Traduction attestée du document de référence sur la définition du réseau de transport principal

Reference document on Main Transmission System definition

Reliability Coordinator for Québec

Version 1.0

I hereby certify that this is a complete and accurate translation into English of the attached French document.

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OTTIAQ, Member No. 7979
Signed in Montréal, Québec, on December 5, 2023

Preface

This technical reference document was prepared by the Reliability Coordinator for Québec to support Registered Entities in applying the Main Transmission System (Réseau de transport principal, or RTP) definition. This document must be read in conjunction with the full definition presented in the *Glossary of Terms and Acronyms Used in Reliability Standards* along with any requests or instructions issued by the Régie de l'énergie. To submit a request for exception from the definition, follow the procedure indicated in this document: *Procedure for identifying Elements of the Main Transmission System (RTP)*. These two documents can be viewed on the Reliability Coordinator's website.

Hydro-Québec | Direction principale – Contrôle des mouvements d'énergie et exploitation du réseau | Reliability Coordinator for Québec

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Introduction

In drafting this definition of the Main Transmission System (RTP), the Reliability Coordinator drew on documentation for interpreting the definition of the Bulk Electric System (BES) available on the North American Electric Reliability Corporation (NERC) website. The Coordinator has prepared this document as a guide for interpreting the definition of the RTP.

Opening statement

This document does not represent an official position of the Reliability Coordinator or the Régie de l'énergie in Québec, and it does not bind decisions arising from monitoring of compliance. This document is a professional opinion prepared by the Reliability Coordinator to offer illustrative guidance to the registered entities in their own determination of RTP Elements and should not be interpreted as prescriptive.

History

On May 14, 2020, the Régie de l'énergie rendered Decision D-2020-052,[1] in which it accepted the Reliability Coordinator for Québec's request to submit a methodology for identifying Elements making up the Main Transmission System (RTP) (the "Methodology") to ensure that all Elements necessary for the reliability of the Québec Interconnection are subject to the Reliability Standards developed by NERC. The final definition and methodology were acknowledged by the Régie de l'énergie on month XX, 20XX, in Decision D-20xx-xxx.

Purpose

The main purpose of this document is to provide explanations and examples that can help Registered Entities in applying the definition of the RTP, as it is the responsibility of these entities to act in a consistent, non-discriminatory manner and in the public interest when the mandatory reliability regime is applied.

[1] Régie Decision D-2020-52, available at http://publicsde.regie-energie.qc.ca/projets/486/DocPrj/R-4073-2018-A-0013-Dec-Dec-2020_05_14.pdf

Definition

The RTP definition can be viewed on the Coordinator's website, under the Documentation tab, Main Transmission System (RTP) tab, in the document entitled Definition of the Main Transmission System. The definition can also be consulted in the *Glossary of Terms and Acronyms Used in Reliability Standards*.

Summary

An understanding of the basic principle of the RTP, along with its inclusions and exclusions, is required to consistently apply the definition of the RTP. Note that the definition applies both to alternating current (AC) and direct current (DC) facilities. For cases where a physical boundary to the RTP or cut-off must be determined, disconnect points (circuit breakers, disconnect switches, etc.) may be used. Application of the definition of the RTP demands deterministic criteria for what is included in the RTP and what is excluded. It is a three-step process that, if executed appropriately, makes it possible to determine most of the Elements of the RTP for the entire Québec Interconnection.

Step 1: Application of basic principle

The general principle of applicability underscores the unique nature of the topology of the Québec power grid. This principle establishes a clear demarcation within which all Transmission Elements operated at 300 kV or higher as well as Active Power and Reactive Power resources connected at a voltage of 300 kV or higher are included in the RTP. It also specifies that all Transmission Elements operated at a voltage of 700 kV or higher as well as Transmission Elements associated with Transmission Elements operated at a voltage of 700 kV or higher cannot be excluded from the RTP.

Step 2: Application of inclusions

The second step consists in applying six specific and complementary inclusions in a pre-determined sequence to clarify the basic principle and clearly establish the Elements included in the RTP. Note that although the inclusions are complementary to the basic principle, they may overlap, or one or more inclusions may overlap the basic principle.

Step 3: Application of exclusions

This step consists in evaluating specific situations for potential exclusion from the RTP. Exclusions are formulated to define Elements or groups of Elements that can be specifically excluded from the RTP. Note that for an Element to qualify for exclusion, it must also be included in the RTP under the basic principle or at least one inclusion.

In the hierarchical application of the RTP definition, the exclusions take precedence over the inclusions, except Inclusion I6, whose application involves certain specificities, as described in the section on Inclusion I6. A full example of the hierarchical application of the RTP definition is provided in the last section of this document.

Inclusions

Each inclusion is shown below with both text and diagrams explaining how to apply the RTP definition for the configurations shown. These examples are not to be considered prescriptive.

The diagrams depict specific applications of the RTP definition. Parts of the diagrams are in black to indicate that no hypotheses have been issued for those parts of the network.

Key to diagram color coding:

- **Blue** indicates that an Element is included in the RTP.
- **Green** indicates that an Element is excluded from the RTP.
- **Orange** indicates a point of connection.
- **Black** indicates an Element that has not been evaluated in the case depicted.

Inclusion I1

I1: Transformers with a terminal operated at 700 kV or higher and associated bus bars.

Figures I1-1 to 1-4 depict various types of transformer operating configurations typically used in the industry.

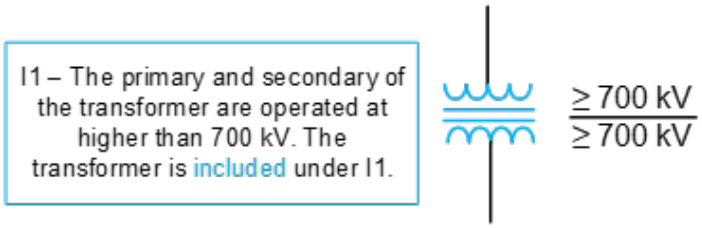


Figure I1-1: Typical transformer operated at higher than 700 kV

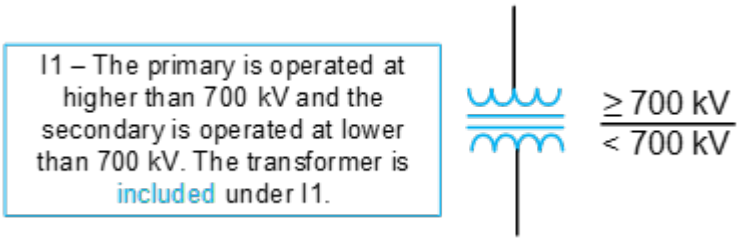


Figure I1-2: Typical transformer with primary operated at higher than 700 kV

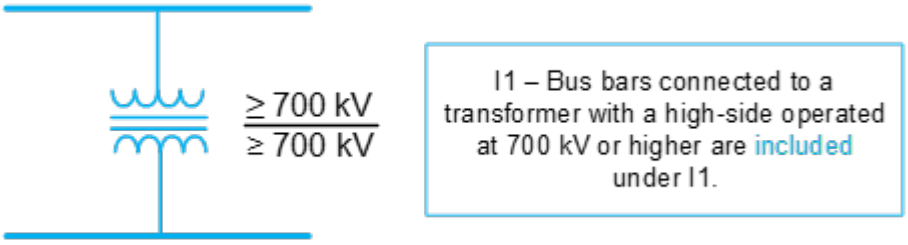
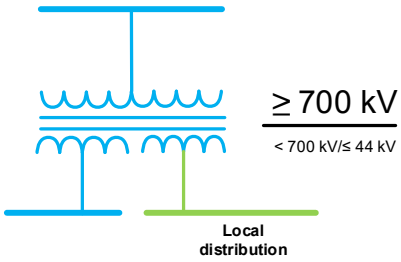


Figure I1-3: Transformer with primary operated at higher than 700 kV and associated bus bars



I1 – Bus bars connected to a transformer with a high-side operated at 700 kV or higher are included under I1, except a bus bar or connection serving distribution needs exclusively (e.g., supply of a substation building).

Figure I1-4: Transformer with primary operated at higher than 700 kV and serving distribution needs

Inclusion I2

I2: Generation resource(s) that is/are part of a generating station or a facility whose gross aggregate nameplate rating is greater than 75 MVA, and:

- for a generation resource Connected to the RTP, generator terminals through the high-side of the step-up transformer(s);
- for a generation resource Not Connected to the RTP, generator terminals through the low-side of the step-up transformer(s).

The interpretation of “and” in Inclusion I2 must be understood as the second condition to be fulfilled should the gross aggregate nameplate rating of the generation resource be higher than 75 MVA.

The presence of a system service, station service or generator auxiliary transformer does not affect the application of Inclusion I2. Transformers associated with system service, station service or generator auxiliaries form part of the RTP according to application of the basic principle or Inclusion I1.

Cut-off point as limit of application

For a generation resource Not Connected to the RTP, the RTP limit must be the first disconnect point (circuit-breaker, disconnect switch, etc.) beyond the generating unit or the low-voltage connection of the step-up transformer associated with the generating unit. Thus, the entire portion between the generation resource(s) and the cut-off point must be included in the RTP.

Note: Figures I2-6 to I2-12 depict the bus bar configuration of the generation resource and the point of aggregation/connection of the generation facility, typically located on the site of the generation resource. The configurations of the bus bars of the generation resources vary according to the situation and include but are not limited to the following: single bus configurations, breaker-and-a-half bus configurations and ring bus configurations.

Figure 5: A typical bus bar

Figure I2-6 depicts a single generation resource with a gross nameplate rating higher than 75 MVA connected to a step-up transformer with a high-side voltage exceeding or equal to 300 kV. By application of Inclusion I2, the generation resource is recognized as an RTP Element.

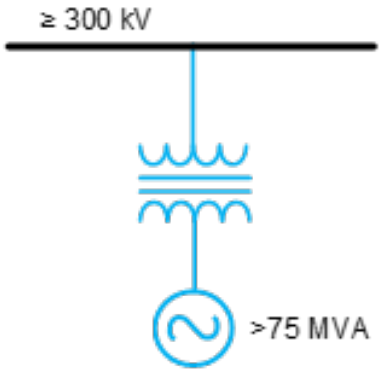


Figure I2-6: Generation resource higher than 75 MVA Connected to the RTP

Figure I2-7 depicts a single generation resource with a gross nameplate rating higher than 75 MVA connected to a step-up transformer with a high-side voltage of less than 300 kV. By application of Inclusion I2, the generation resource is recognized as an RTP Element.

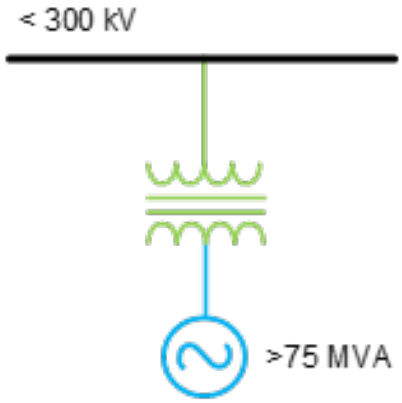


Figure I2-7: Generation resource higher than 75 MVA Not Connected to the RTP

Figure I2-8 depicts a single generation resource with a gross nameplate rating less than or equal to 75 MVA. The voltage level of the step-up transformer is irrelevant in applying Inclusion I2. The generation resource is not considered as an RTP Element.

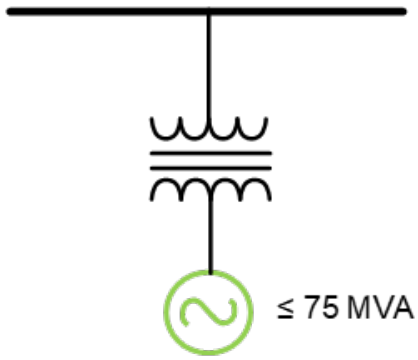


Figure I2-8: Generation resource of 75 MVA or less

Figure I2-9 depicts a generation facility with multiple generation resources (generating units, for example) connected to a ≥300-kV bus bar. The facility gross aggregate nameplate rating is less than 80 MVA. By application of Inclusion I2, each of the generation resources is included in the RTP.

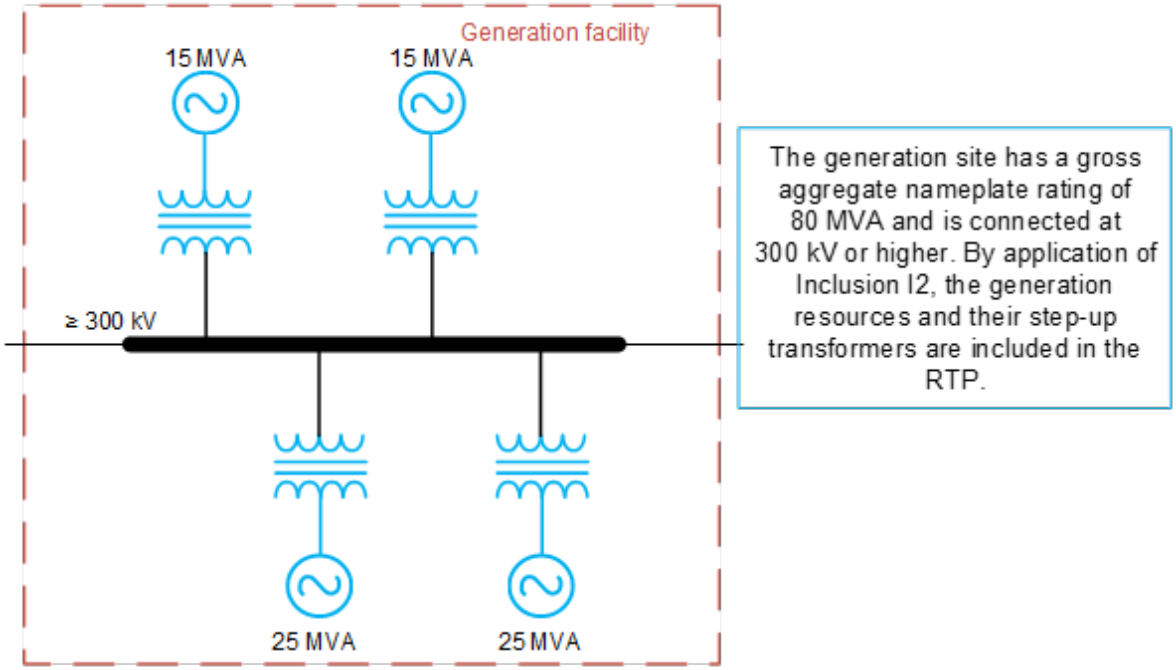


Figure I2-9: Generating station with multiple generating units connected at 300 kV

Figure I2-10 depicts a generation facility with multiple generation resources connected to a ≥300-kV bus bar. The facility's gross aggregate nameplate rating is 60 MVA. By application of Inclusion I2, these generation resources are not included in the RTP.

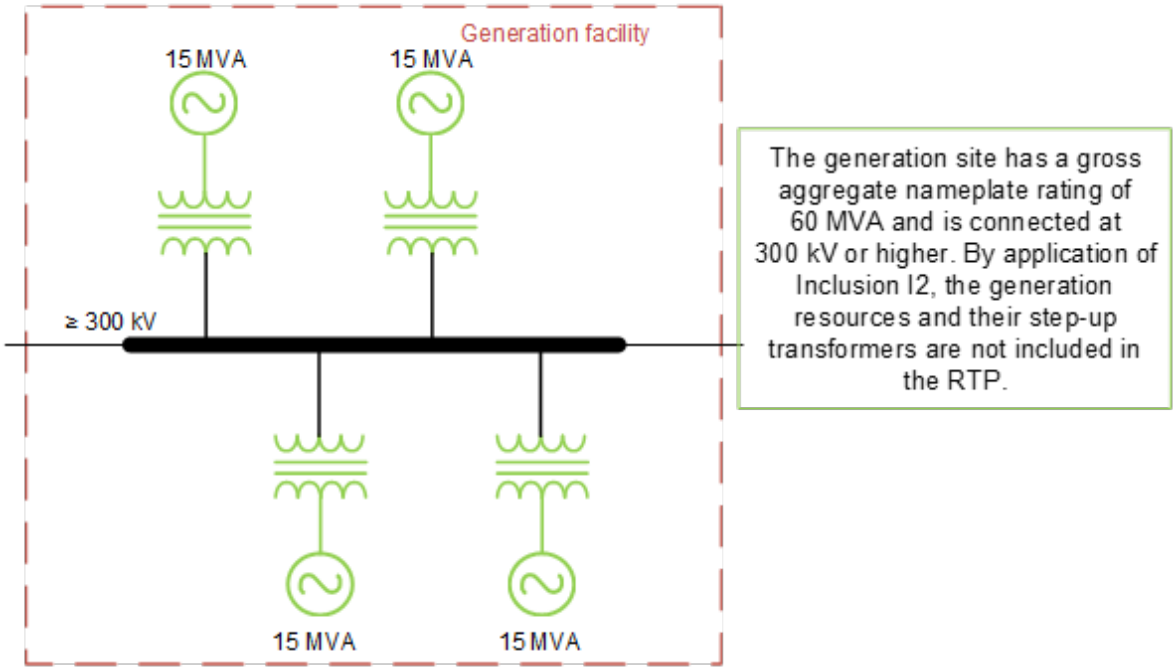


Figure I2-10: Generating station with a gross nameplate rating less than 75 MVA

Figure I2-11 depicts a generation facility with multiple generation resources connected to a common point at a voltage of 300 kV or higher through the high side of the step-up transformers. The facility's gross aggregate nameplate rating is over 75 MVA. By application of Inclusion I2, all of the generation resources connected are included in the RTP. The generation resource with a gross nameplate rating of 10 MVA is included in the aggregated generation since the step-up transformers and the bus bar are connected exclusively to connect the generation resource to the bus bar. The step-up transformers were installed for the sole purpose of increasing the output voltage of the generation resources so they could be connected to the transmission corridor (300 kV or higher).

