicates Elements that are not evaluated for the specific exclusion depicted in the individual diagrams being shown.



- All voltages and generator ratings are utilized for illustrative purposes only. Actual voltages and generator ratings will vary depending on the system configuration.
- The depicted system **does not** contain dispersed power producing resources applicable to Inclusion I4.
- The depicted system **does not** include static or dynamic devices (excluding generators) dedicated to supplying or absorbing Reactive Power applicable to Inclusion I5 or Exclusion E4.

Figure S1-1: System Diagram – Base Diagram

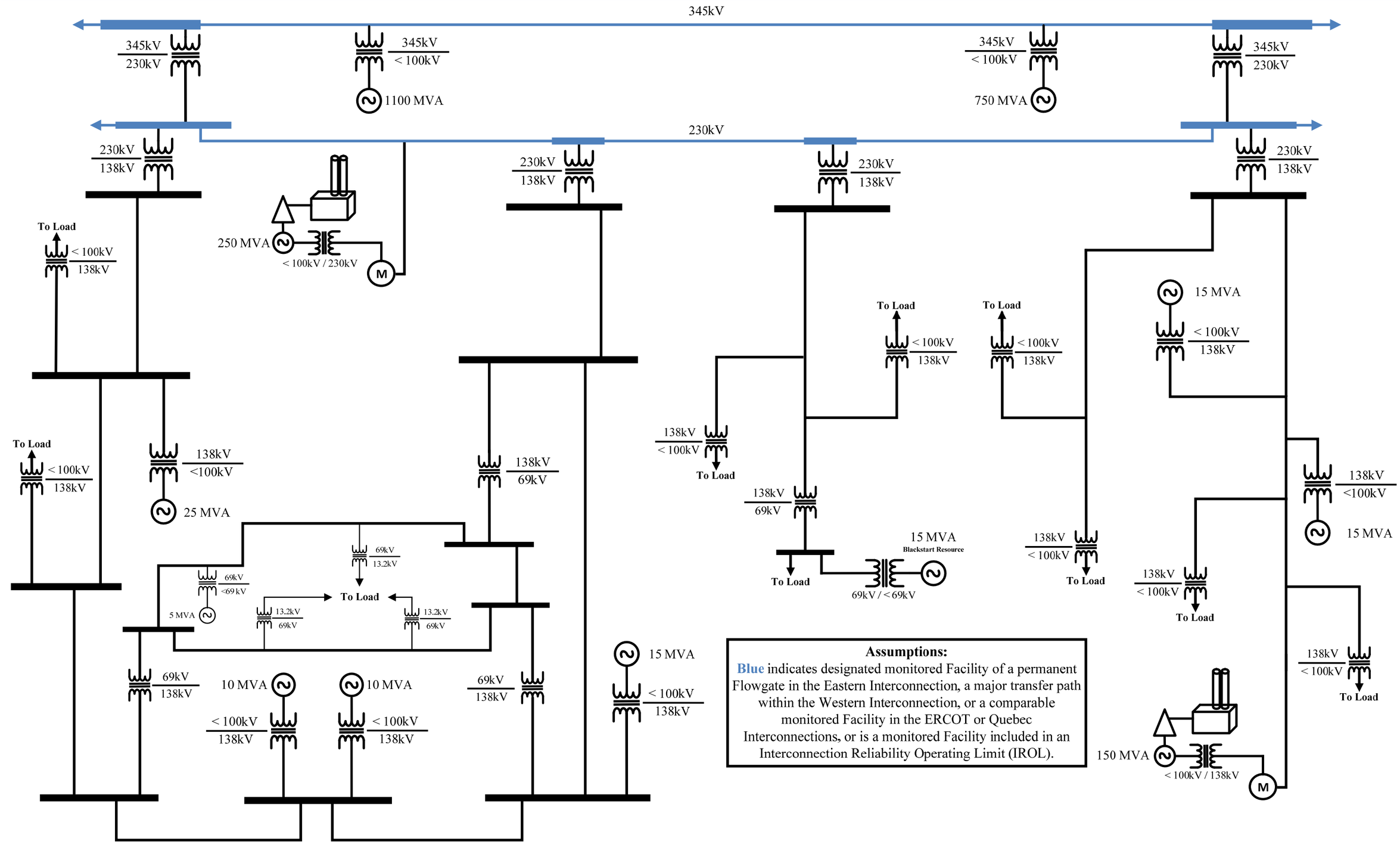
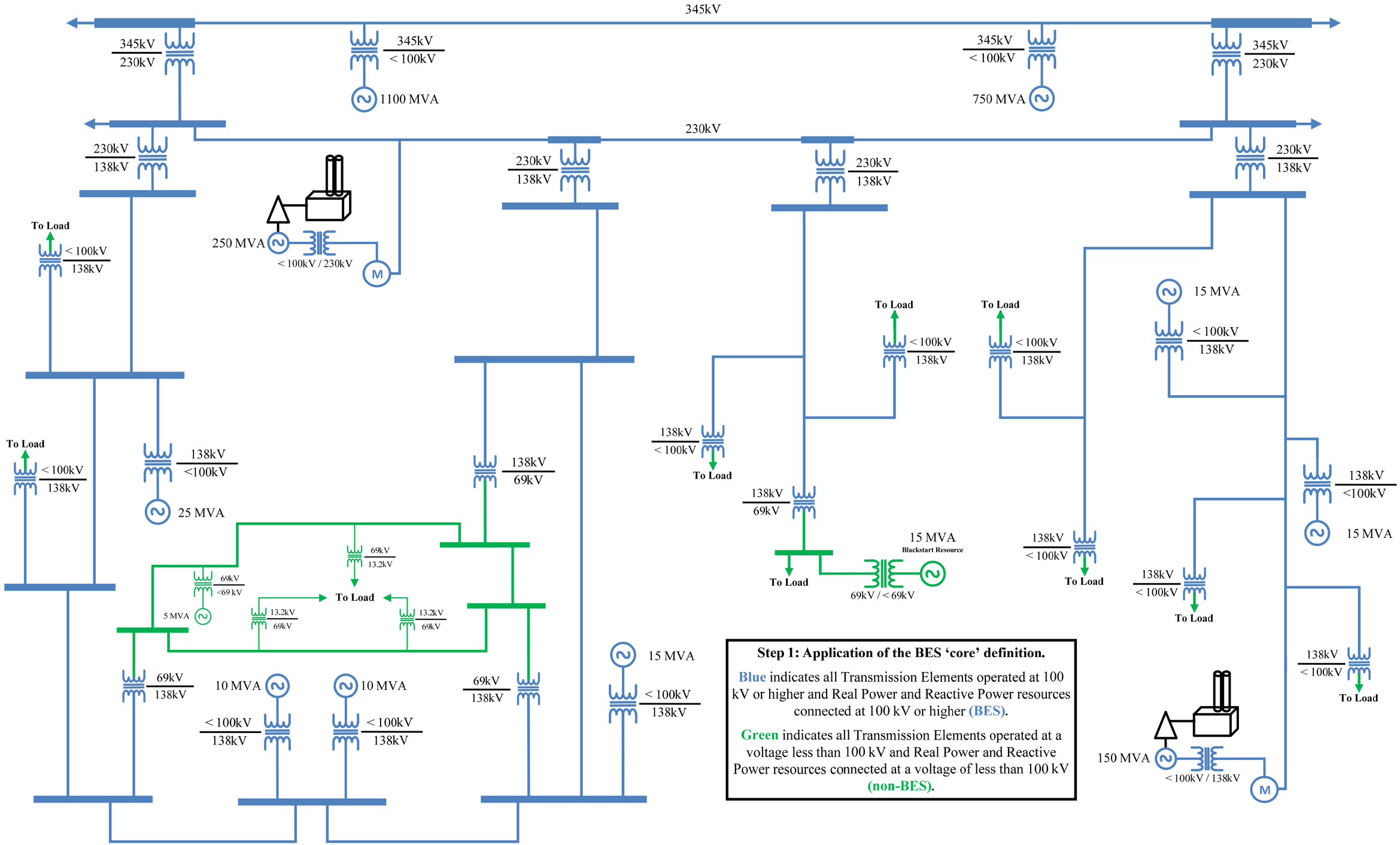