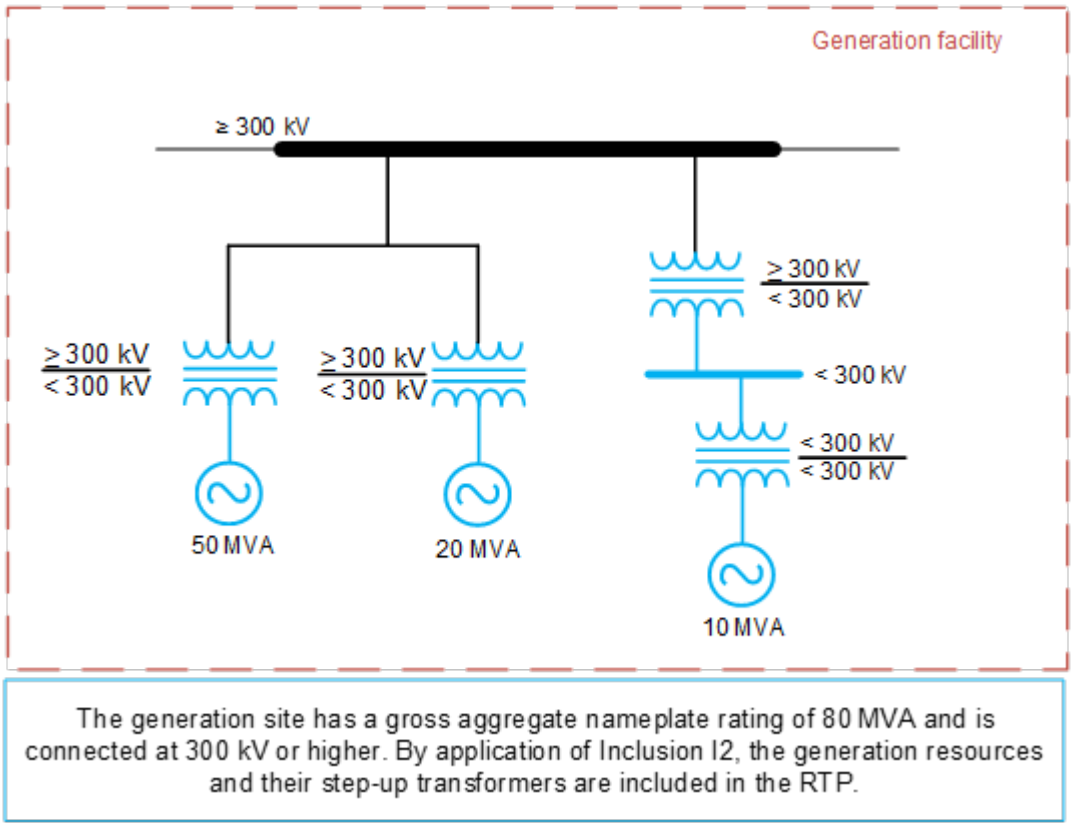
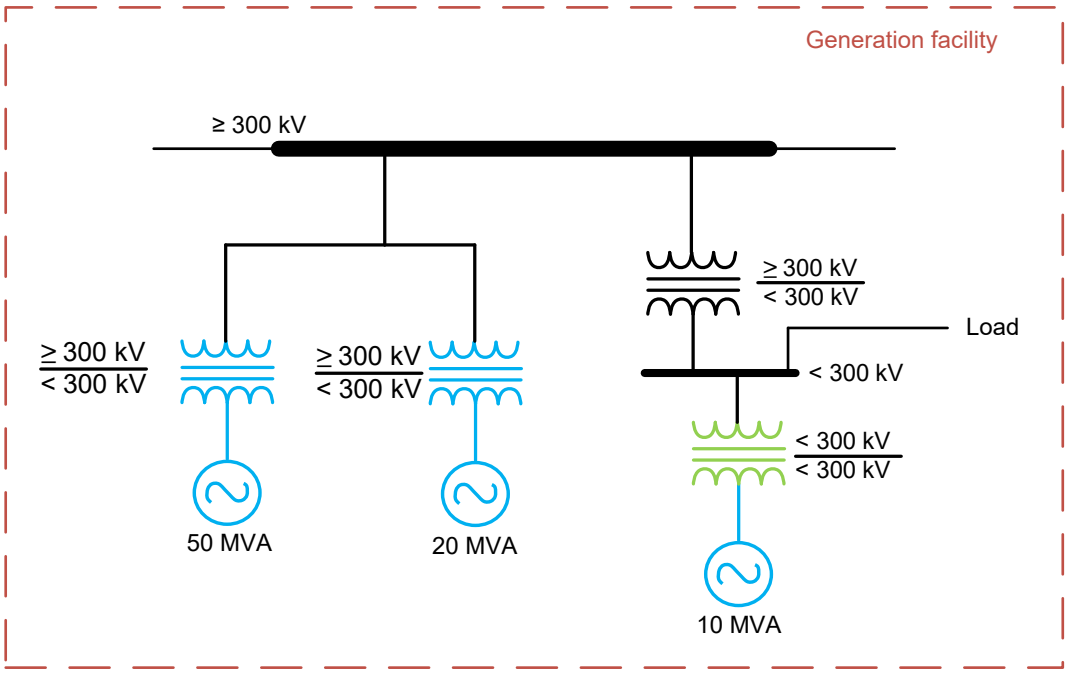


Figure I2-11: Generating station with total gross nameplate rating above 75 MVA and one generating unit with multiple voltage transformation levels

Figure I2-12 depicts a generation facility with multiple generation resources connected to a common point at a voltage of 300 kV or higher. The facility's gross aggregate nameplate rating is over 75 MVA. The generation resource with a gross nameplate rating of 10 MVA is included in the aggregated generation since it is part of the generation facility. However, its transformer at distribution voltage serving load is not included in the RTP.



The generation site has a gross aggregate nameplate rating of 80 MVA and is connected at 300 kV or higher. By application of Inclusion I2, the generation resources are included in the RTP, as are their step-up transformers. The transformer serving load, however, is excluded.

Figure I2-12: Generating station with gross nameplate rating higher than 75 MVA but one generating unit serving load

Inclusion I3

I3: Blackstart Resources identified in the Transmission Operator's Restoration Plan.

The *Glossary of Terms and Acronyms Used in Reliability Standards* defines a 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 (TOP) Restoration Plan refers to the System restoration plan discussed in Reliability Standard EOP-005, System Restoration from Blackstart Resources.

No figure is presented specifically for Inclusion I3 due to the simplicity of the language of this inclusion.

Inclusion I4

I4: Dispersed Power Producing Resources having a gross aggregate nameplate rating greater than 75 MVA and connected through a system designed primarily for delivering such capacity to a common point of connection. In such cases, the facilities designated as part of the RTP are:

- the individual resources, and
- 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.

Common point of connection

The common point of connection is the location where Transmission Elements of the collector system (designed primarily for delivering capacity to the Transmission System) are connected to the Transmission System. This point is typically indicated in the Transmission Owner's (TO) connection requirements and the Generator Owner's (GO) connection requirements. The gross nameplate rating of a configuration including a common point of connection is calculated without regard to the facility owner.

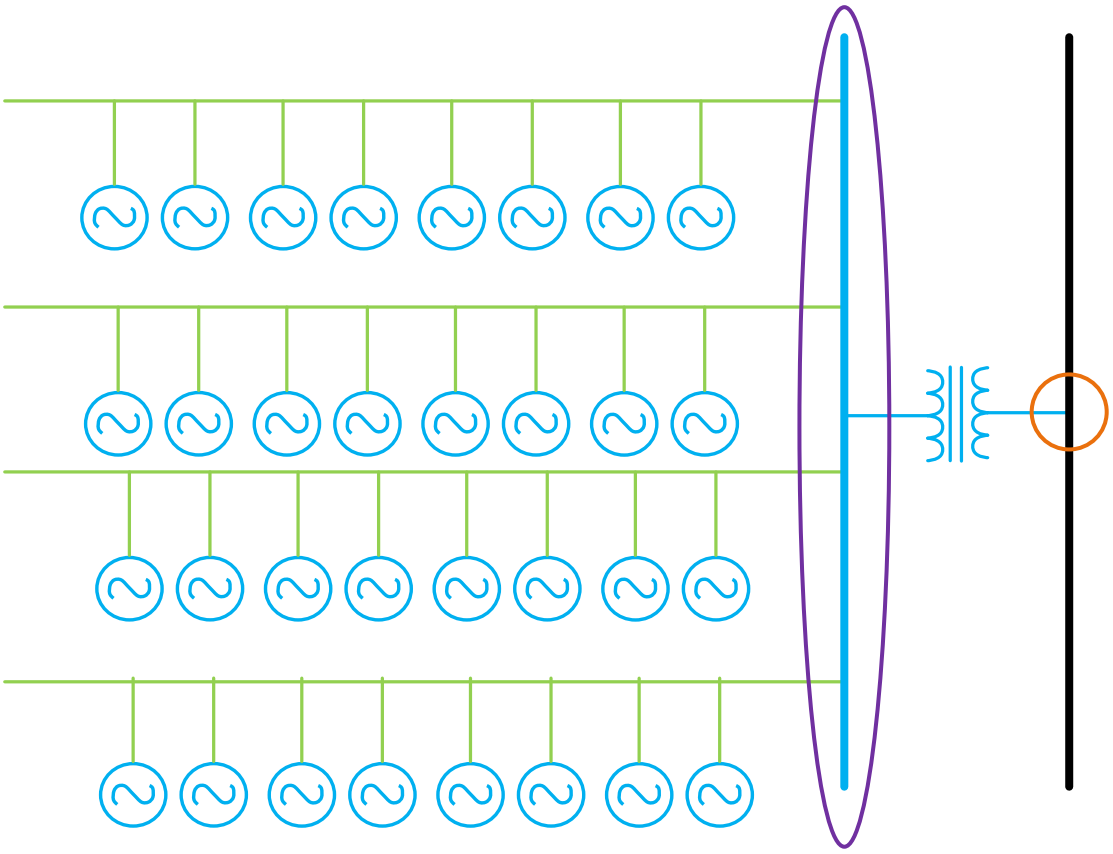
Collector system

The basis for this determination takes into account the significant differences in collector system configurations that exist today and that do not lend themselves to a continent-wide bright-line determination.

It is therefore necessary to correctly determine the parts of the collector system that systematically contribute to the reliability of the Transmission System. The result identifies the point of aggregation of more than 75 MVA and the facilities interconnecting to the Transmission System. This aggregation threshold is consistent with the aggregation of capacity specified in Inclusion I4 and recognizes that the loss of these facilities would result in a loss of capacity of more than 75 MVA for the Transmission System.

In sum, the collector system is designed primarily to deliver capacity from the point where Dispersed Power Producing Resources aggregate capacity greater than 75 MVA to the common point of connection with the Transmission System.

Figure I4-13 depicts a wind farm of 32 turbines, each with a gross nameplate rating of 2.5 MVA, for a gross aggregate nameplate rating for the generation facility of 80 MVA. In this case, the individual resources and the common point of connection to the Transmission System are part of the RTP.



The point of aggregationis the location where the individual nameplate ratings of the dispersed generation resources total more than 75 MVA and a failure would result in loss of 75 MVA capacity or greater to the RTP.

The common point of connection is the location where Transmission Elements of the collector system are connected to the transmission system. (This point is generally defined in the connection requirements of the transmission facility owner.)

Figure I4-13: Dispersed generation site – wind farm

Figure I4-14 depicts a dispersed generation site and switchyard design with unknown collector system configuration. The gross aggregate nameplate rating is 80 MVA at the point of aggregation.

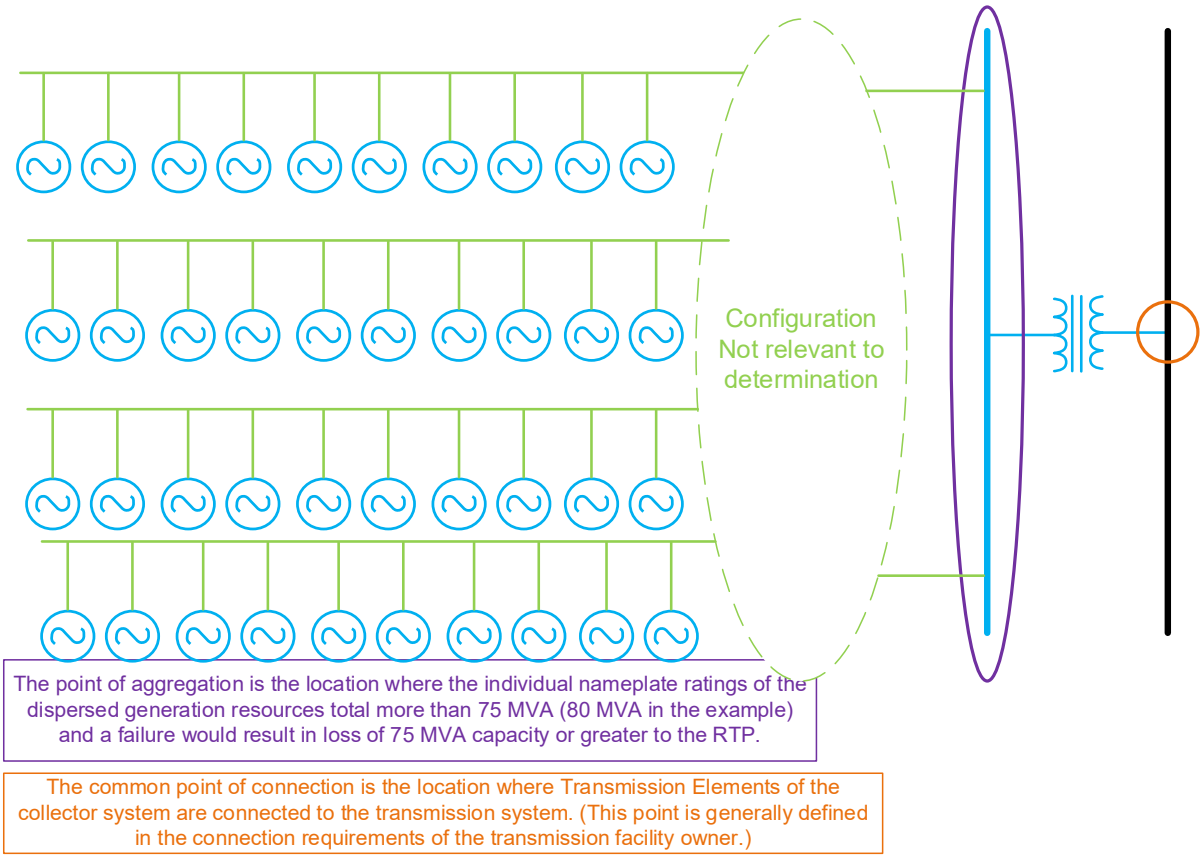


Figure I4-14: A wind farm with unknown configuration on the line side of the switchyard

Figure I4-15 depicts a dispersed generation site and switchyard design with a single transformer.

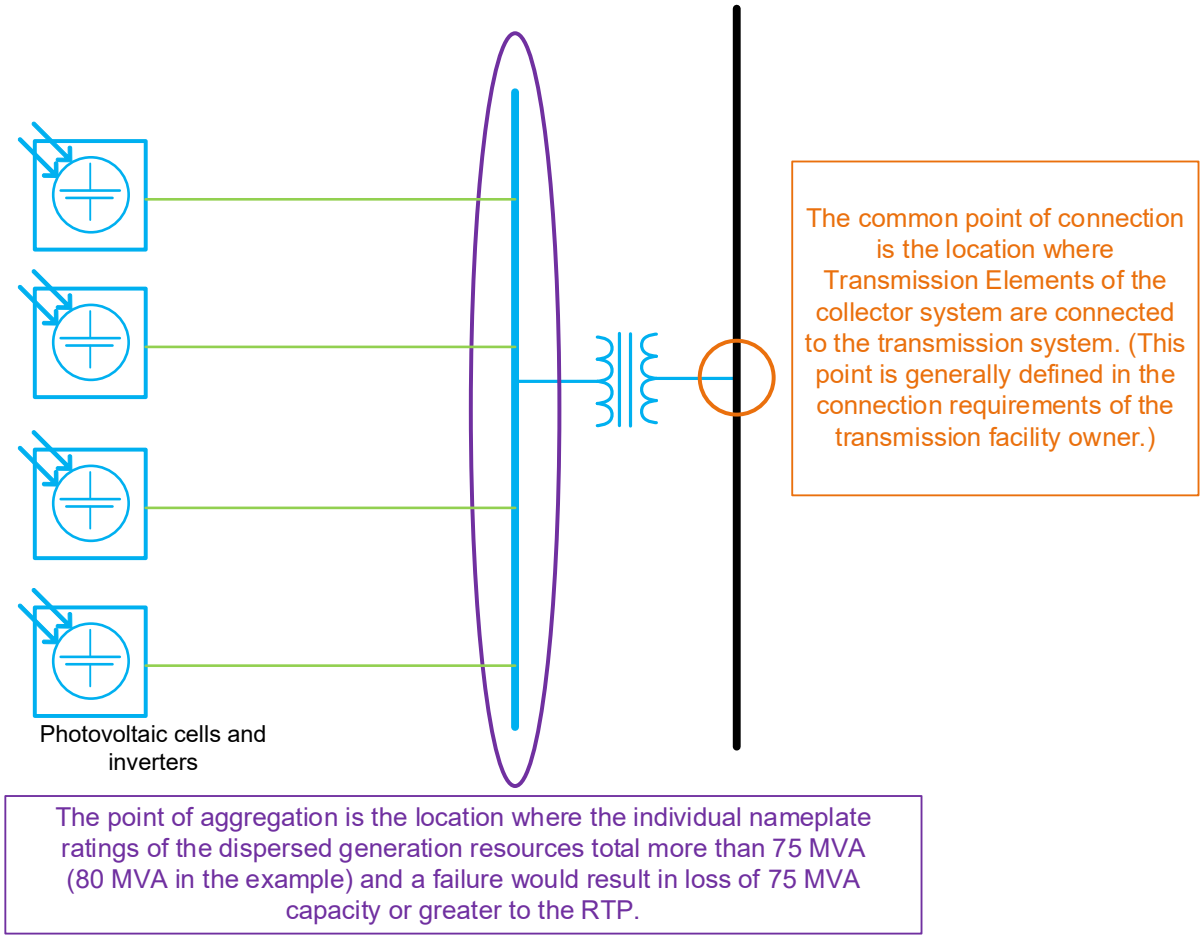


Figure I4-15: Photovoltaic generating station with gross aggregate nameplate rating of 80 MVA

Figure I4-16 depicts a dispersed generation site and switchyard design with multiple levels of voltage transformation.