Figure S1-2: System Diagram - Assumptions

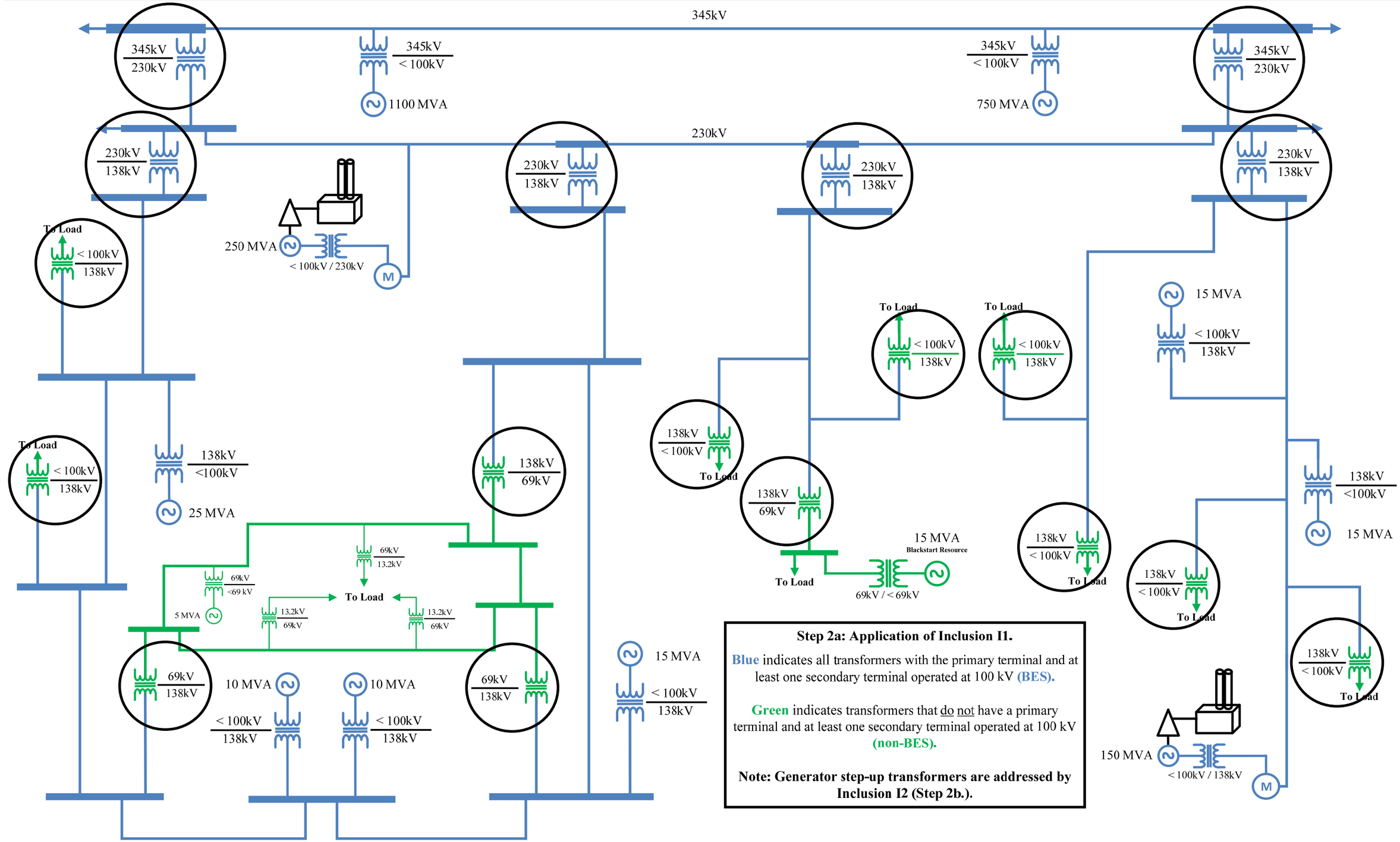


Step 1: Application of the BES 'core' definition.

Blue indicates all Transmission Elements operated at 100 kV or higher and Real Power and Reactive Power resources connected at 100 kV or higher **(BES)**.

Green indicates all Transmission Elements operated at a voltage less than 100 kV and Real Power and Reactive Power resources connected at a voltage of less than 100 kV **(non-BES)**.