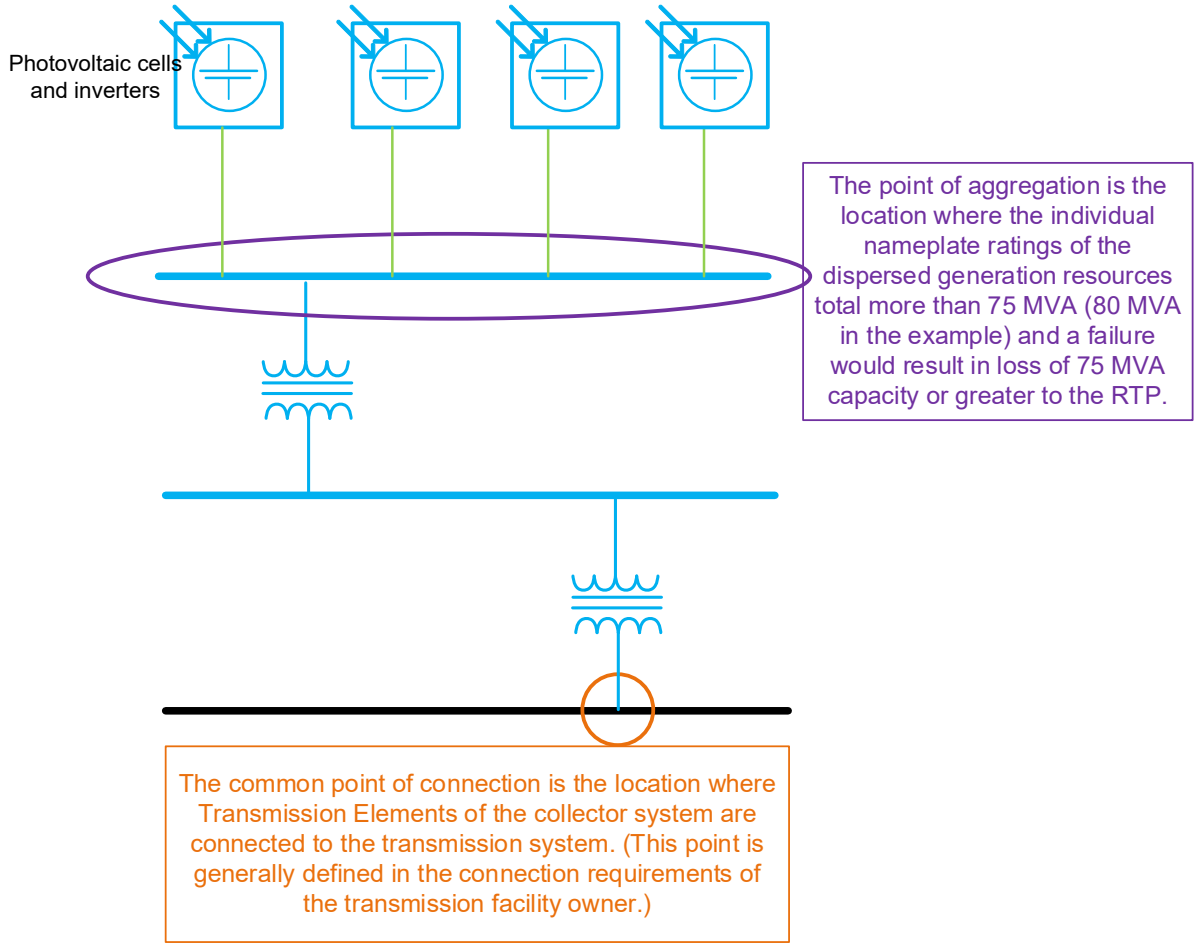
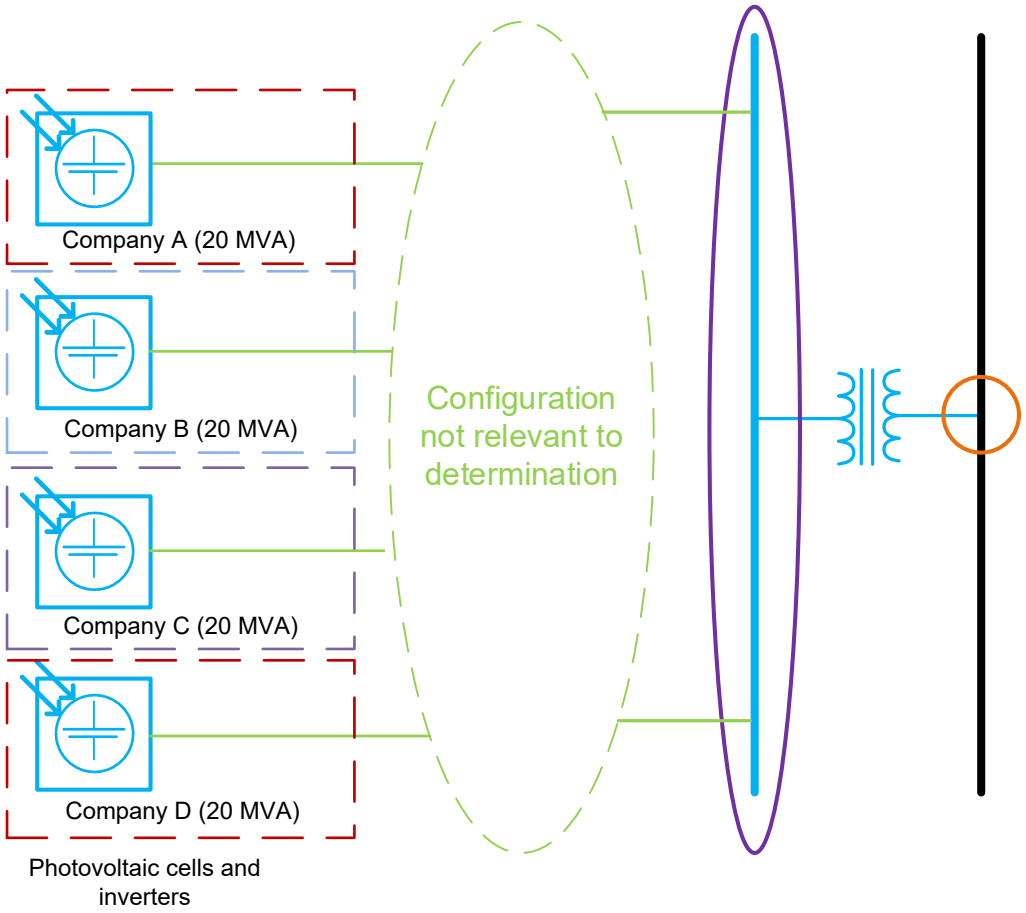


Figure I4-16: Photovoltaic generating station with multiple levels of voltage transformation

Figure I4-17 depicts a dispersed generation site with multiple owners and a transformation substation design with unknown collector system configuration.



The point of aggregation is the location where the individual nameplate ratings of the dispersed generation resources total more than 75 MVA (4 x 20 MVA = 80 MVA in the example) and a failure would result in loss of 75 MVA capacity or greater to the RTP.

The common point of connection is the location where Transmission Elements of the collector system are connected to the transmission system. (This point is generally defined in the connection requirements of the transmission facility owner.)

Figure I4-17: Photovoltaic generating station with generation facilities with multiple owners

Inclusion I5

I5: Static or dynamic devices (excluding generating units) dedicated to supplying or absorbing Reactive Power (unless excluded by Exclusion E4) and connected:

- at 300 kV or higher; or
- through a dedicated step-up transformer with a high-side voltage of 300 kV or higher; or
- through a transformer and associated bus bars covered by Inclusion I1; or
- through a dedicated step-up transformer connected to one of the associated bus bars covered by Inclusion I1.

Inclusion I5 covers static or dynamic devices (considered Reactive Power resources throughout this document) connected via the methods specified in the text of Inclusion I5 regardless of the quantity of Reactive Power output or input. It is important that Inclusion I5 be limited to static or dynamic devices that meet the connection criteria. In the following examples, several Reactive Power resources (designated as capacitors in the diagrams) are presented with various connection methods.

Figure I5-18 depicts different connection methods for the reactive resources typically used in the industry. The reactive resource symbol represents all potential reactive resources, including static and dynamic devices used in the operation of the transmission system. The diagram depicts examples of the first two connection scenarios mentioned above for application of Inclusion I5.

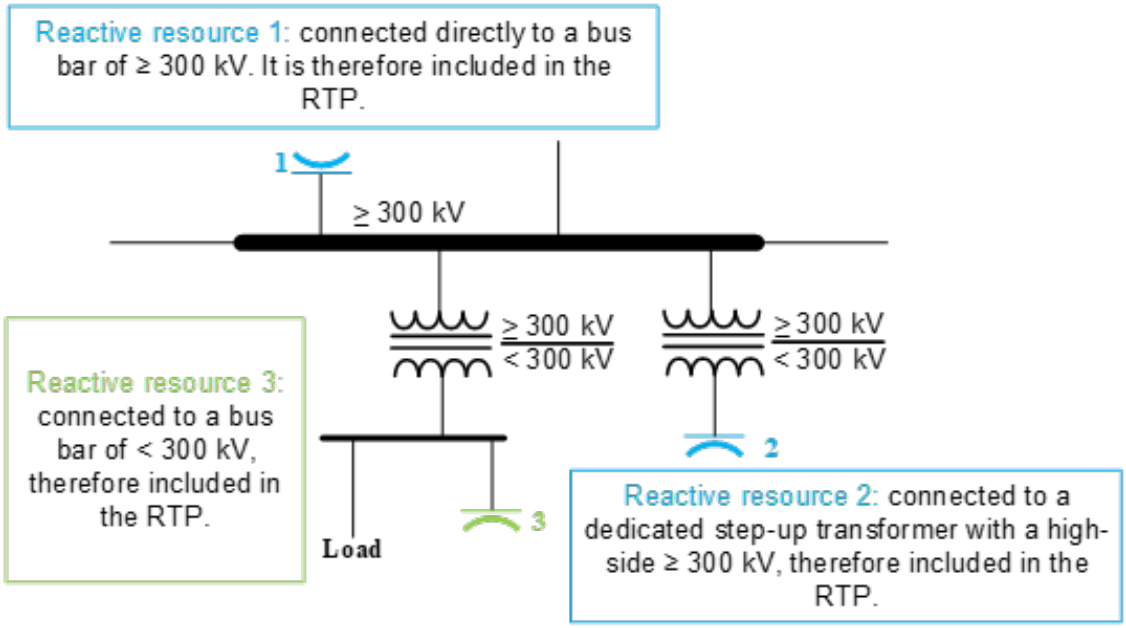


Figure I5-18: Application of Inclusion I5 to a bus bar of 300 kV or higher

Figure I5-19 depicts different connection methods for the reactive resources typically used in the industry. The reactive resource symbol represents all potential reactive resources, including static and dynamic devices used in the operation of the transmission system. The diagram depicts examples of the last two connection scenarios for application of Inclusion I5 mentioned earlier (through transformer and associated bus bars covered by Inclusion I1 or through a dedicated step-up transformer connected to one of the associated bus bars covered by Inclusion I1).

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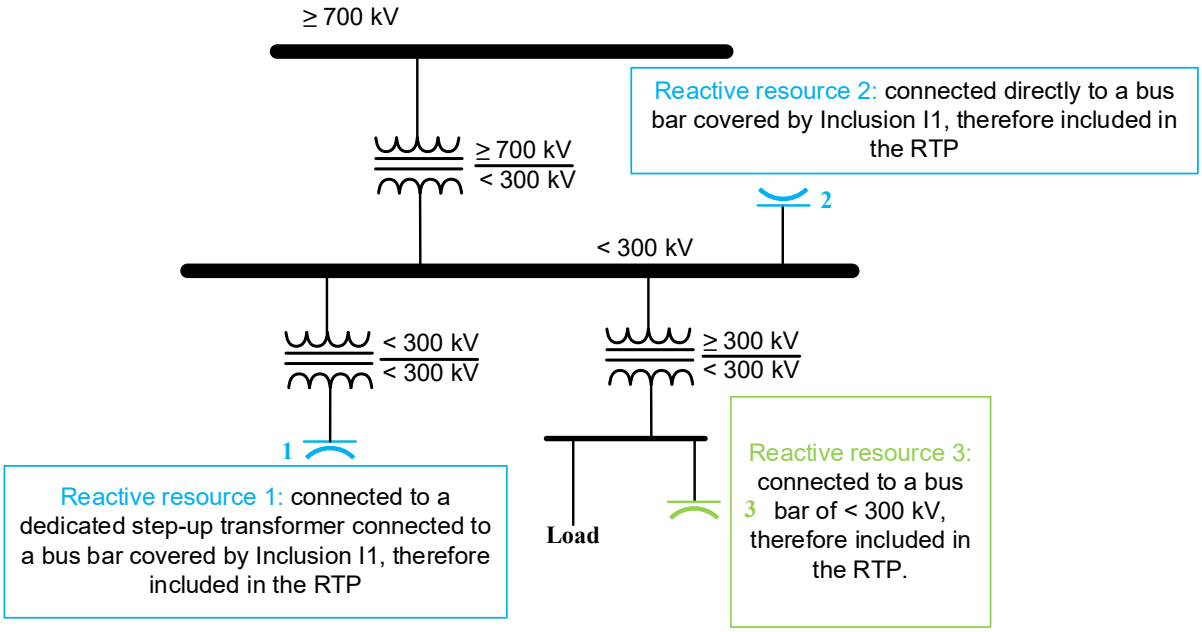


Figure I5-19: Application of Inclusion I5 to a substation with maximum voltage of 700 kV or higher

Inclusion I6

I6: Facilities that connect the Québec Interconnection to another Interconnection, based on the following criteria:

- For facilities that under normal operation are synchronized to the Québec Interconnection, the RTP includes Transmission facilities (including DC converter facilities and all associated Elements) that provide the principal path for bulk power transfer between the Bulk Electric System (BES*)* Facilities located in the other jurisdiction and the Transmission Elements that are part of the RTP;
- For facilities that under normal operation are synchronized to an Interconnection other than the Québec Interconnection, the RTP includes the Facilities to which the BES definition applies, with the following exception:
    - For Elements covered by Inclusion I2 of the BES definition, individual units with a gross nameplate rating of 20 MVA or higher must be included in a generating station having a gross nameplate rating greater than 50 MVA.

Normal operation

Normal operation includes all operating configurations except those in emergency operating state. An emergency operating state occurs when an abnormal condition of the system (e.g., forest fire, uncontrolled separation, etc.) requires immediate action to prevent or limit a failure of transmission or generation facilities that could adversely affect the reliability of the Main Transmission System.

Principal path for bulk power transfer

The interpretation is not exhaustive. The Coordinator interprets this specification as the lowest impedance path. However, an entity could decide to select the principal path based on the capacity of the Transmission Elements. Alternatively, an entity could decide to include multiple paths. The minimum path between the RTP or a generation resource transferring bulk power to another Interconnection to be included in the RTP is the lowest impedance path.

Application specifications and priority over exclusions

The application of Inclusion I6 is particular. Two different procedures are possible depending on the scenario:

1. Determine which scenario applies to the Element:
    1.1. If the Element is synchronized under normal operation to the Québec Interconnection, procedure 2.1 applies (first scenario).
    1.2. If the Element is synchronized to an Interconnection other than the Québec Interconnection, procedure 2.2 applies (second scenario).
2. Depending on the scenario:
    2.1. First scenario: The RTP definition is applied as written.

2.2. Second scenario: The BES definition is applied in its entirety (basic principle, inclusions and exclusions) to determine the Elements included in the RTP. The Elements included on full application of the BES definition are included in the RTP by virtue of the BES definition. Likewise, Elements excluded on full application of the BES definition are excluded from the RTP by virtue of the BES definition. In other words, the result of full application of the BES definition determines whether or not an Element is included in the RTP in this second scenario.

The Elements included in the RTP based on application of Inclusion I6 are identified via the procedures outlined above. Inclusion I6 is the only inclusion that has priority over all RTP definition exclusions. An Element included under Inclusion I6 cannot be excluded under RTP definition exclusions E1, E2, E3 or E4.

Figure I6-20 depicts the first scenario for application of Inclusion I6. It involves an Interconnection Line with a neighboring system whose Facilities located within the jurisdiction of Québec are synchronized with the Québec Interconnection. The Facilities located in the neighboring system are part of the BES. In this situation, the RTP must encompass all Transmission Facilities, including DC converters and all associated Elements that constitute the principal transfer path (generally, the path of lowest impedance) up to the interconnection point.

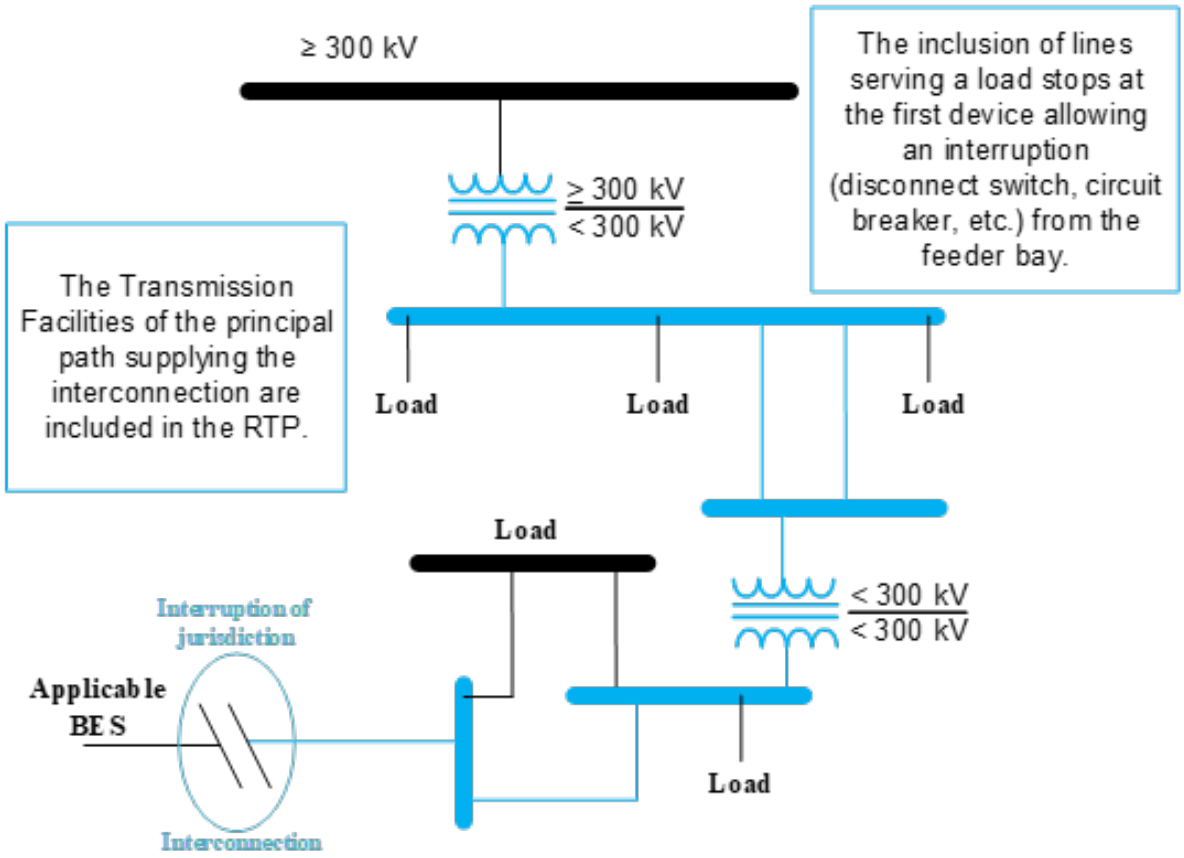


Figure I6-20: Example of application of the first scenario of Inclusion I6

Figure I6-21 depicts a second first scenario for application of Inclusion I6. In this case, an Interconnection Line with a neighboring system is supplied at a voltage of 120 kV by three nearby generating stations. These three generating stations have operating modes that serve the Interconnection Line. Furthermore, these generating stations are included in the RTP under Inclusion I2. It is therefore necessary to establish a path between these generating stations and the interconnection point.

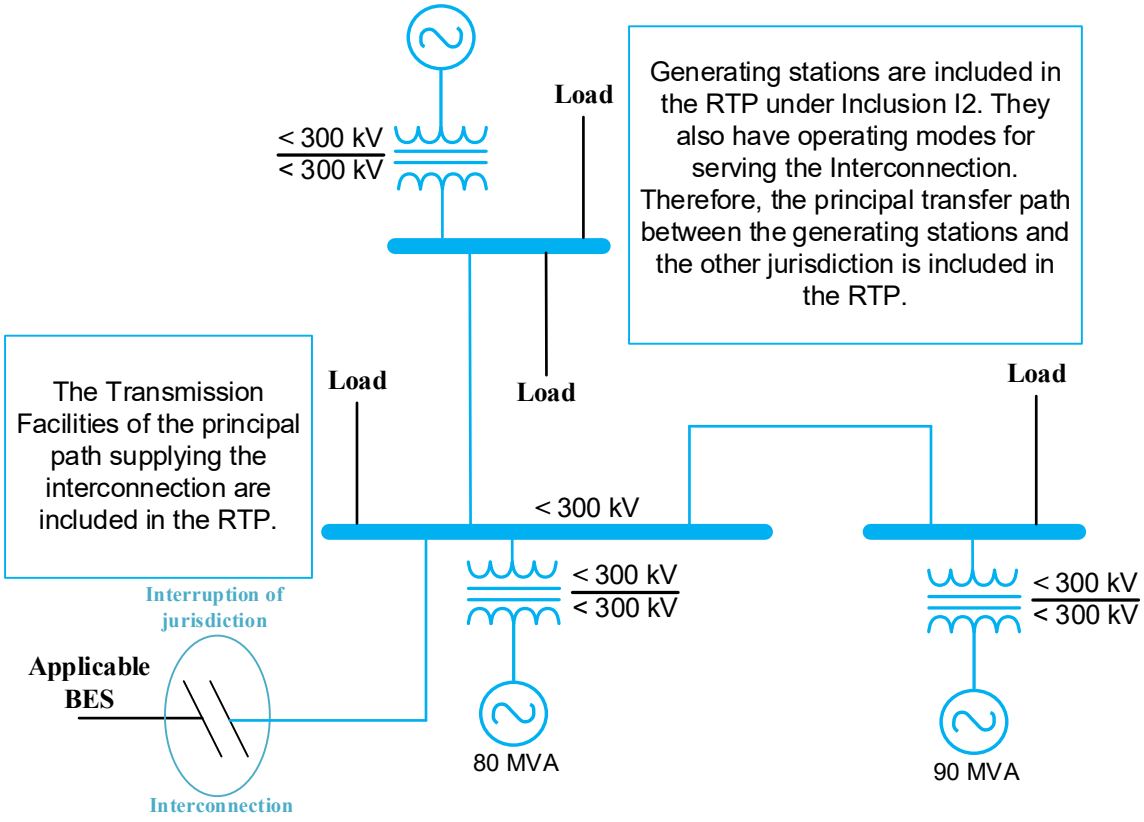
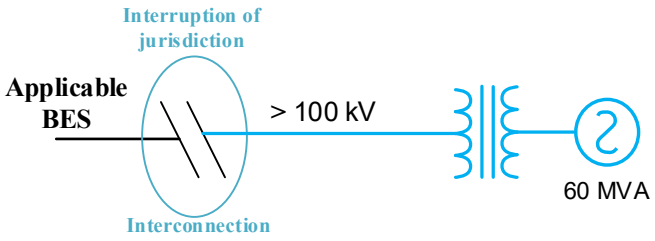


Figure I6-21: Second example of application of the first scenario of Inclusion I6

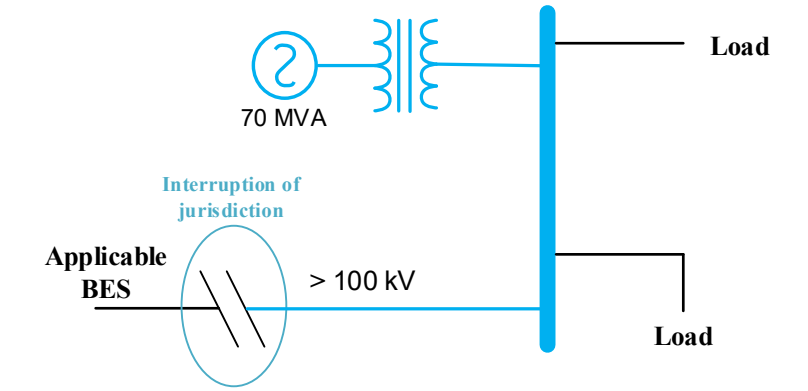
Figure I6-22 depicts an example of the second scenario, where a generating station is located within the jurisdiction of Québec and is synchronized with an Interconnection other than the Québec Interconnection. The generating station includes generating units with gross nameplate ratings of 25 MVA, and the gross aggregate nameplate rating of the generating station is 60 MVA. In this case, the whole generating station is part of the RTP, as Inclusion I2 of the BES definition applies.



The generating station is synchronized with an Interconnection other than the Québec Interconnection, and the BES definition is applicable in the neighboring system. The generating station includes generating units with a gross nameplate ratings > 20 MVA and the gross nameplate rating of the generating station is > 50 MVA. The generating station and the Transmission Facilities supplying the other Interconnection are included in the RTP.

Figure I6-22: Example of application of the second scenario of Inclusion I6

Figure I6-23 depicts a second case of the second scenario for application of Inclusion I6. A generating station houses generating units synchronized with an Interconnection other than the Québec Interconnection, and one of these generating units has a gross nameplate rating higher than 20 MVA. The gross aggregate nameplate rating of the generating station is higher than 50 MVA. The generating station is therefore part of the RTP, along with all Transmission Elements synchronized with the Interconnection, as Inclusion I2 of the BES definition applies for the generating facility and the basic principle applies for the Transmission Elements.



The generating station includes at least one generating unit synchronized under normal operation to an Interconnection other than the Québec Interconnection and the BES definition is applicable in the neighboring system. The generating station includes generating units with gross nameplate ratings > 20 MVA, and the gross nameplate rating of the generating station is > 50 MVA. The generating station and the Transmission Facilities suppling the Interconnection are included in the RTP.

Figure I6-23: Second example of application of the second scenario of Inclusion I6

Figure I6-24 depicts a third case of the second scenario for application of Inclusion I6.

All of the facilities depicted in the figure are synchronized under normal operation with an Interconnection other than the Québec Interconnection. Hence it is the BES definition that applies in determining which facilities are included the RTP.

The generating station with a gross nameplate rating of 180 MVA is included in the RTP under Inclusion I2 of the BES definition. However, given that it is connected on the customer side of the retail meter, that it never delivers more than 75 MVA to the Transmission System and that there is an agreement between the operator of the facility and the RC, the BA and the TOP, this generating station is excluded from the RTP under Exclusion E2 of the BES definition.

The generating station with a gross nameplate rating of 80 MVA is included in the RTP under Inclusion I2 of the BES definition. It cannot be excluded from the RTP by virtue of any BES definition exclusions because none are applicable.

The same is true of the Transmission Elements serving a load. As shown in the following figure, these Elements supply a radial load. Exclusion E1 of the BES definition is applicable. These Elements are therefore not included in the *RTP*.

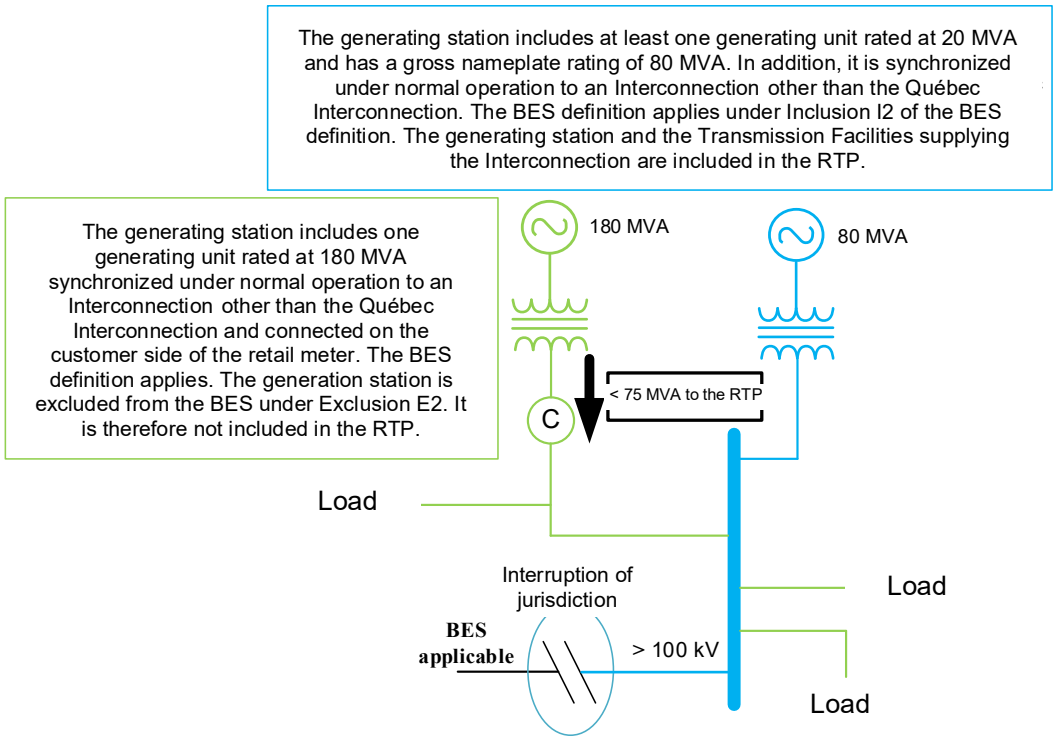


Figure I6-24: Third example of application of the second scenario of Inclusion I6

Exclusions

Each exclusion is shown with both text and diagrams explaining how to apply the RTP definition for the configurations shown. These examples are not to be considered prescriptive.

The diagrams depict specific applications of the RTP definition. Parts of the diagrams are in black to indicate that no hypotheses have been issued for those parts of the network.

Key to diagram color coding:

- **Blue** indicates that an Element is included in the RTP.
- **Green** indicates that an Element is excluded from the RTP.
- **Orange** indicates a point of connection.
- **Black** indicates an Element that has not been evaluated in the case depicted.

Further clarification on exclusions

As specified in the basic principle, Transmission Elements operated at a voltage of 700 kV or higher as well as Transmission Elements associated with Transmission Elements operated at a voltage of 700 kV or higher cannot be excluded under exclusions E1 to E4.

Exclusion E1

E1: Radial systems. A radial system is a group of contiguous Transmission Elements that emanate from a single point of connection of 300 kV or higher, and that:

- only serve Load; or
- only include generation resources not covered by Inclusions I2, I3 and I4 and that have an aggregate capacity less than or equal to 75 MVA (gross nameplate rating); or
- serve Load and include generation resources not covered by Inclusions I2, I3, and I4 that have 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 does not affect this exclusion unless that switching device can be used to transfer bulk power between different parts of the Main Transmission System.

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

Single point of connection

The single point of connection of 300 kV or higher is the location where the radial system begins if it meets the criteria of Exclusion E1. For example, the start of a radial system could be a feeder bay disconnect switch.

The connection to the radial system must be made from a single point at 300 kV or higher. Any group of contiguous Transmission Elements with multiple connections at 300 kV or higher does not qualify for Exclusion E1.

Switching devices normally open between radial systems do not disqualify a radial system from Exclusion E1.

Evaluation of single points of connection in radial systems

If the radial system being evaluated emanates from a single point of connection at 300 kV or higher but does not meet the criteria for Exclusion E1, then it may not be excluded under Exclusion E1. However, an evaluation of the underlying Elements in the radial system may be appropriate. An underlying radial system emanating from a single point of connection at 300 kV or higher may qualify for exclusion as a radial system if it meets the criteria for Exclusion E1.

Retail and non-retail generation

Non-retail generation resources are located on the line side of a customer's retail meter. The radial system is limited to 75 MVA of non-retail generation.

Retail generation is behind-the meter generation. When a retail generation resource meets Exclusion E2 criteria, generation not consumed, up to 75 MVA, can be used to supply the RTP

without the resource being part of the RTP.

Static or dynamic devices

Exclusion E1 excludes Transmission Elements of radial systems that meet the established criteria. This does not allow the exclusion of Reactive Power resources covered by Inclusion I5. Exclusion E1 only allows the exclusion of Transmission Elements of radial systems.

Limits to generation

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

1. If one or more generation resources within the radial system in question is subject to Inclusions I2, I3 or I4; or

2. If the aggregate nameplate capacity of the non-retail generation resources within the radial system in question exceeds75 MVA.

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

Exclusion E1 allows exclusion of contiguous Transmission Elements, such as transformers, circuit breakers, transmission lines and bus bars.

Figures E1-25 to E1-31 depict applications of Exclusion E1 and are intended to guide the user during hierarchical application of the RTP definition.

Figure E1-25 depicts a radial system that only supplies Load. There is no limit to the amount of load within the radial system.

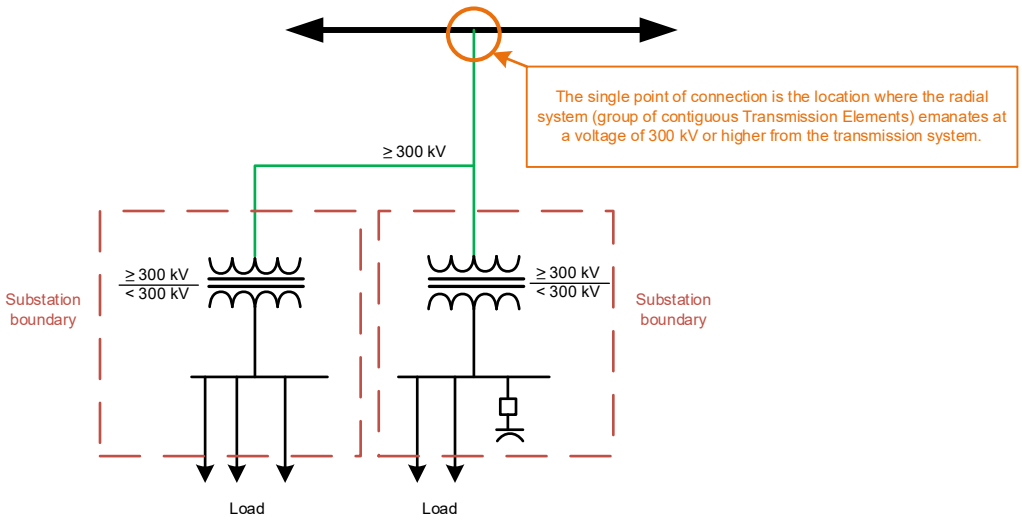


Figure E1-25: Radial system – only serves Load

Figure E1-26 depicts a configuration that contains two separate radial systems due to a contiguous loop operated at a voltage of 50 kV or less.

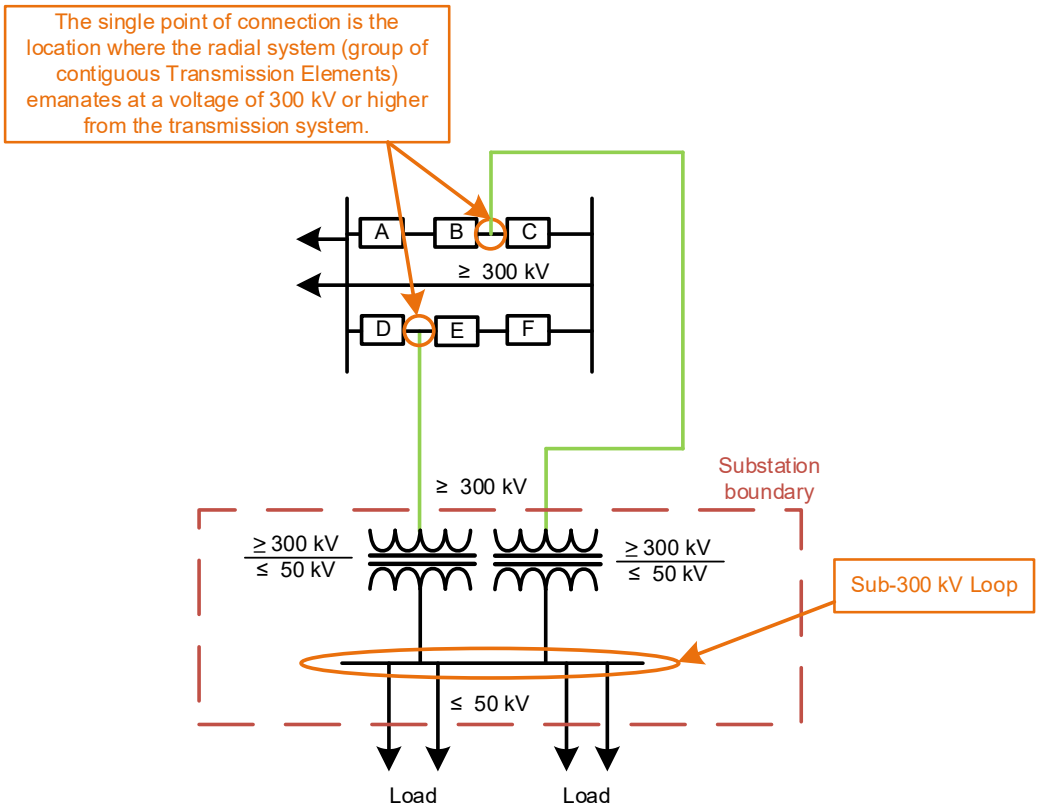


Figure E1-26 : Multiple radial systems (contiguous loop operated at a voltage of 50 kV or less)

Figure E1-27 depicts a configuration that contains a contiguous loop operated at a voltage greater than 50 kV and lower to 300 kV. This configuration cannot be evaluated under exclusion E1; it can only be evaluated under Exclusion E3.