Figure S1-3: System Diagram – Application of 'Core' Definition



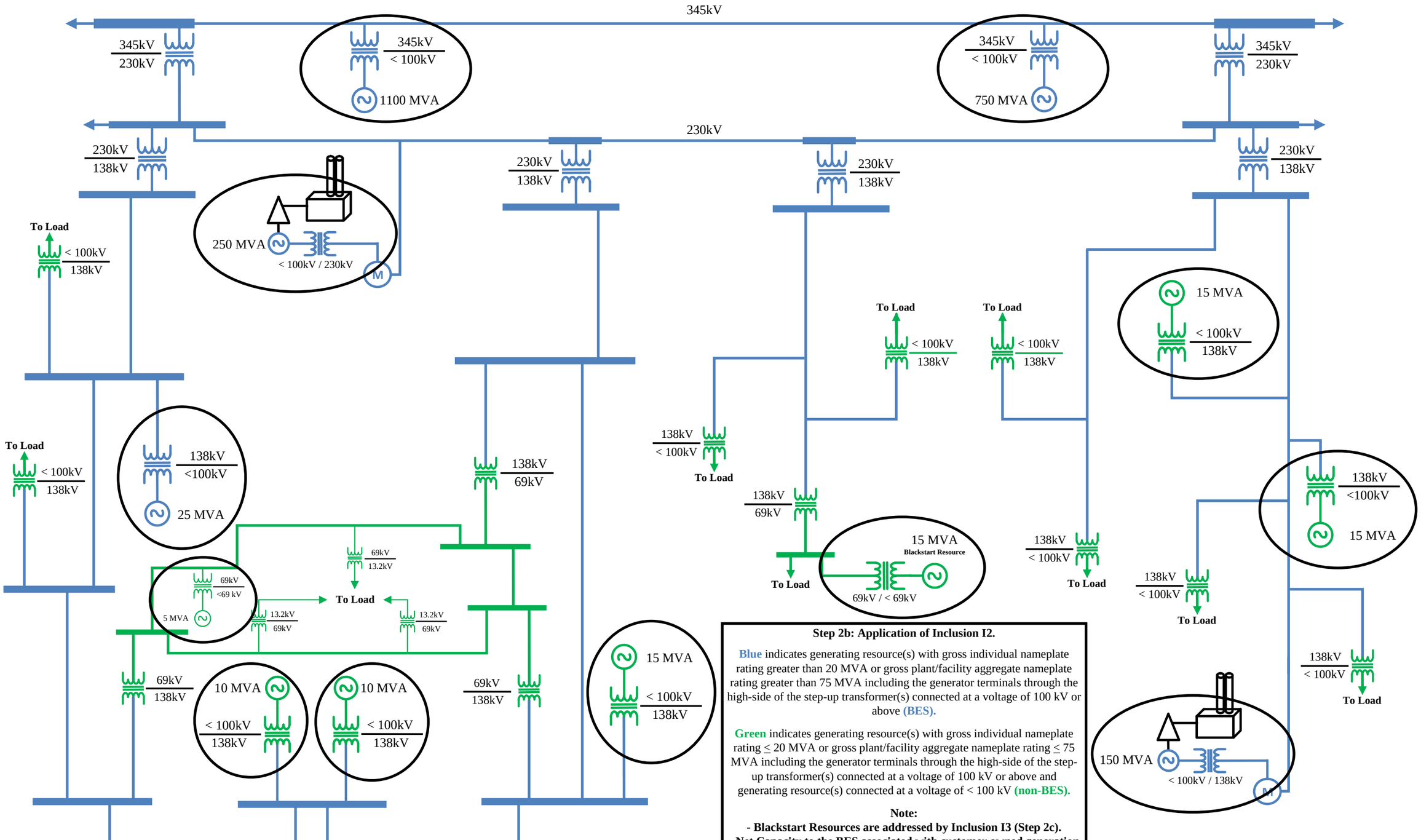
Step 2a: Application of Inclusion I1.

Blue indicates all transformers with the primary terminal and at least one secondary terminal operated at 100 kV **(BES).**

Green indicates transformers that do not have a primary terminal and at least one secondary terminal operated at 100 kV **(non-BES).**

Note: Generator step-up transformers are addressed by Inclusion I2 (Step 2b.).

Figure S1-4: System Diagram – Application of Inclusion I1



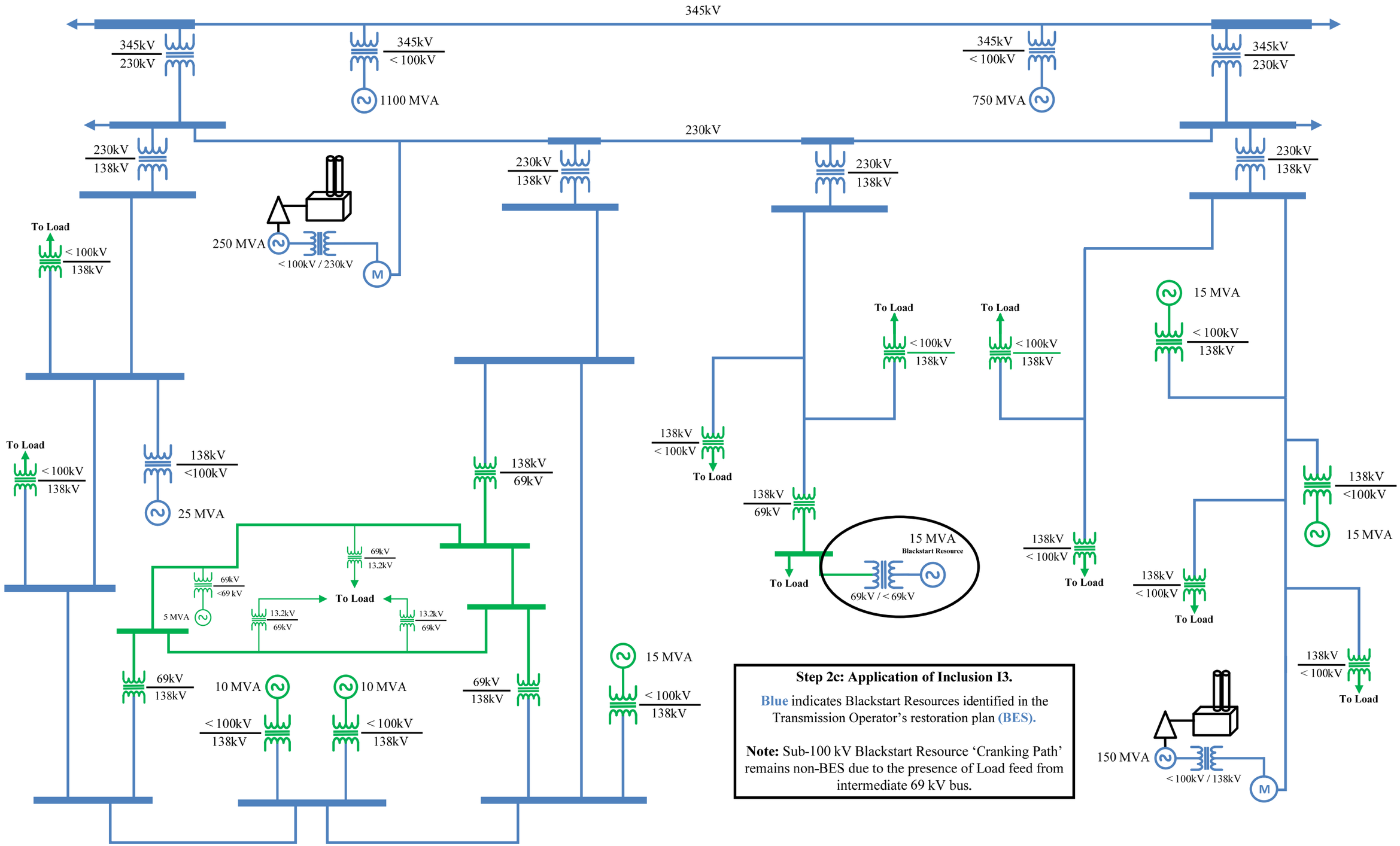
Step 2b: Application of Inclusion I2.