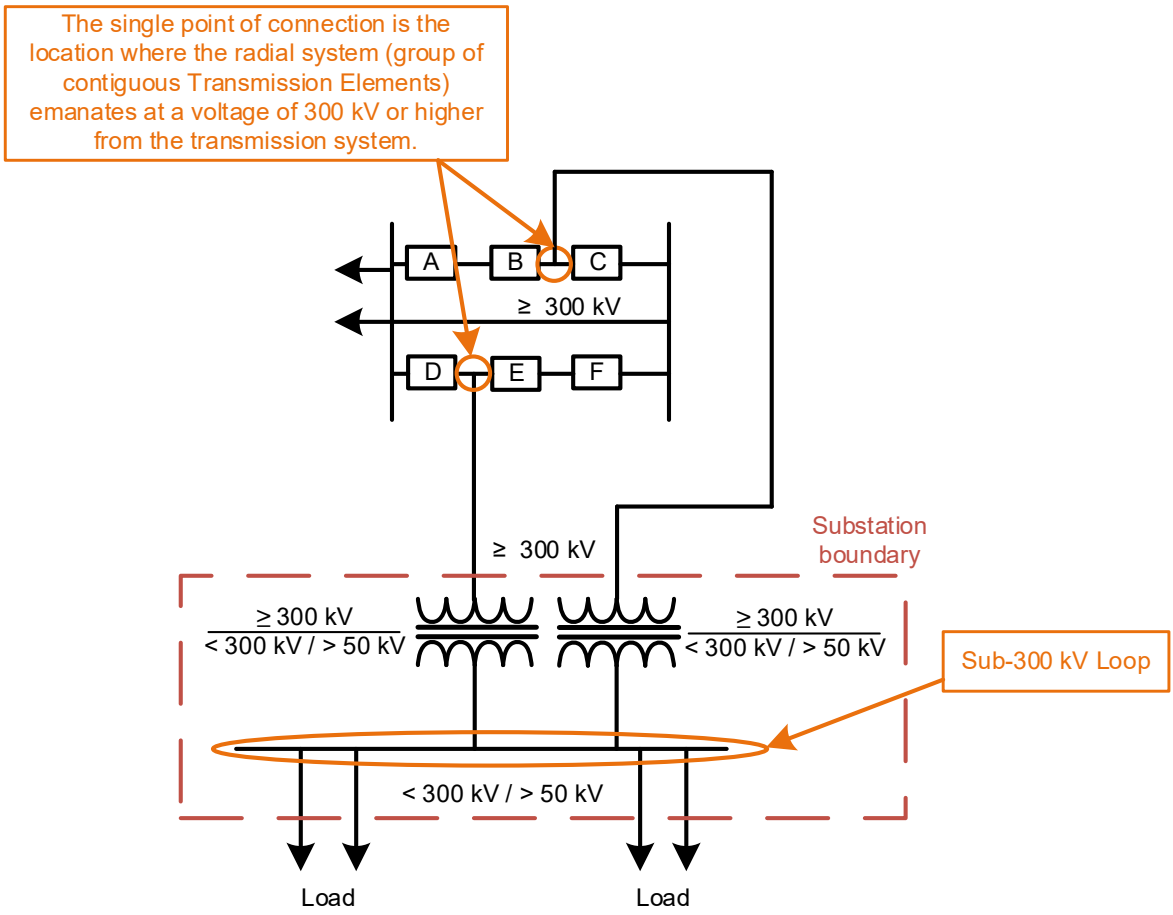


Figure E1-27 : Impact of contiguous loop operated at a voltage greater than 50 kV and lower than 300 kV

Figure E1-28 depicts two radial systems separated by a normally open (N.O.) switching device operated at a voltage of 300 kV or above. The switching device cannot be used to transfer bulk power between different parts of the Main Transmission System. The normally open (N.O.) device must be identified as such on one-line diagrams of the entity that owns/operates the facility.

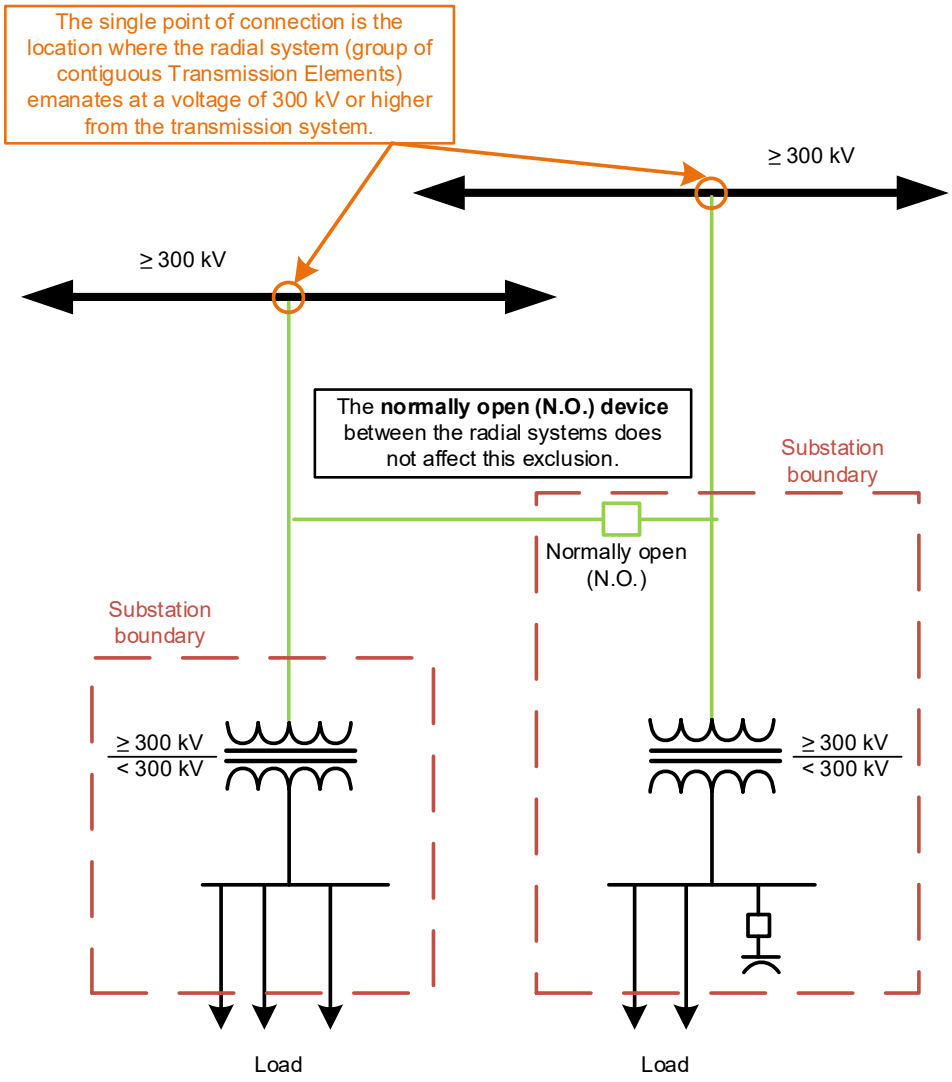


Figure E1-288 : Normally open switching device between two load-serving radial systems

Figure E1-29 depicts two radial systems separated by a normally closed (N.C.) switching device operated at a voltage of 300 kV or above. This configuration requires evaluation under Exclusion E3 criteria.

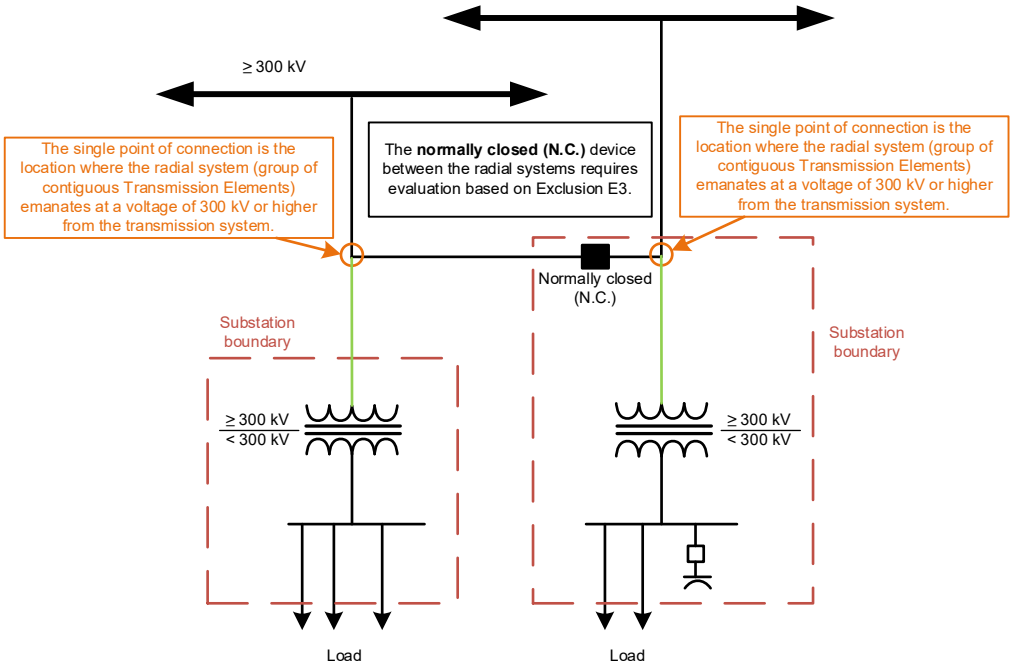


Figure E1-29: Normally closed switching device between two load-serving radial systems

Figure E1-30 depicts a radial system with a single generation resource and no Load.

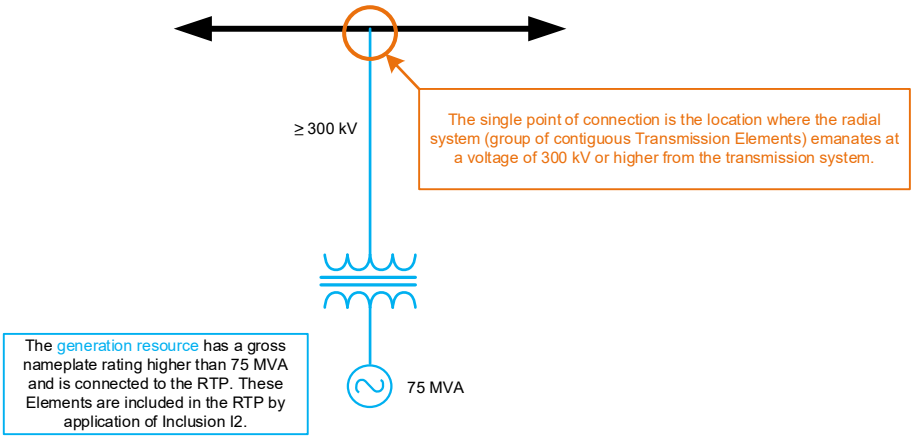


Figure E1-30: Radial system with a single generation resource, included in the RTP

Figure E1-31 depicts another case of a radial system that includes a single generation resource and no Load.

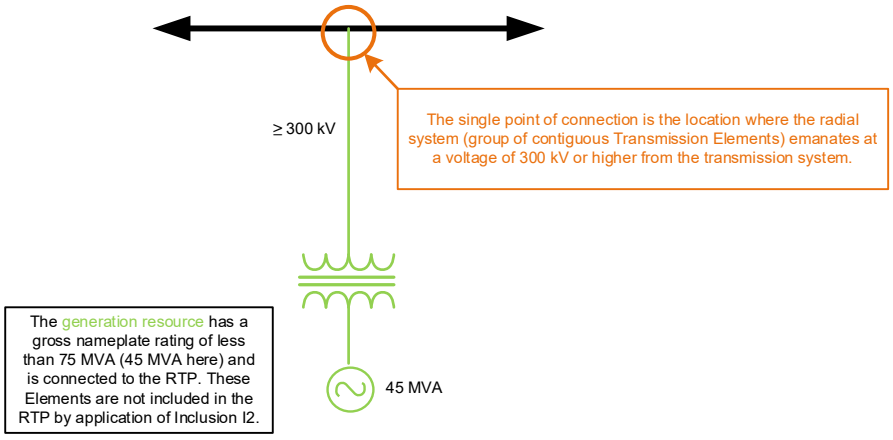


Figure E1-29: Radial system with a single generation resource, excluded from the RTP

Exclusion E2

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

Exclusion E2 allows for the exclusion of real power resources on the customer side of the retail meter and takes precedence over Inclusion I2. Exclusion E2 references net generation capacity and net capacity provided to the RTP not nameplate rating. Real power delivered is subject to a maximum of 75 MVA.

Exclusion E2 applies even if there are multiple points of connection to the RTP.

Net capacity

The net capacity criterion for Exclusion E2 is the net aggregated flow delivered to the RTP as measured by hourly revenue metering for the 12 most recent months. Exclusion E2 can apply if there are periods of net capacity to the RTP that exceed the prescribed maximum, provided that such overload was requested by the Balancing Authority (BA).

Figures E1-32 to E1-33 depict examples of the application of Exclusion E2 and are meant to guide the user during hierarchical application of the RTP definition.

Figure E2-32 depicts generating units on the customer side of the retail meter delivering net capacity of 50 MVA to the RTP.

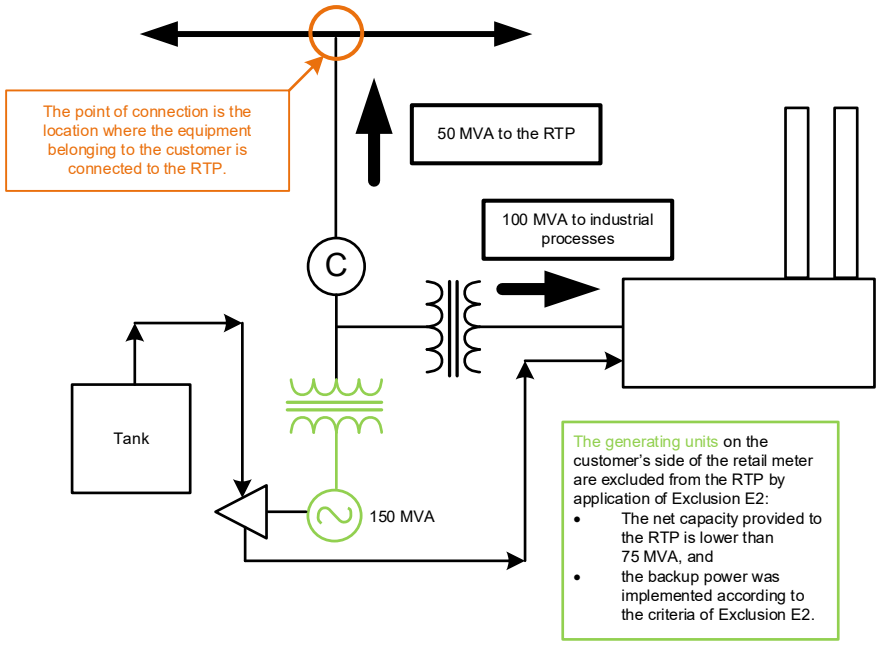


Figure E2-32: Customer generating units on the customer side of the retail meter that deliver less than 75 MVA to the RTP

Figure E2-33 depicts generating units on the customer side of the retail meter delivering net capacity of 100 MVA to the RTP.

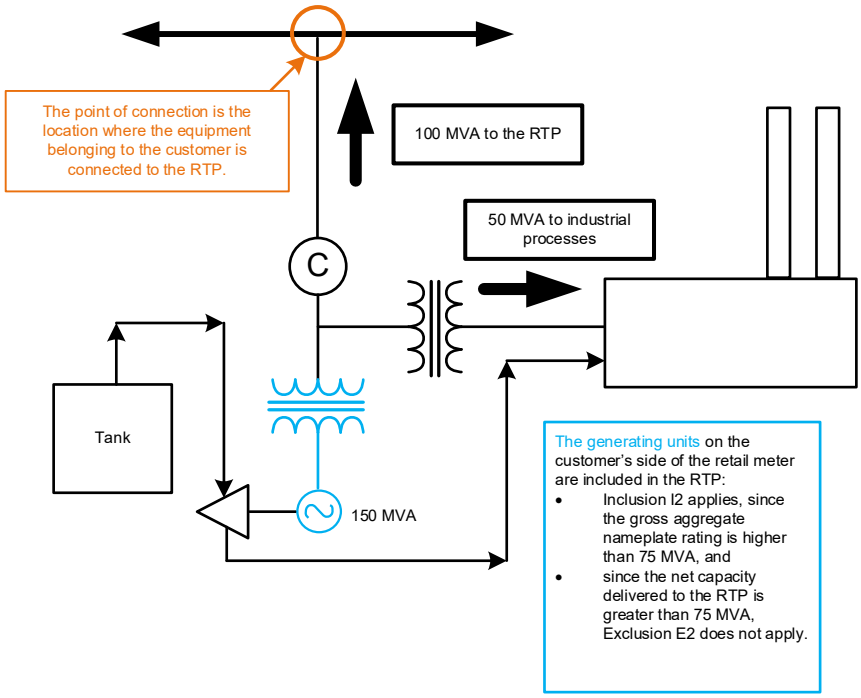


Figure E2-33: Customer generating units on the customer side of the retail meter that deliver more than 75 MVA to the RTP

Exclusion E3

E3: Local networks. A local network is a group of contiguous Transmission Elements operated at less than 700 kV that transfer power to Load rather than between the parts of the Main Transmission System. Local networks are supplied from multiple points of connection at 300 kV or higher to improve the level of service to retail customers and not to ensure power transfer between the parts of the Main Transmission System. The local network is characterized by the following:

- Limits on connected generation: the local network and the Elements composing it do not include generation resources covered by Inclusion I2, I3 or I4 and do not have an aggregate non-retail generation capacity greater than 75 MVA (gross nameplate rating).

Exclusion E3 covers local networks in which the contiguous Transmission Elements are operated at less than 700 kV and are supplied by multiple points of connection at 300 kV or higher. Exclusion E3 does not depend on the presence of a switching devices at the point of connection to the RTP. Generation resources connected within the local network qualify for this exclusion. However, Exclusion E3 does not apply to generation resources included under Inclusions I2, I3 and I4. Exclusion E3 does not allow the exclusion of static or dynamic devices that meet the criteria of Inclusion I5. Exclusion E3 allows exclusion of contiguous Transmission Elements, such as transformers, circuit breakers, bus bars and Transmission Lines that emanate from multiple points of connection at 300 kV or higher.

Static or dynamic devices

Static or dynamic devices that meet the criteria of Inclusion I5 are not eligible for Exclusion E3. The presence of Reactive Power resources does not preclude application of Exclusion E3.

Power limits

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

1. The aggregate nameplate capacity of the generation resources within the local network exceeds the 75 MVA maximum.
2. The local network includes one or more generation resources subject to Inclusions I2, I3 or I4.

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

Direction of power flow at the RTP limit

An entity that determines all or some of its facilities meet the local network exclusion should be able to demonstrate, by inspection of actual system data, that flow of power is into the local network at each point of interface with the RTP under all operating conditions 98% of the time (on an hourly integrated basis over two years). In addition, the flow of power to the RTP must not exceed 75 MVA.

Note: The Coordinator's intent is that the entity can demonstrate that hourly integrated power flow values over the last two-year period would be a sufficient demonstration.

Voltage threshold

The local network exclusion applies to Transmission Elements operated below 700 kV; it does not apply to facilities operated at 700 kV or more. Facilities operated below 300 kV are excluded from the RTP by application of the basic principle.

Figures E3-34 and E3-35 illustrate examples of application of Exclusion E3 and are intended to guide the user during hierarchical application of the RTP definition.

Figure E3-34 depicts a situation that lends itself to evaluation based on Exclusion E3.

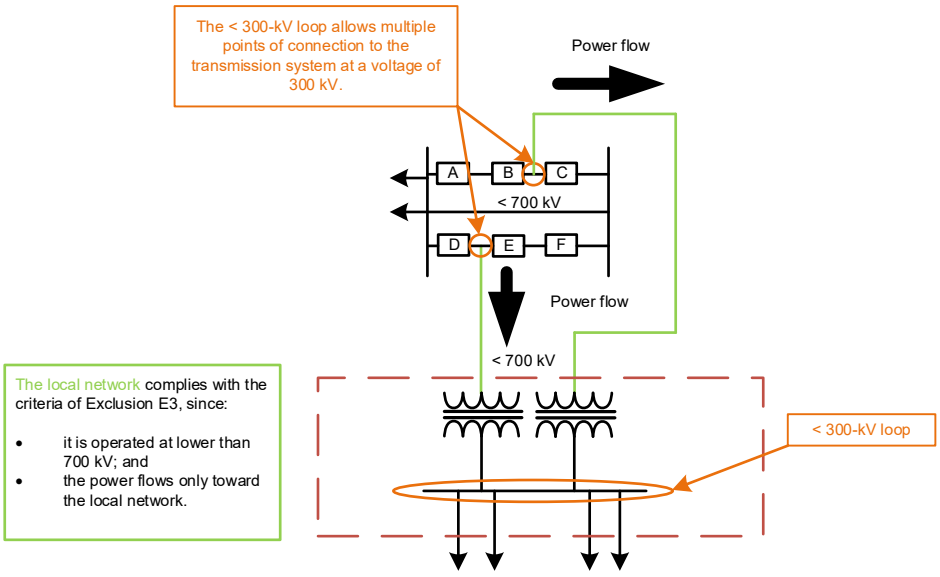


Figure E3-30: Local network with < 300-kV loop

Figure E3-35 uses the same configuration as the previous figure. However, since power flows out of the potential local network, this configuration is not considered a local network under Exclusion E3.

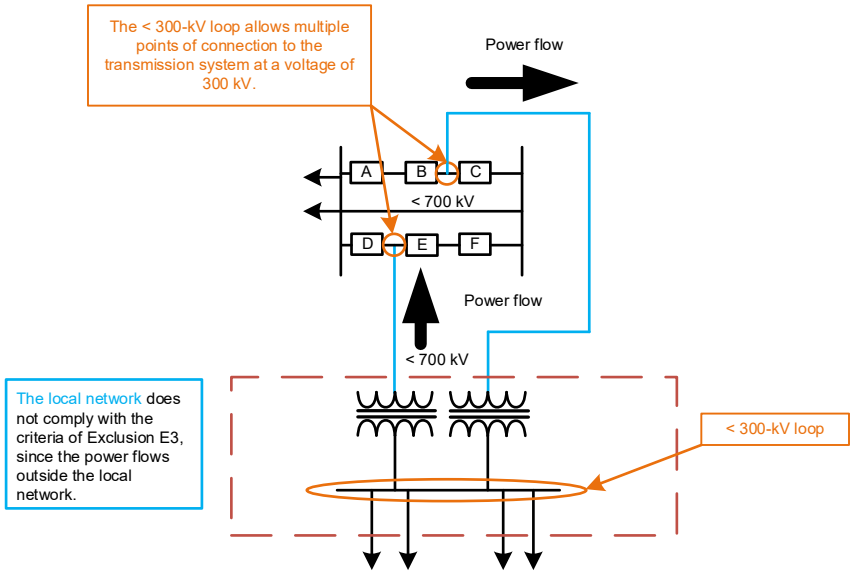


Figure E3-31: Local network with < 300-kV loop

Exclusion E4

E4: Reactive Power devices installed solely to serve load.

Exclusion E4 is based on the intended function of the Reactive Power control devices. Transmission Elements used to serve Load are identified by application of exclusions E1 and E3. Exclusion E4 removes from the RTP those Reactive Power resources connected to Transmission Elements used to serve Load.

No figure is presented specifically for Exclusion E4 due to the simplicity of the language of this exclusion.

Hierarchical application of the definition

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

Application of the RTP definition is a three-step process that, if executed appropriately, makes it possible to identify the vast majority of RTP Elements. The example on the following pages does not include application of Inclusion I4 or Exclusions E2 and E4.

Step 1: Application of basic principle

The general principle of applicability underscores the unique nature of the topology of the Québec power grid. This principle establishes a clear demarcation within which all Transmission Elements operated above 300 kV as well as Active Power and Reactive Power resources connected at a voltage of more than 300 kV are included in the RTP.

Step 2: Application of inclusions

The second step consists in applying six specific and complementary inclusions in a pre-determined sequence to clarify the basic principle and clearly establish the Elements included in the RTP. Note that although the inclusions are complementary to the basic principle, they may overlap, or one or more inclusions may overlap the basic principle.

Step 3: Application of exclusions

This step consists in evaluating specific situations for potential exclusion from the RTP. Exclusions are formulated to define Elements or groups of Elements that can be specifically excluded from the RTP. Note that for an Element to qualify for exclusion, it must be included in the RTP under the basic principle or at least one inclusion.

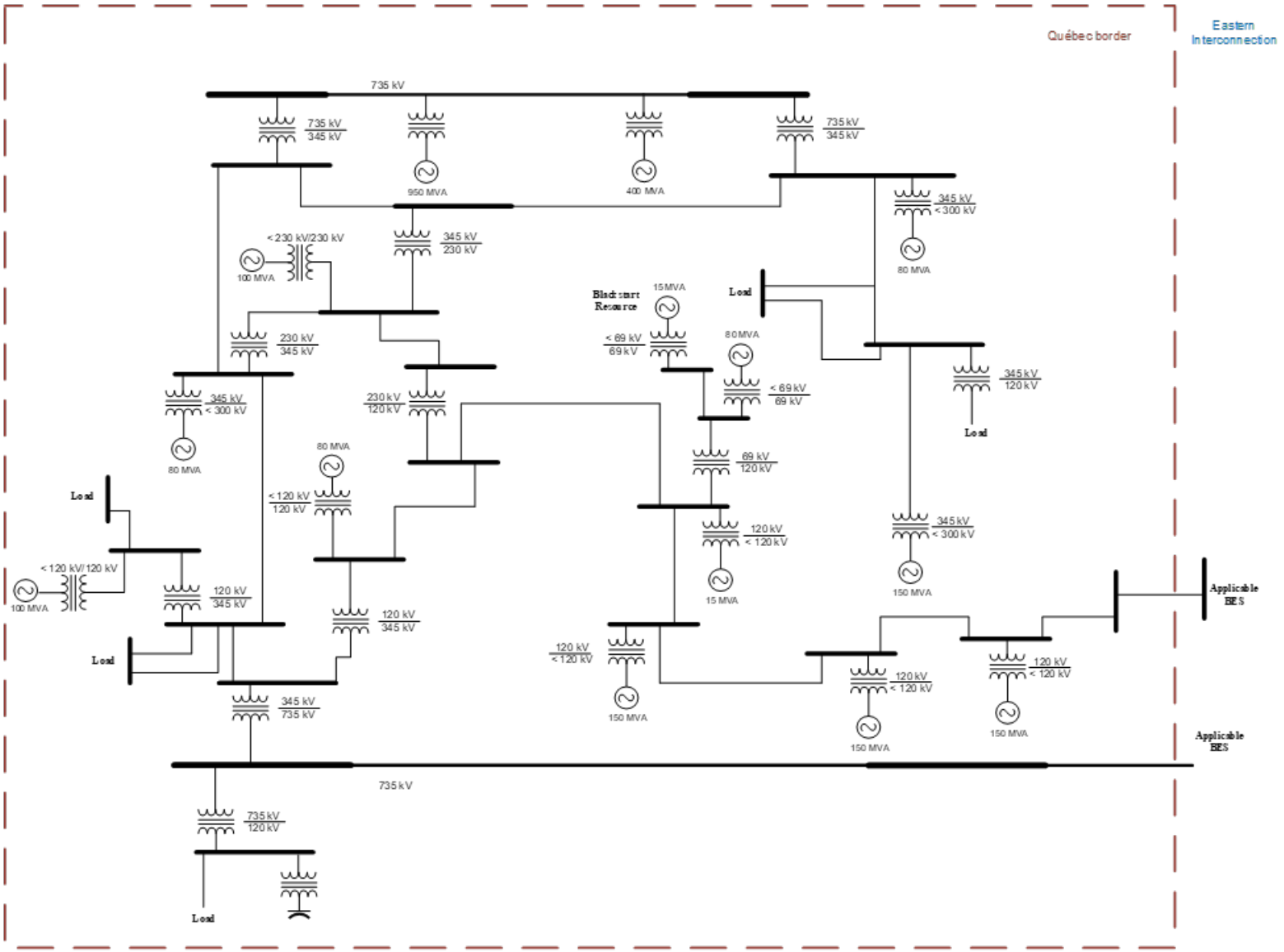


Figure 326: Step 0 – Example used for full application of the RTP definition

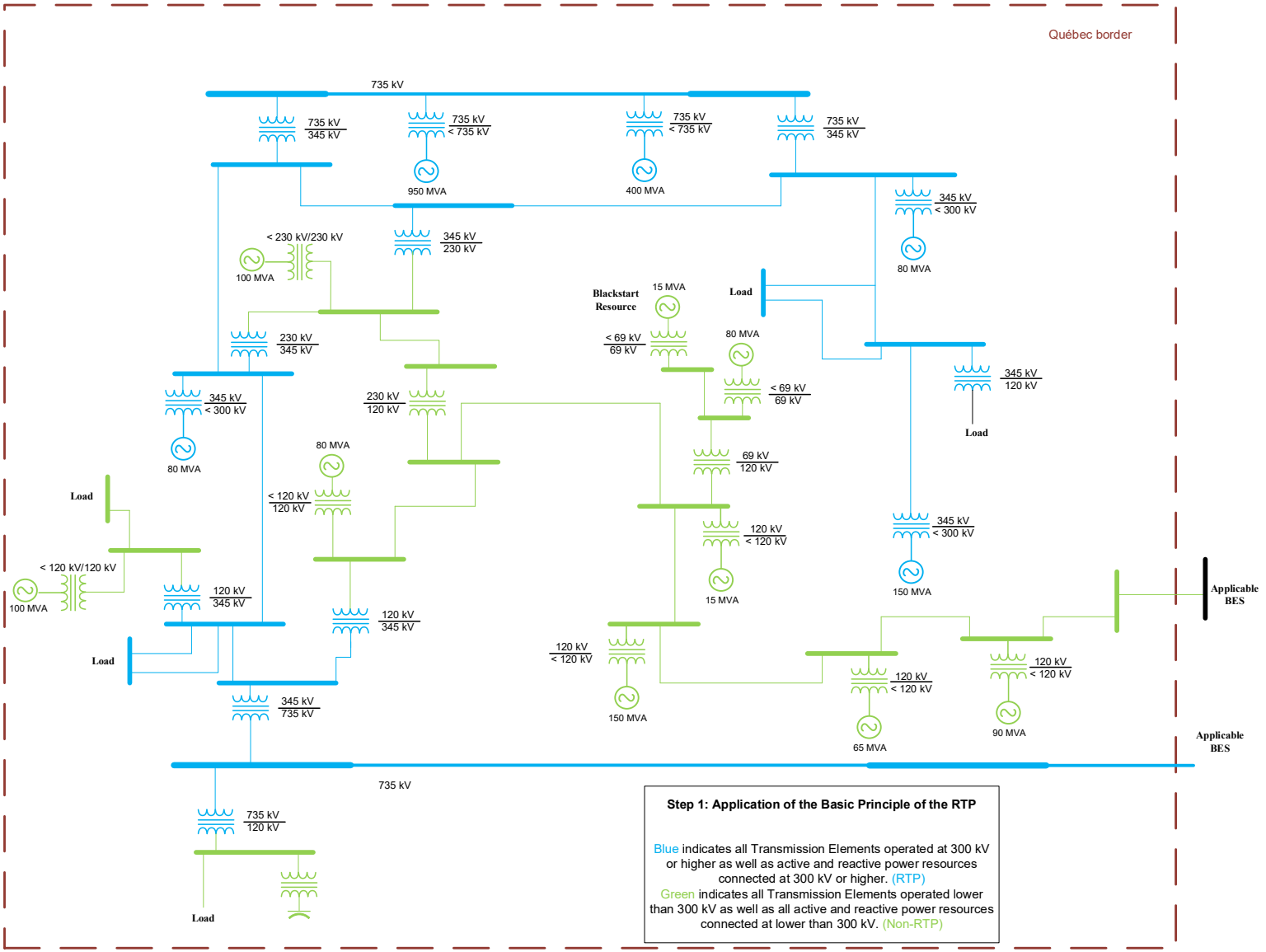


Figure 33: Step 1 – Application of basic principle

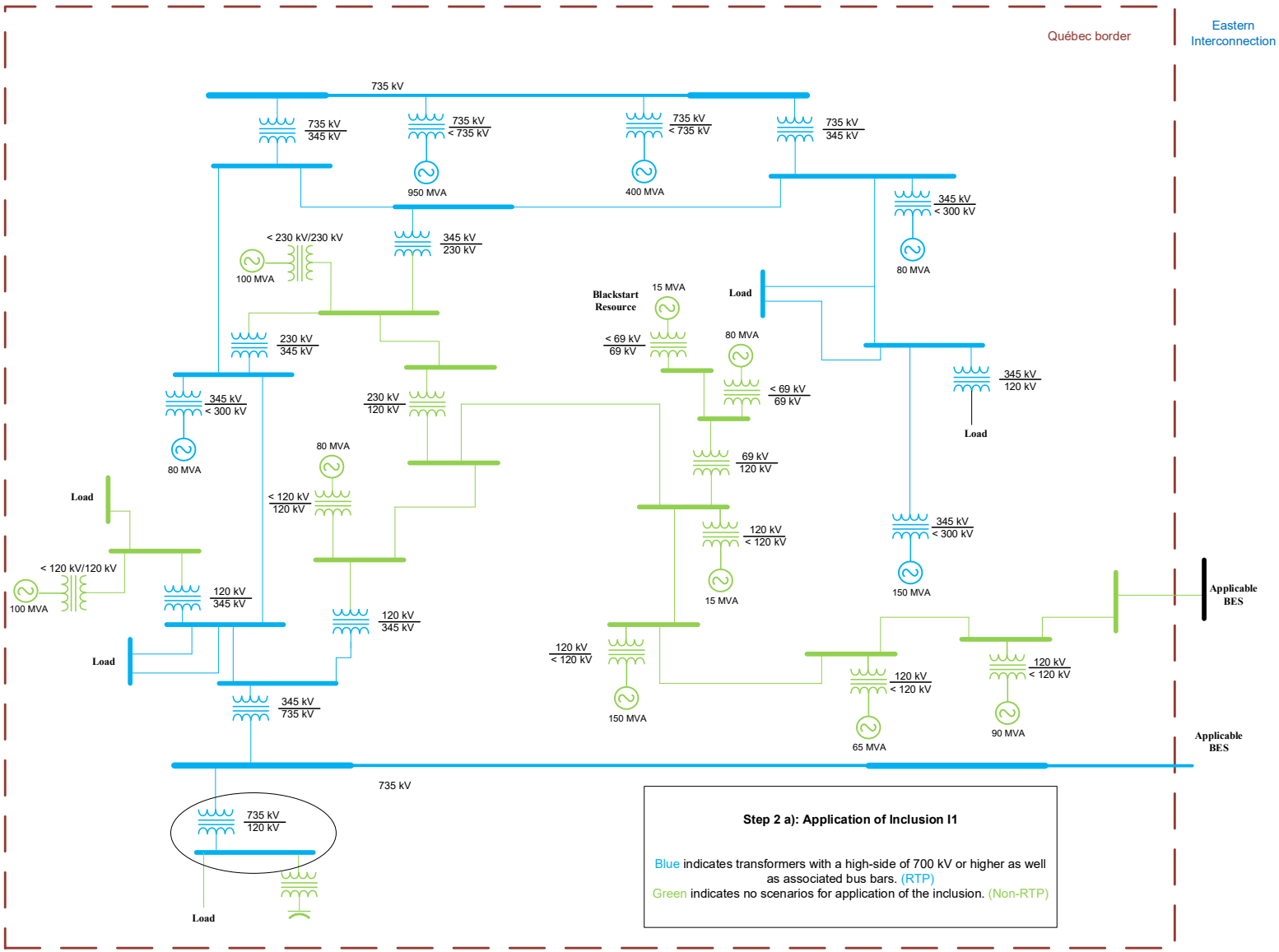
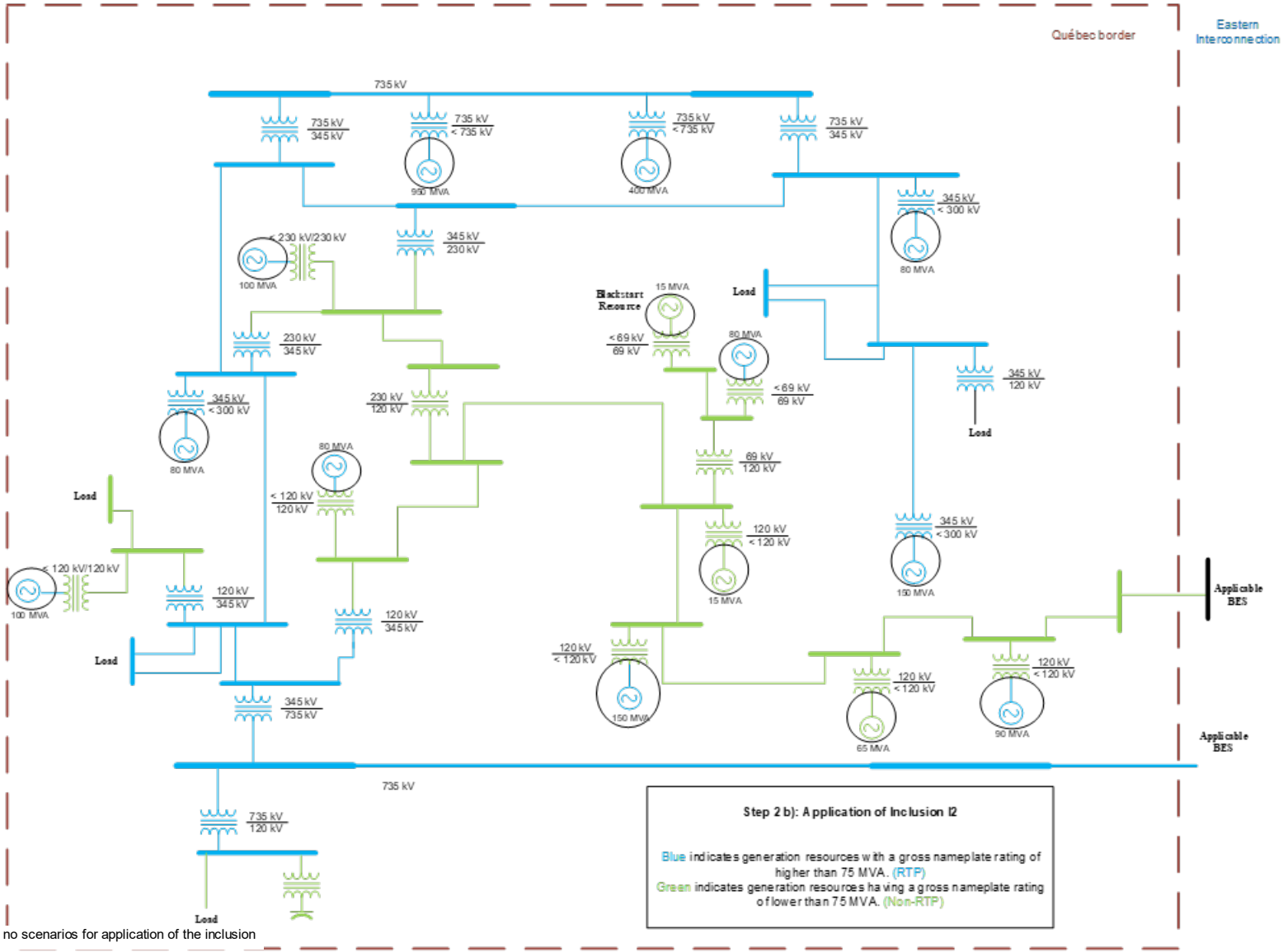