Blue indicates generating resource(s) with gross individual nameplate rating greater than 20 MVA or gross plant/facility aggregate nameplate rating greater than 75 MVA including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above **(BES).**

Green indicates generating resource(s) with gross individual nameplate rating ≤ 20 MVA or gross plant/facility aggregate nameplate rating ≤ 75 MVA including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above and generating resource(s) connected at a voltage of < 100 kV **(non-BES).**

Note:
- Blackstart Resources are addressed by Inclusion I3 (Step 2c).
- Net Capacity to the BES associated with customer owned generation behind the meter is addressed by Exclusion E2 (Step 3a).

Figure S1-5: System Diagram – Application of Inclusion I2

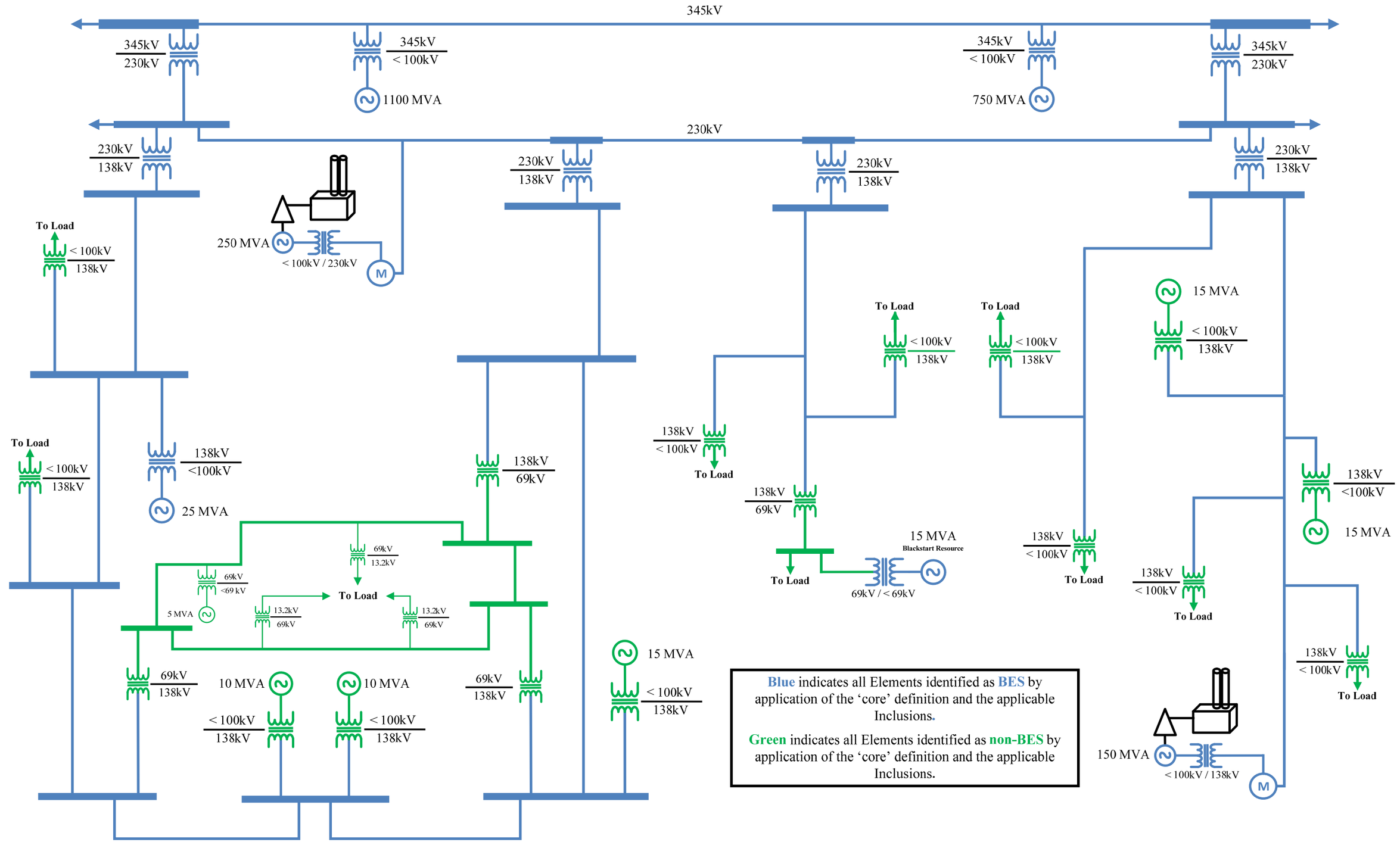


Step 2c: Application of Inclusion I3.

Blue indicates Blackstart Resources identified in the Transmission Operator's restoration plan **(BES).**

Note: Sub-100 kV Blackstart Resource 'Cranking Path' remains non-BES due to the presence of Load feed from intermediate 69 kV bus.

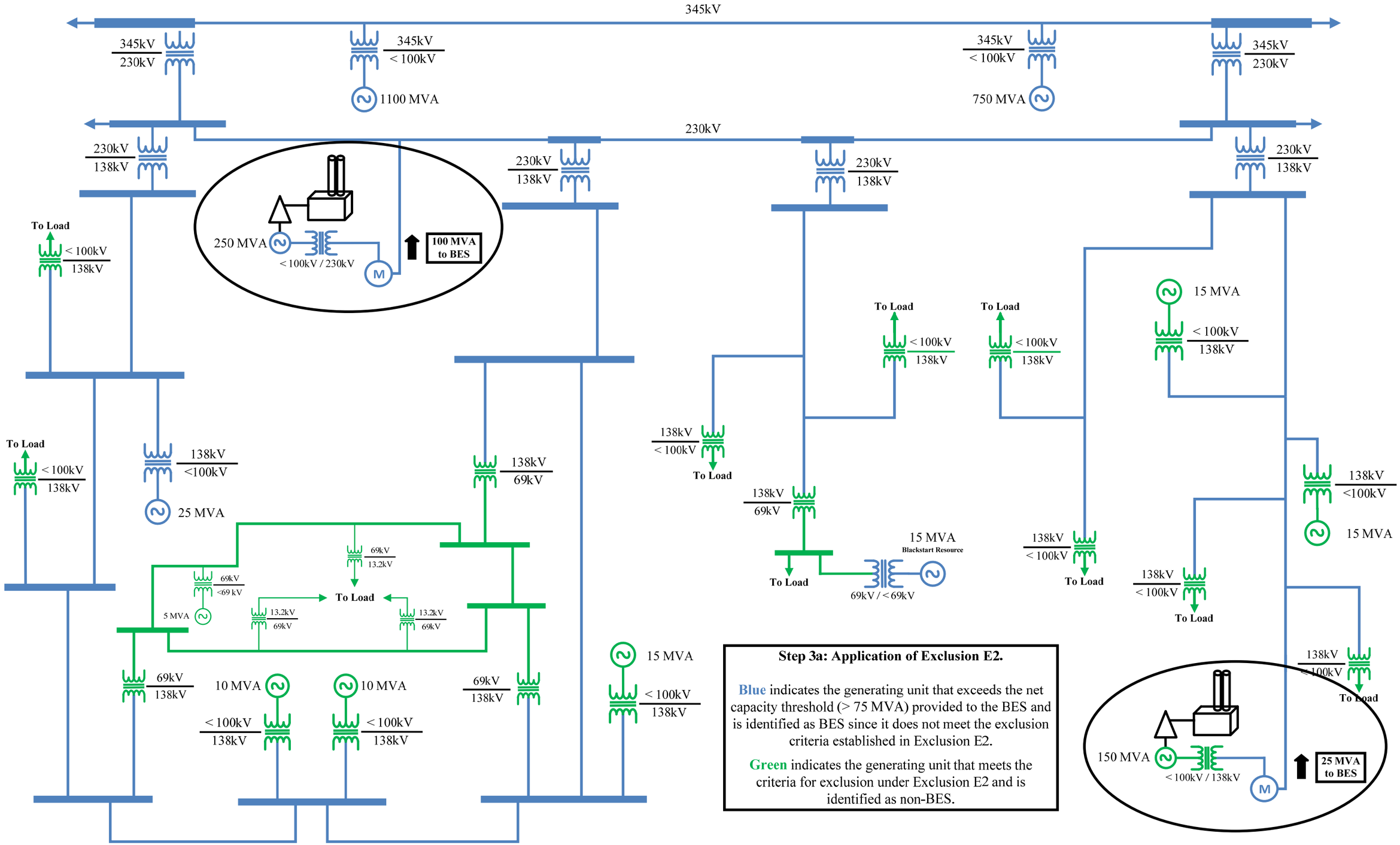
Figure S1-6: System Diagram – Application of Inclusion I3



Blue indicates all Elements identified as **BES** by application of the 'core' definition and the applicable Inclusions.

Green indicates all Elements identified as **non-BES** by application of the 'core' definition and the applicable Inclusions.

Figure S1-7: System Diagram – Application of 'Core' Definition & Inclusions



Step 3a: Application of Exclusion E2.

Blue indicates the generating unit that exceeds the net capacity threshold (> 75 MVA) provided to the BES and is identified as BES since it does not meet the exclusion criteria established in Exclusion E2.

Green indicates the generating unit that meets the criteria for exclusion under Exclusion E2 and is identified as non-BES.