Figure 34: Step 2 a) – Application of Inclusion I1



no scenarios for application of the inclusion

Figure 35: Step 2 b) – Application of Inclusion I2

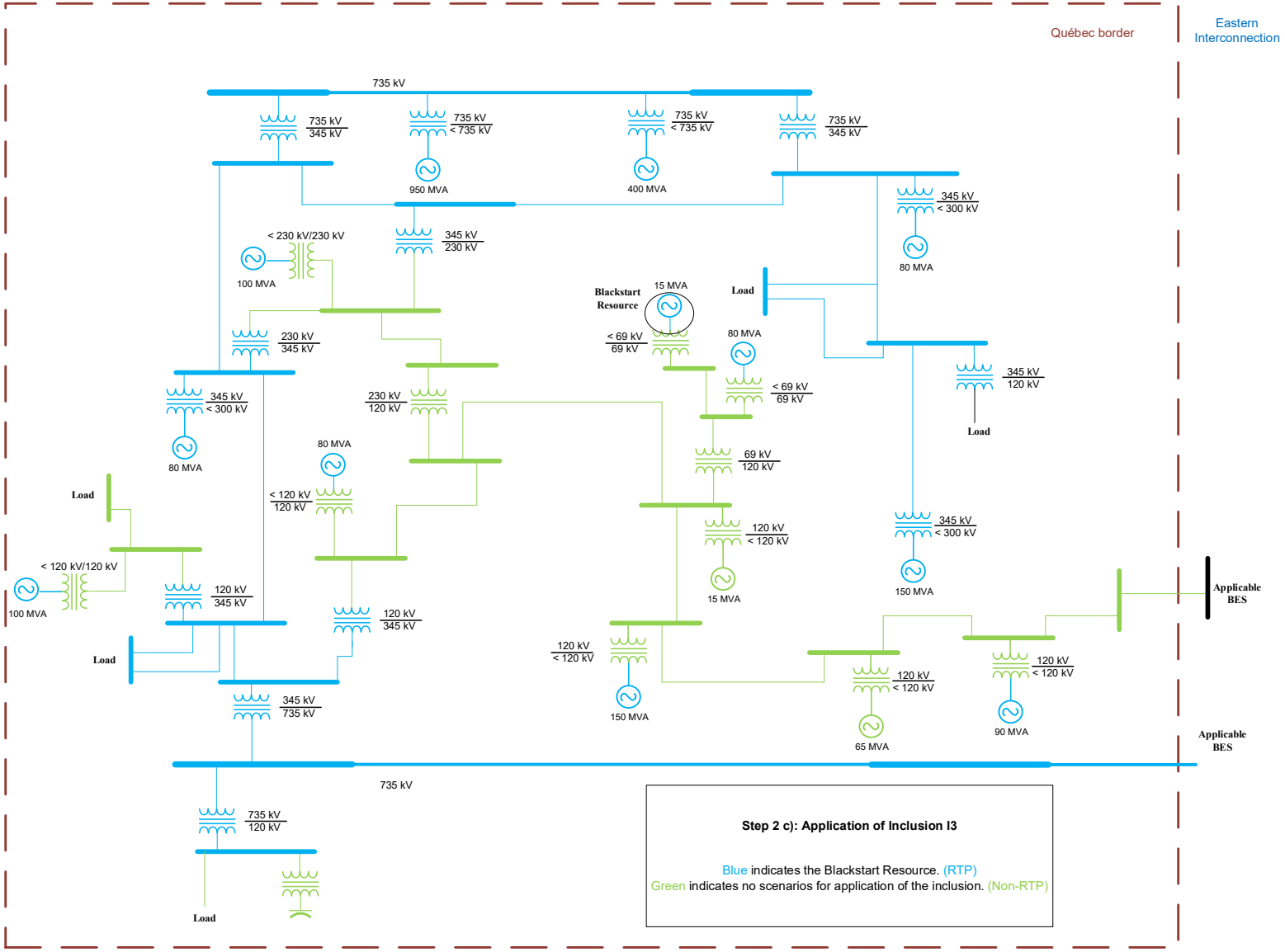


Figure 40: Step 2 c) – Application of Inclusion I3

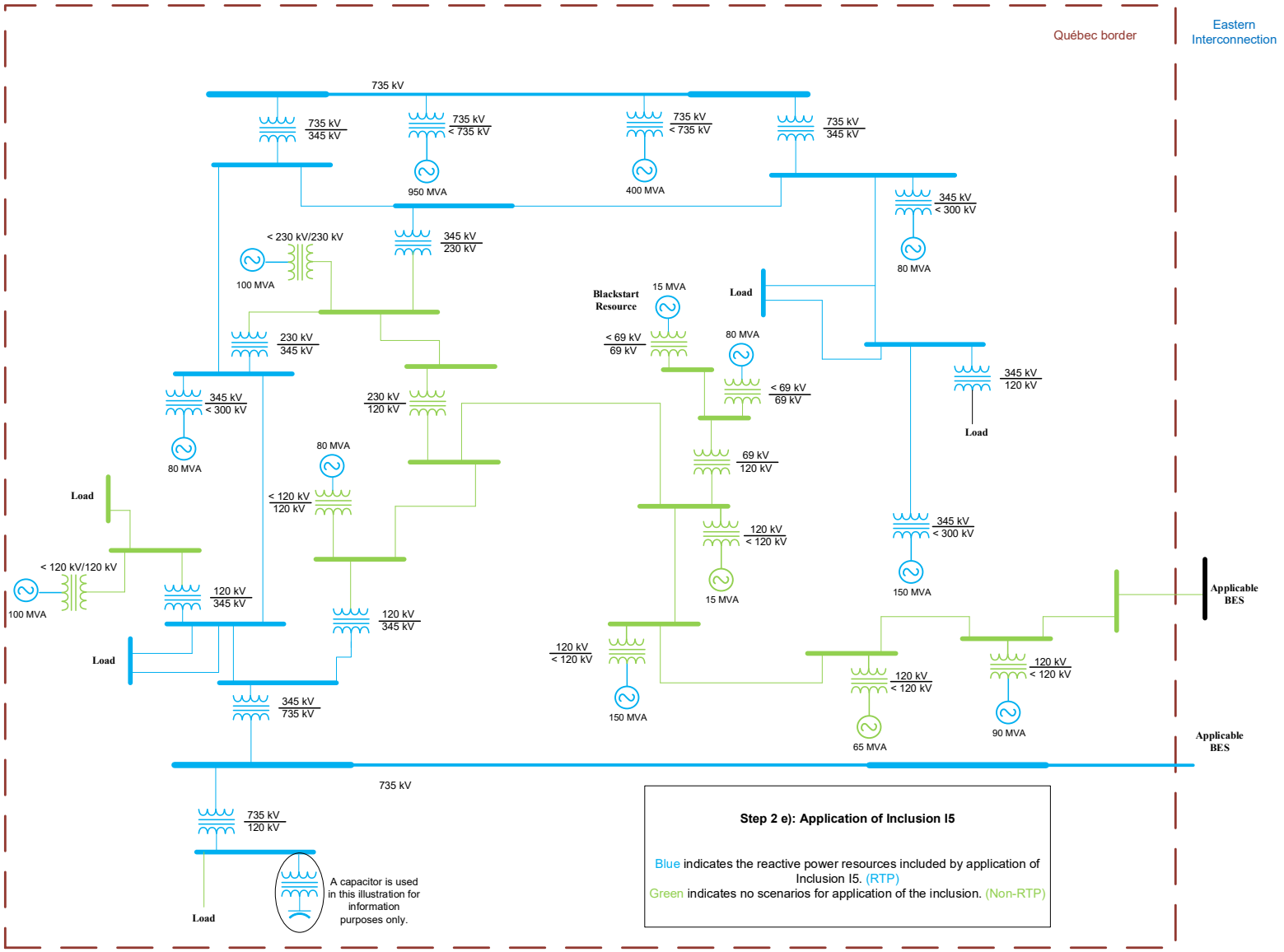


Figure 36: Step 2 e) – Application of Inclusion I5

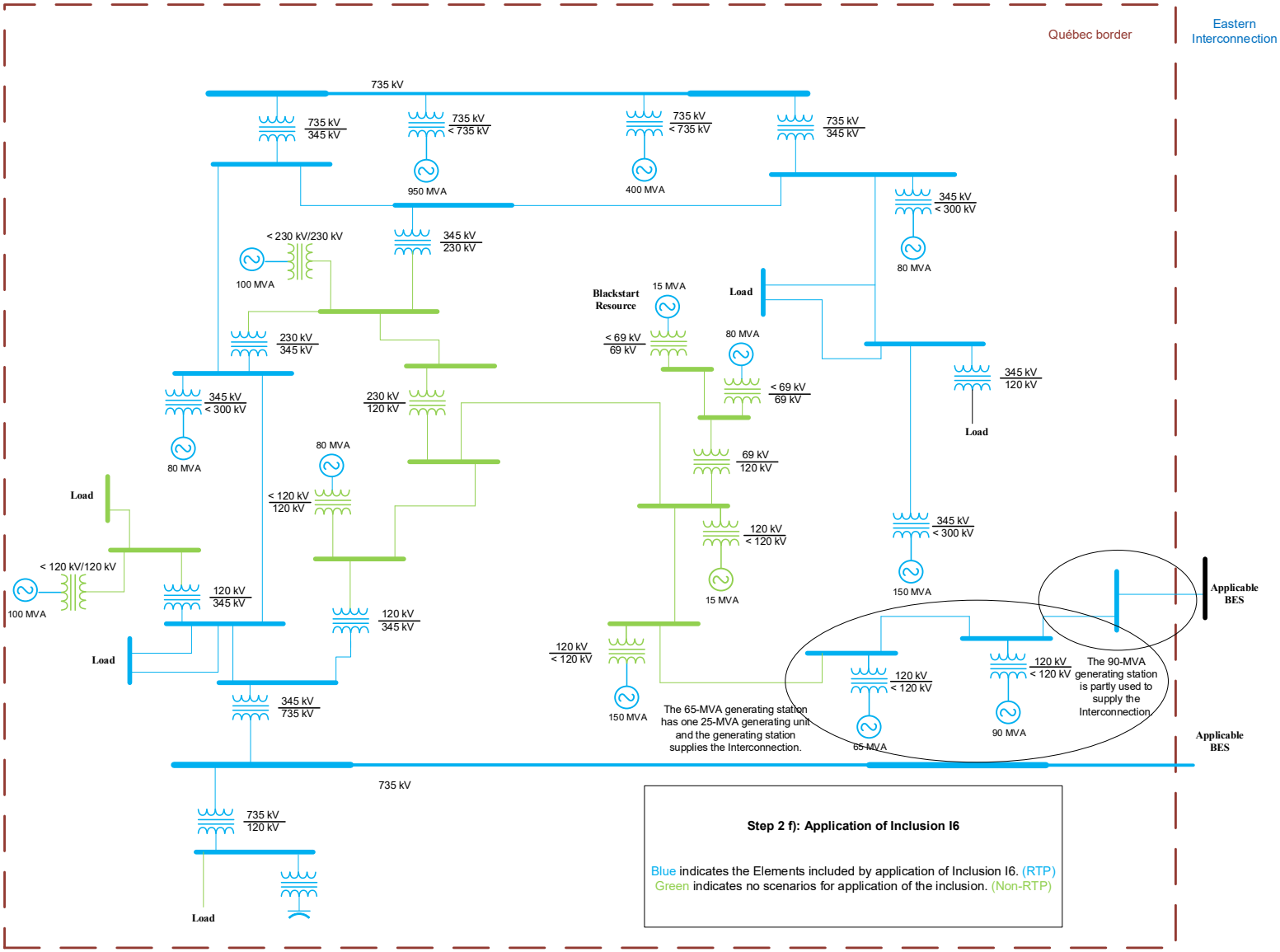


Figure 37: Step 2 f) – Application of Inclusion I6

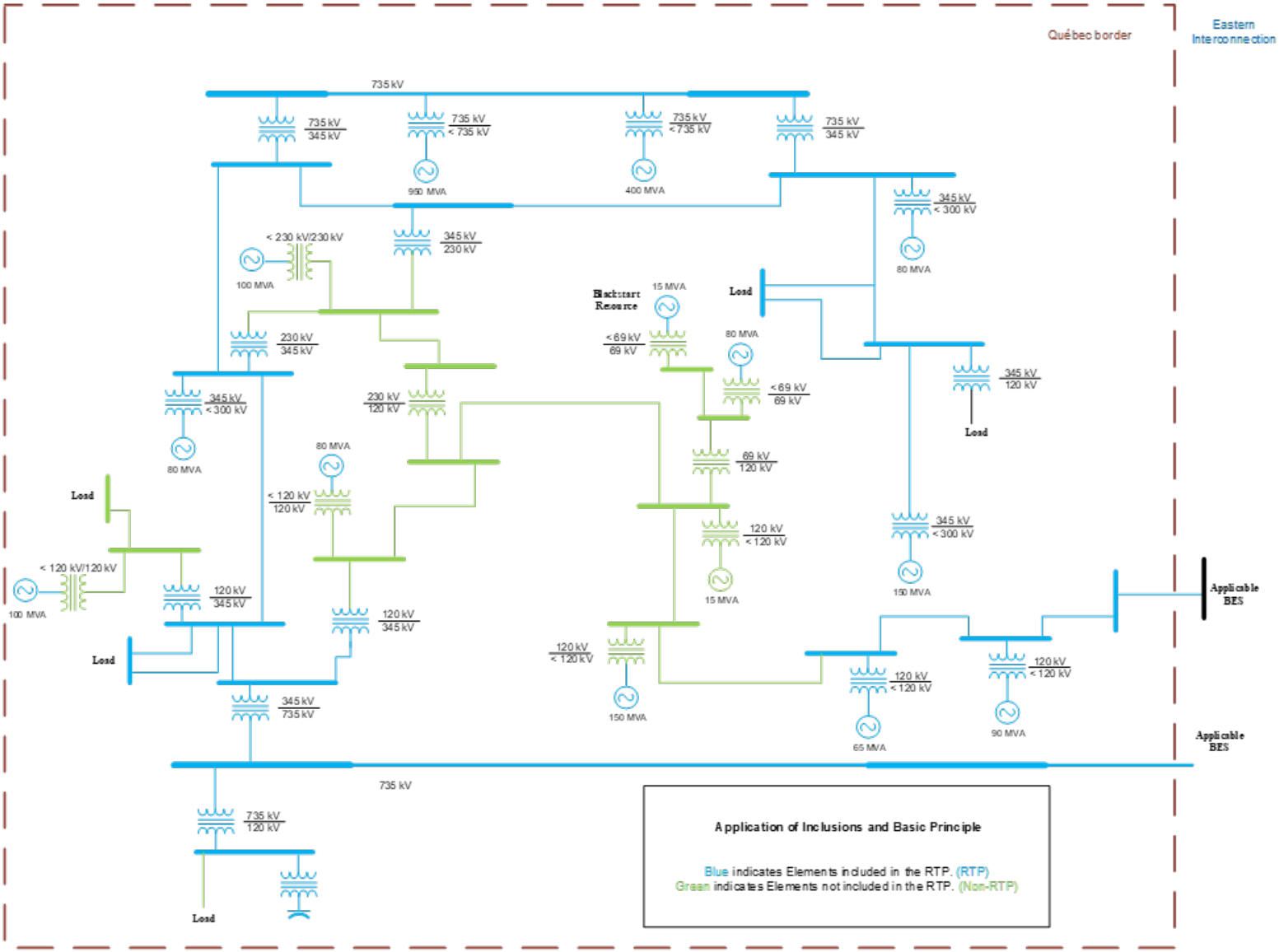


Figure 383: Result of application of inclusions and the basic principle

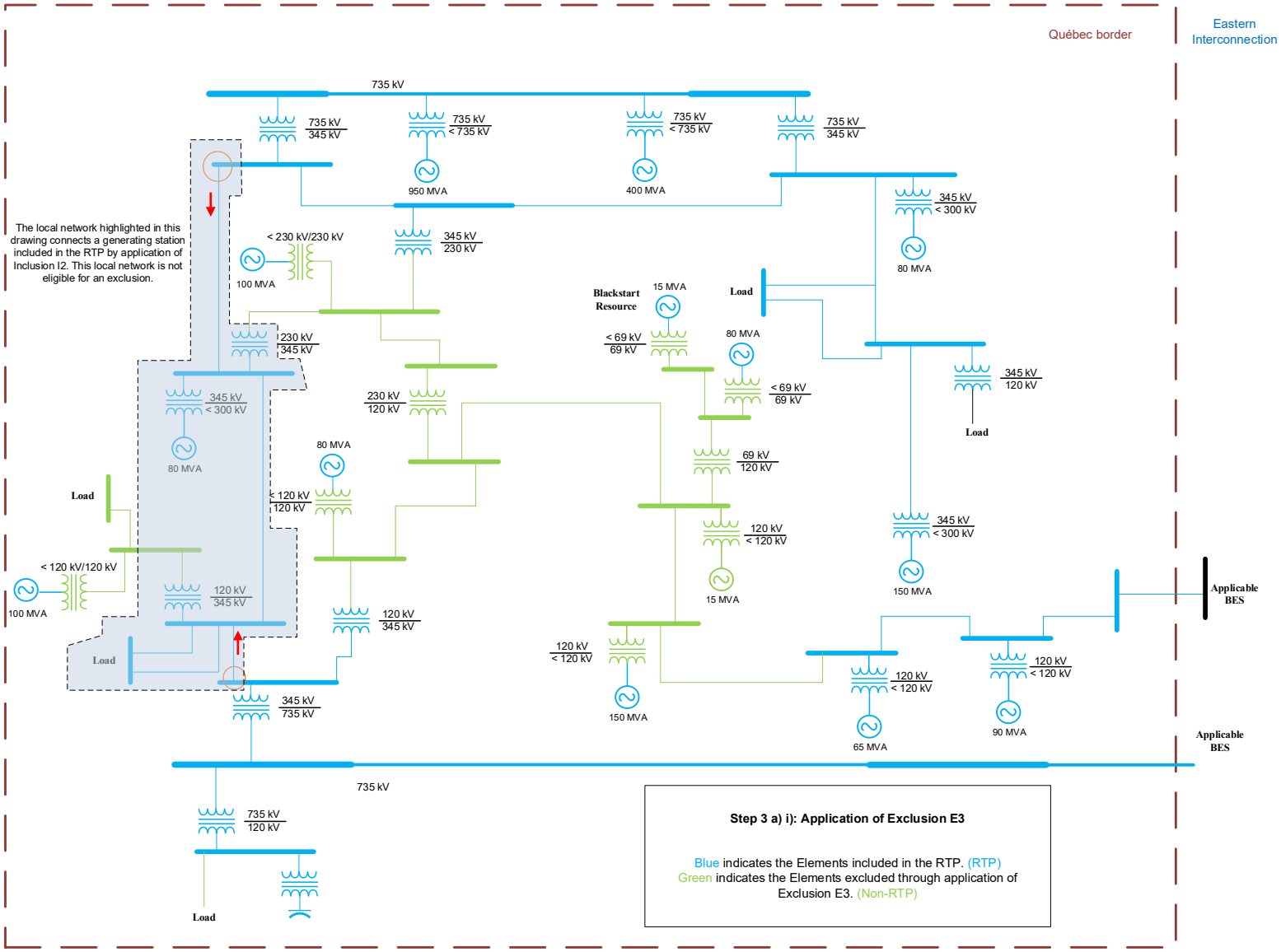


Figure 39: Step 3 a) i) – Application of Exclusion E3