Figure S1-8: System Diagram – Application of Exclusion E2

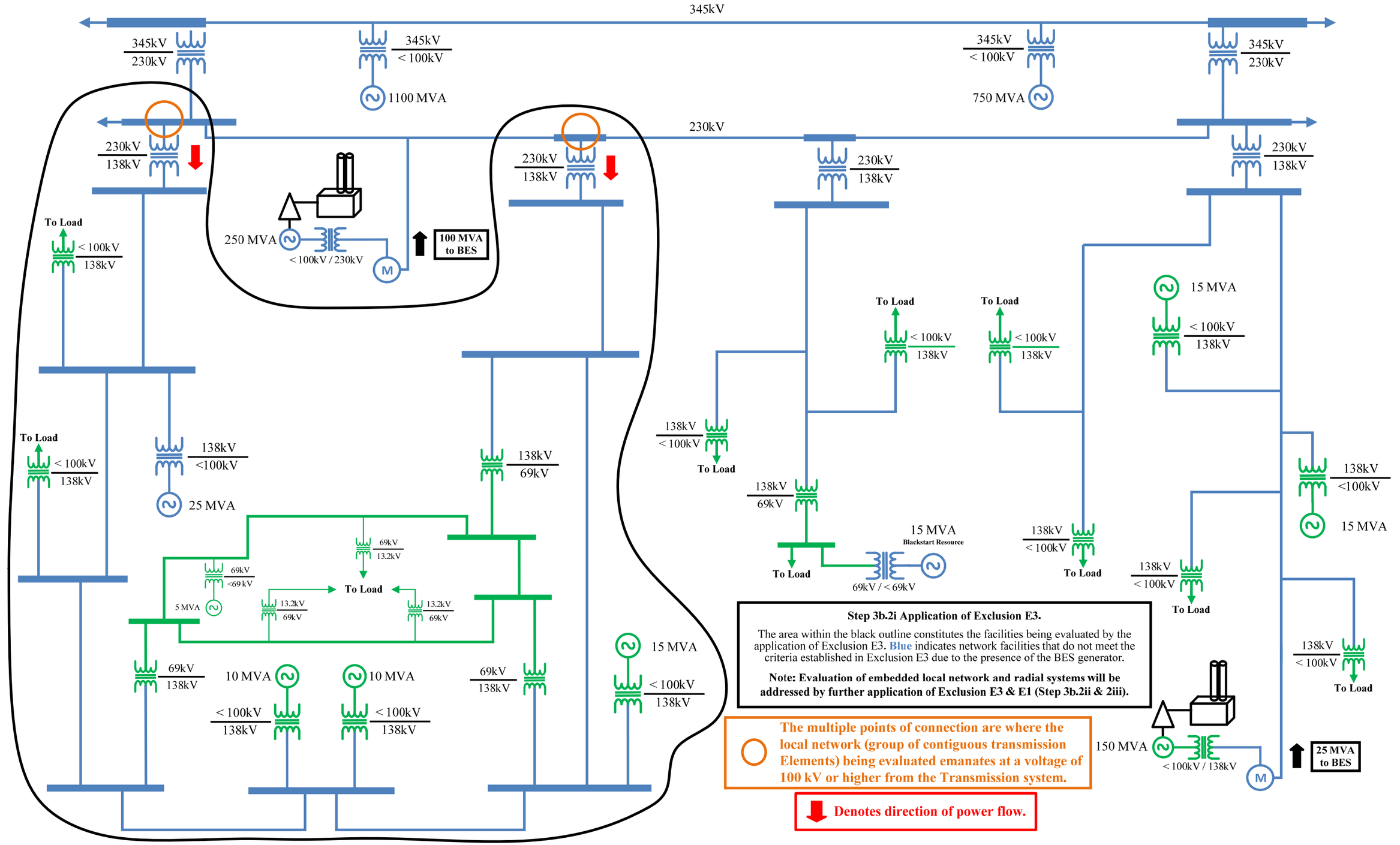


Figure S1-9: System Diagram – Application of Exclusion E3

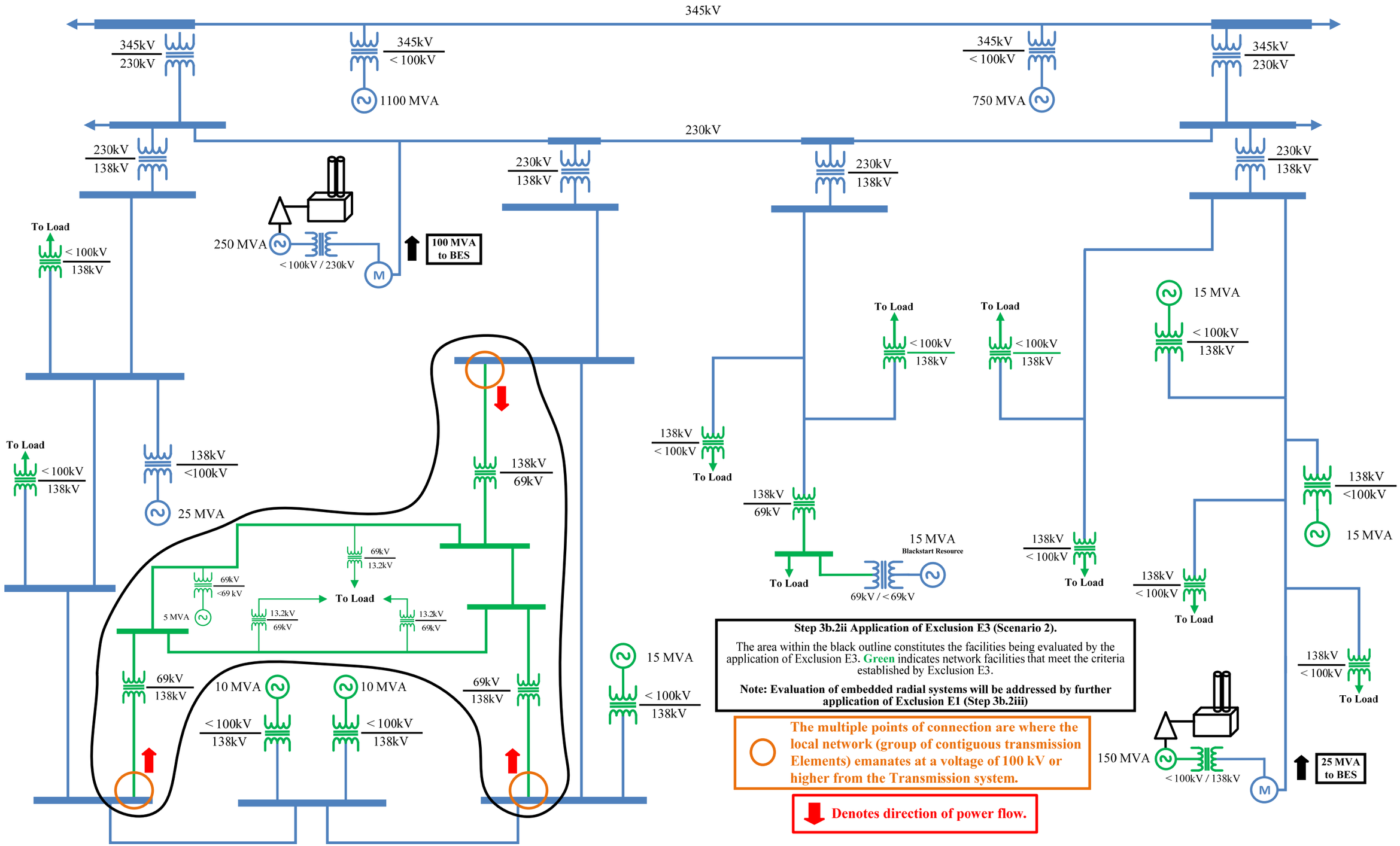


Figure S1-9a: System Diagram – Application of Exclusion E3 (Embedded Local Network)

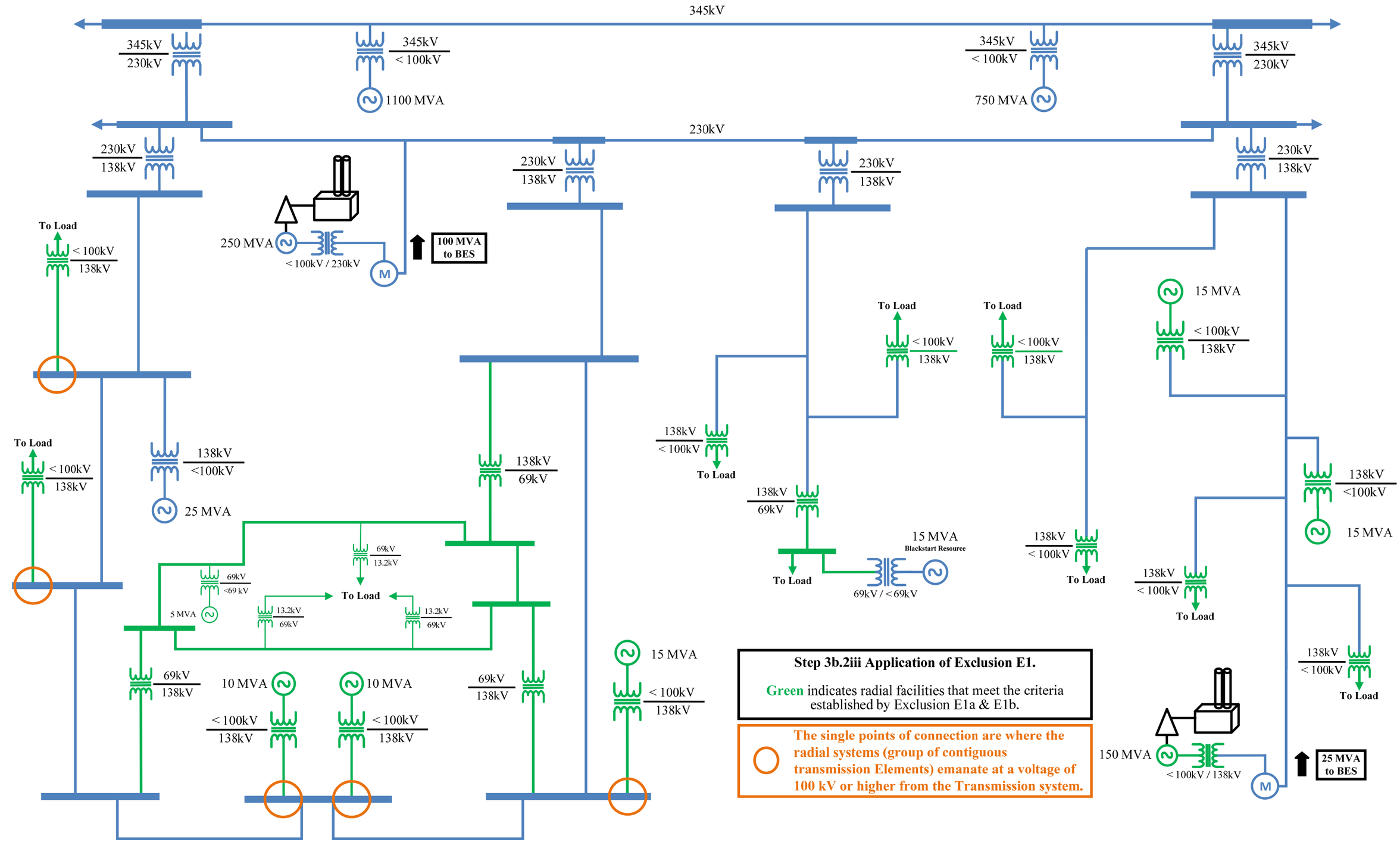
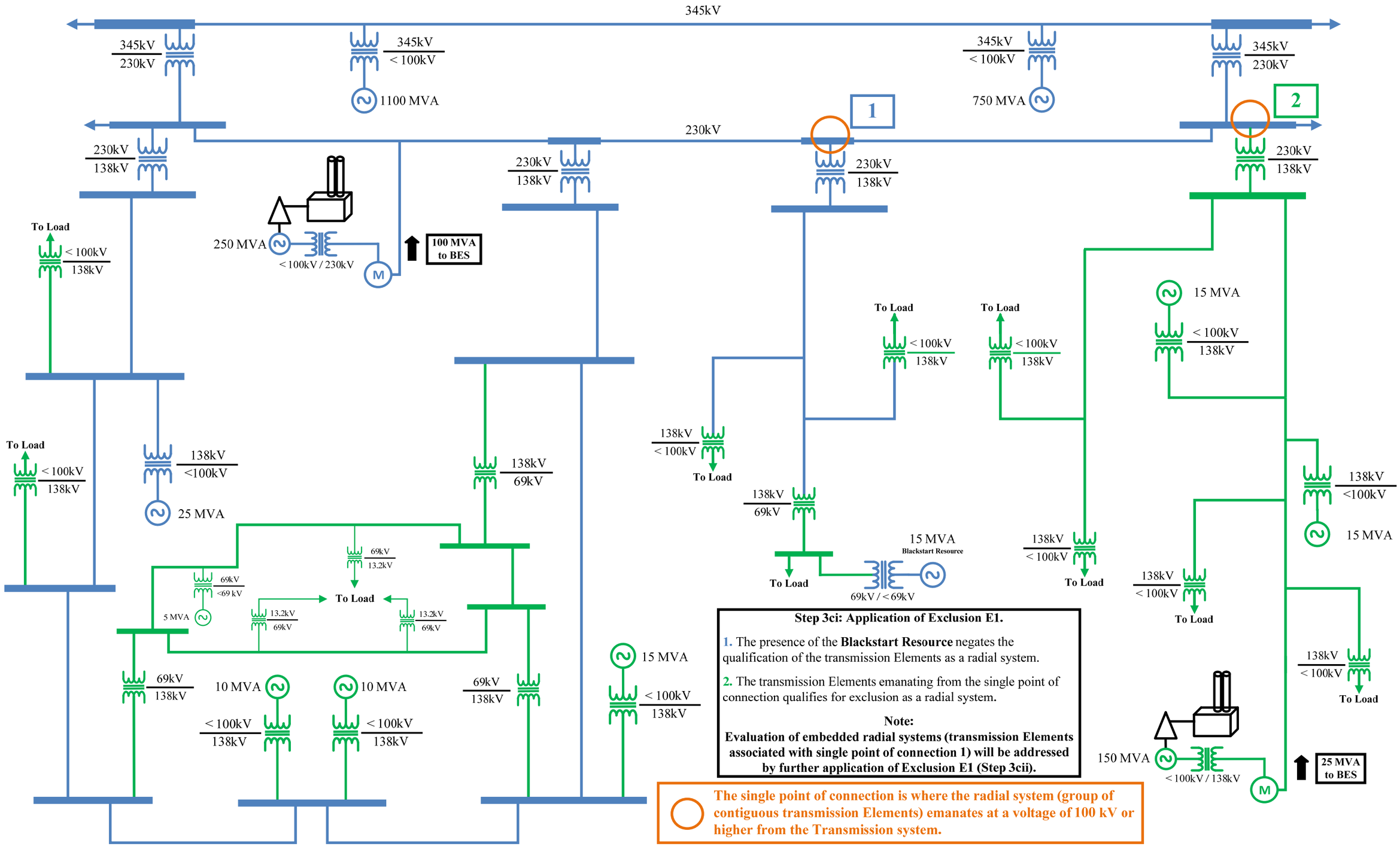


Figure S1-9b: System Diagram – Application of Exclusion E3 (Embedded Radial Systems)



Step 3ci: Application of Exclusion E1.

1. The presence of the **Blackstart Resource** negates the qualification of the transmission Elements as a radial system.

2. The transmission Elements emanating from the single point of connection qualifies for exclusion as a radial system.

Note:
Evaluation of embedded radial systems (transmission Elements associated with single point of connection 1) will be addressed by further application of Exclusion E1 (Step 3cii).

The single point of connection is where the radial system (group of contiguous transmission Elements) emanates at a voltage of 100 kV or higher from the Transmission system.

Figure S1-10: System Diagram – Application of Exclusion E1 (Part 1)