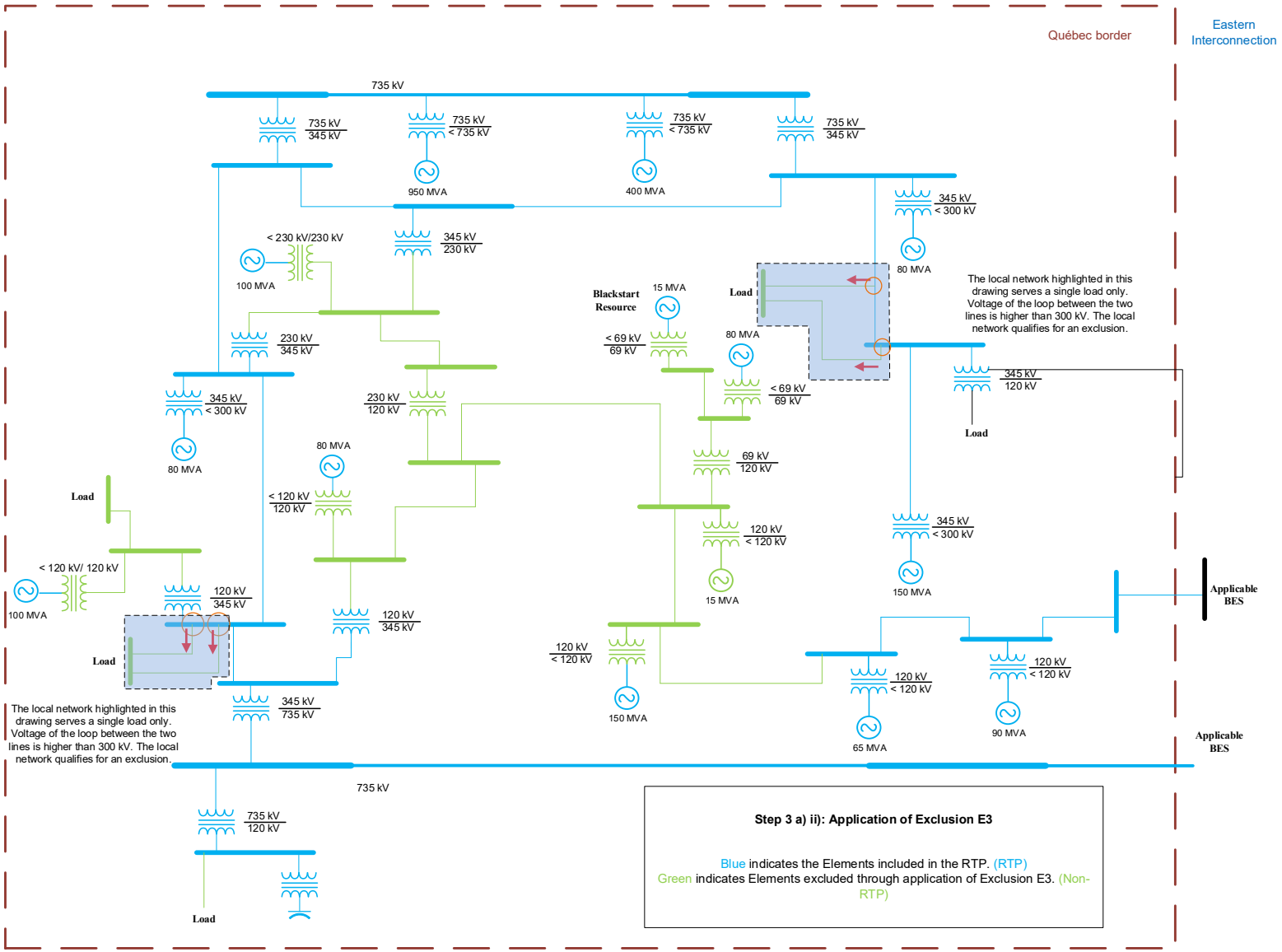


Figure 405: Step 3 a) ii) – Application of Exclusion E3 (cont.)

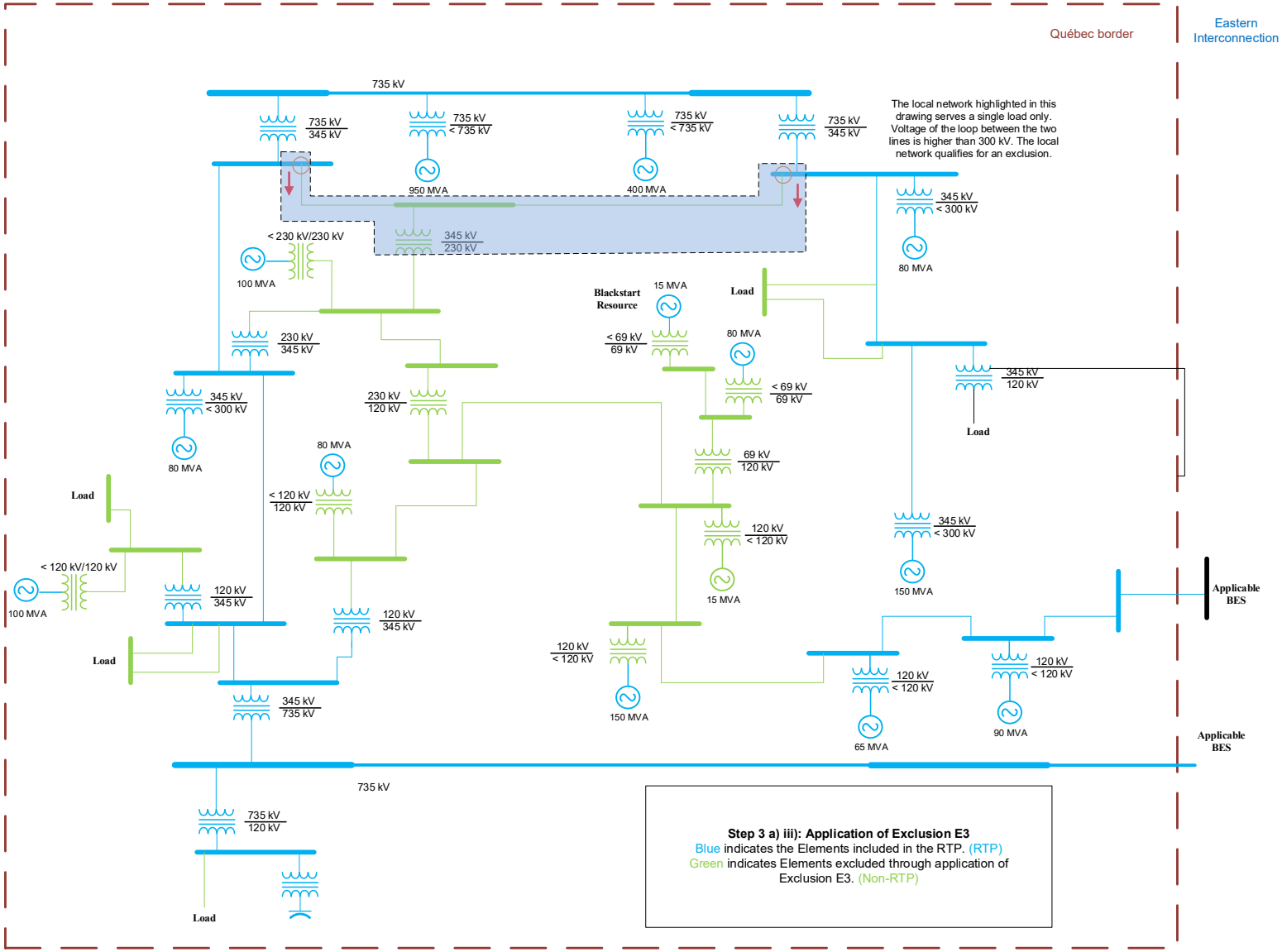


Figure 46: Step 3 a) iii) – Application of Exclusion E3 (cont.)

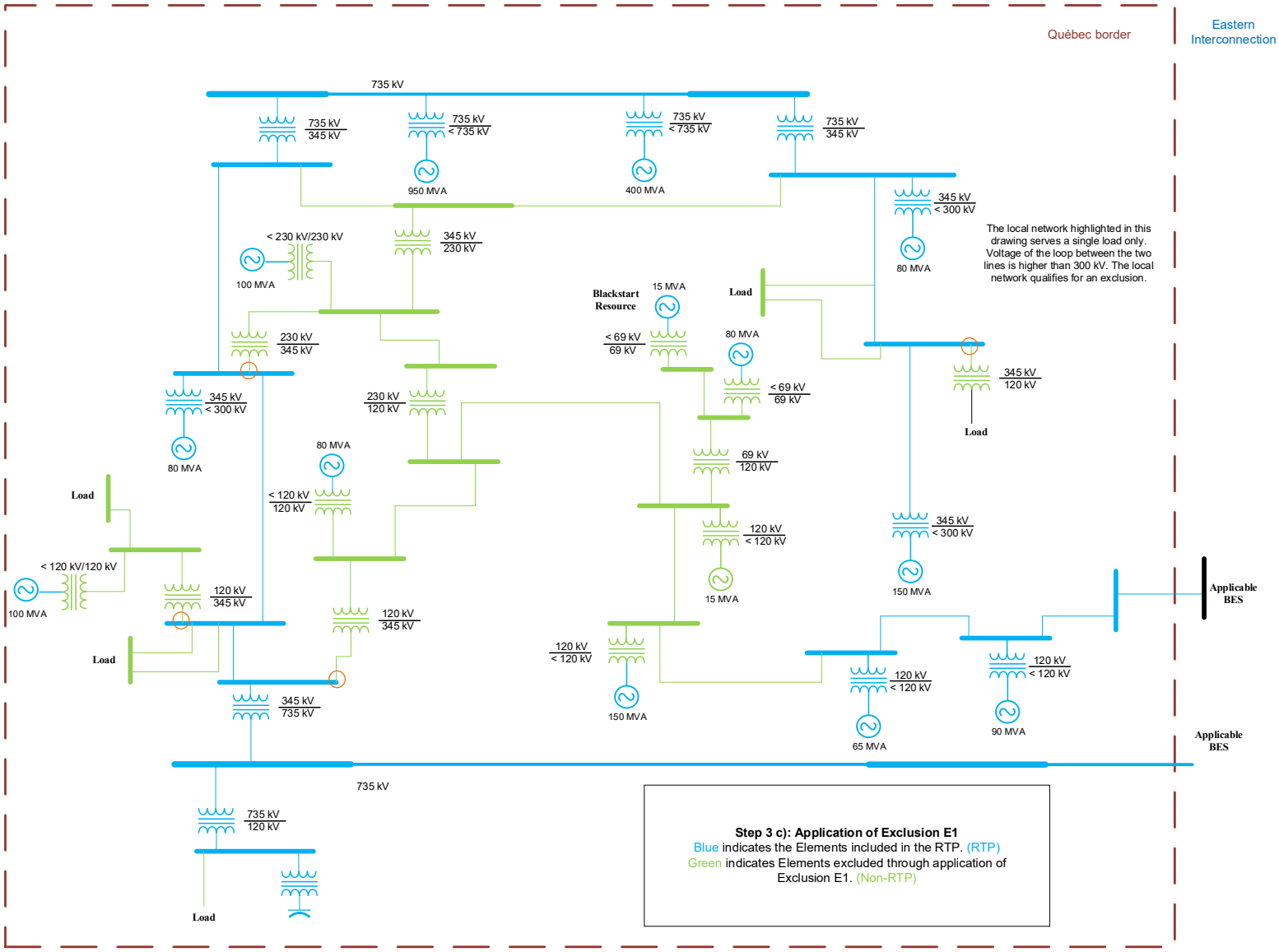


Figure 417: Step 3 c) – Application of Exclusion E1

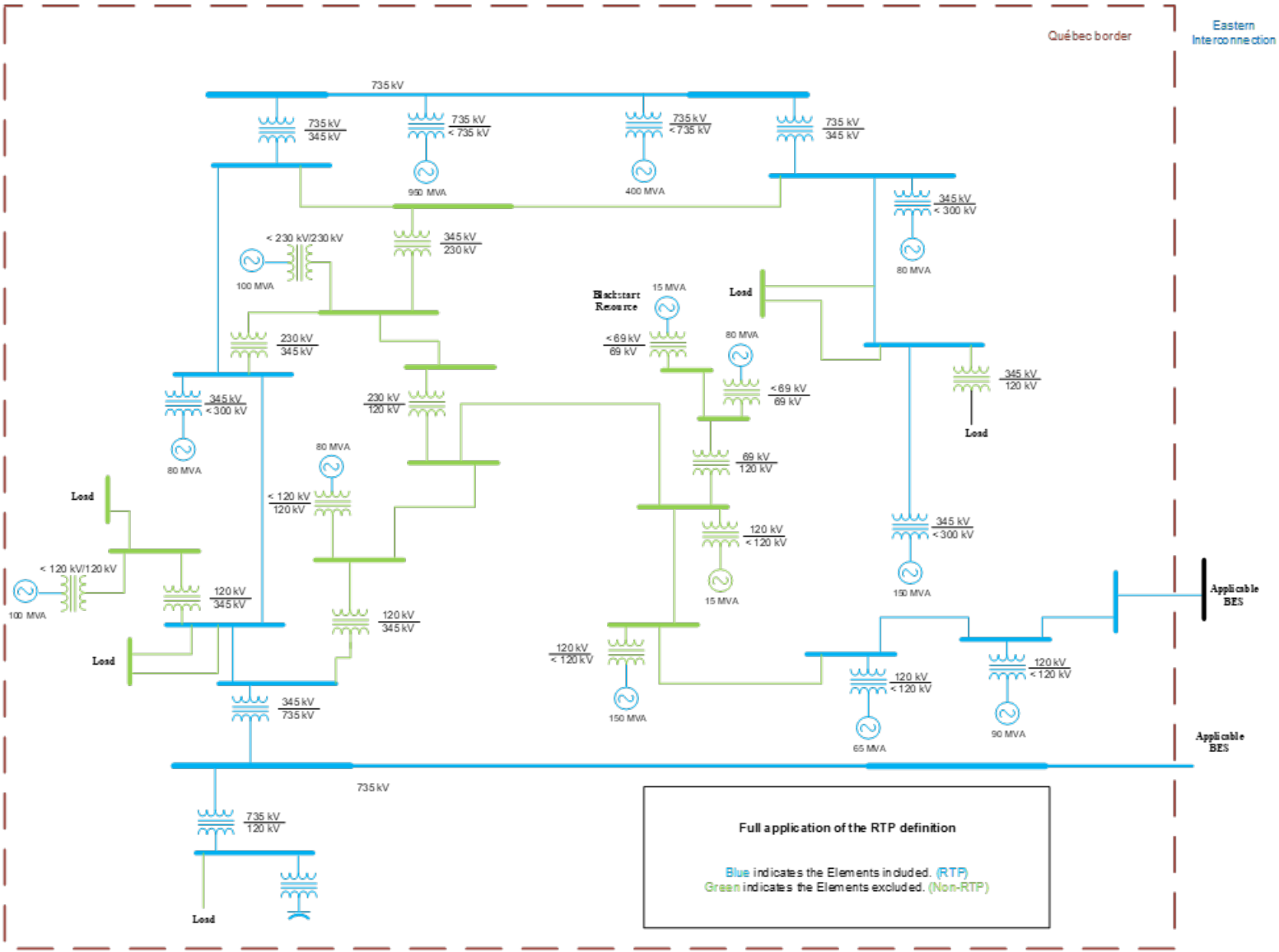


Figure 428: Full application of the RTP definition

Version history

Version	Date	Action	Change Tracking
1	Month xx, 20xx	RTP interpretation guide according to RTP definition acknowledged by the Régie in Decision D-xxxx-yyyy	First release
1.0	Month xx, 20xx	Effective date	