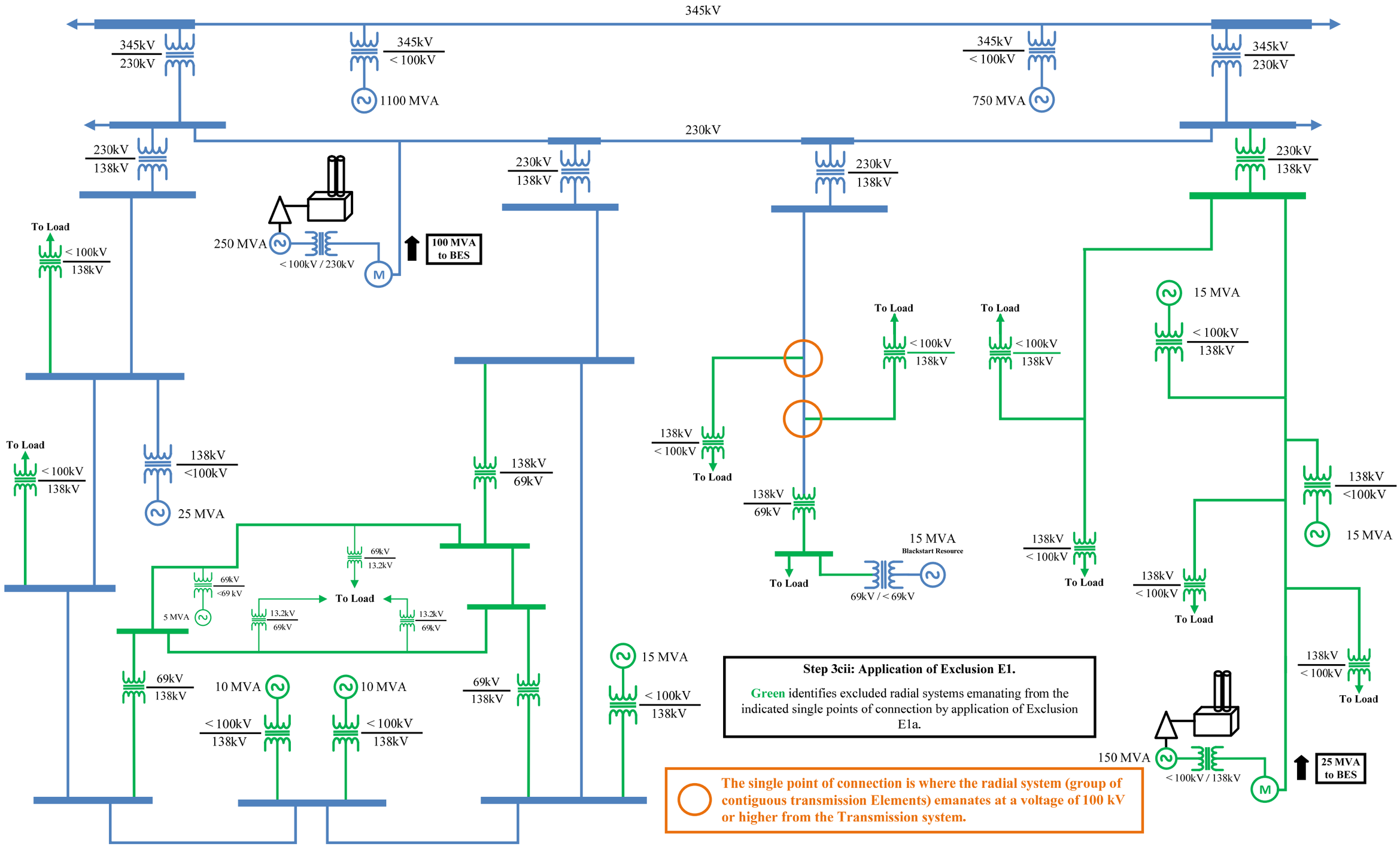


Figure S1-10a: System Diagram – Application of Exclusion E1 (Part 2)

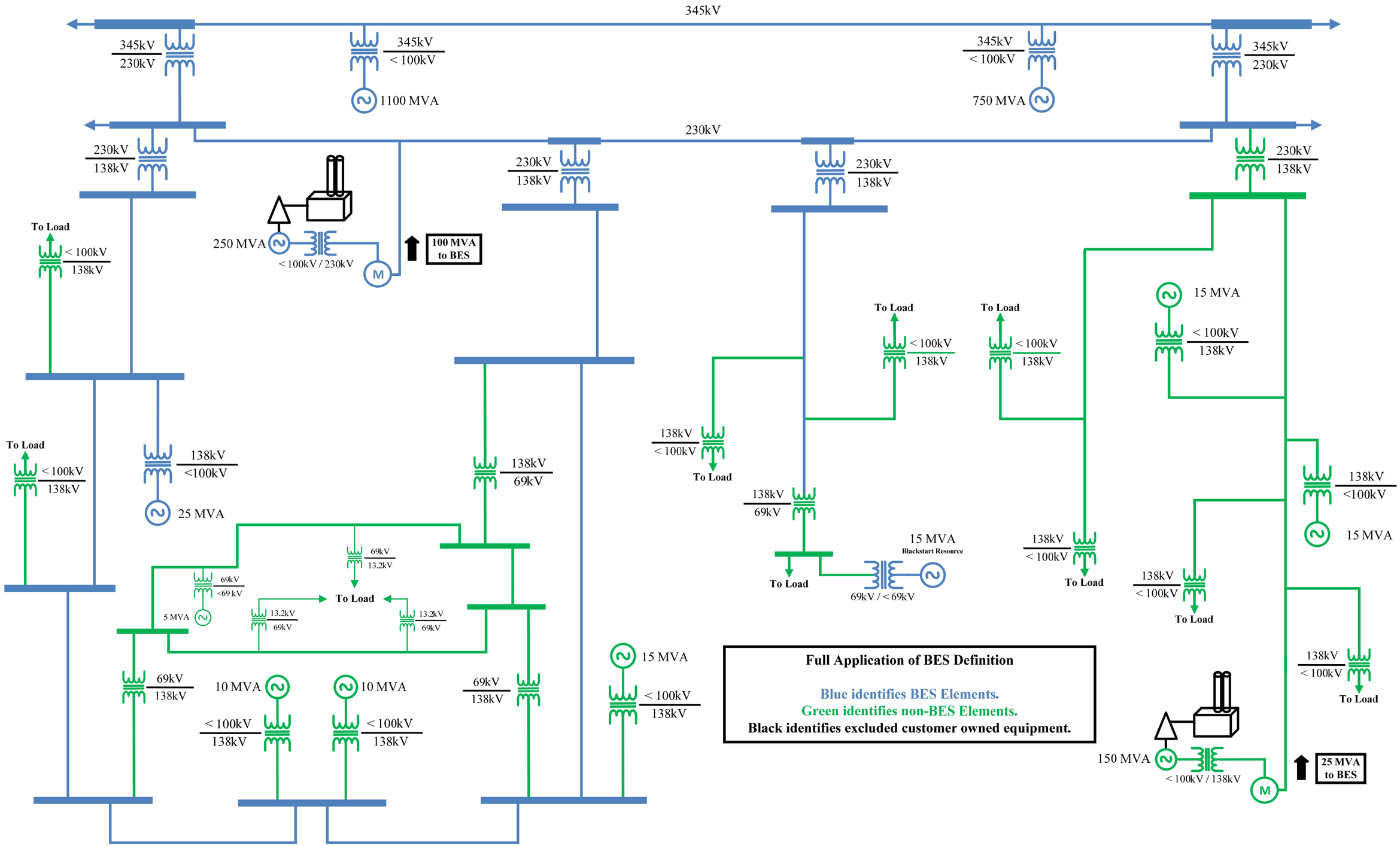


Figure S1-11: System Diagram – Full Application of BES Definition

V. Availability of Exception Process

In the event that the BES definition designates an Element as BES that an entity believes is not necessary for the reliable operation of the interconnected Transmission network or designates an Element as non-BES that an entity believes is necessary for the reliable operation of the interconnected Transmission network, the ERO Rules of Procedure exception process may be utilized on a case-by-case basis to either include or exclude an Element.

The exception process can be found in Section 5C of the ERO Rules of Procedure: “Procedure for Requesting and Receiving an Exception from the Application of the NERC Definition of Bulk Electric System.”