
Project QC-2025-01

TPL-001-5.1 — Transmission System Planning Performance Requirements

1. OVERVIEW OF THE RELIABILITY STANDARD

1.1. Applicability

The purpose of this document is to enable the adoption of Reliability Standard TPL-001-5.1, replacing Reliability Standard TPL-001-4.

Reliability Standard TPL-001-5.1 applies to the functional entities summarized in the following table.

Standard	Functional entities
TPL-001-5.1	Planning Coordinator (PC) Transmission Planner (TP)

The Québec Reliability Coordinator (hereinafter, the “Coordinator”) states that there is no change between the applicability of TPL-001-5.1 and its earlier version, TPL-001-4.

Additionally, Reliability Standard TPL-001-5.1 only applies to the Planning Coordinator and the Transmission Planner. In Québec, the same Registered Entity, Hydro-Québec, performs these two (2) reliability functions.

1.2. Purpose of the standard

This section describes the purpose of the standard that is the subject of this request. The title and purpose of the standard are as follows:

- **TPL-001.5.1 – Transmission System Planning Performance Requirements:** Establish Transmission system planning performance requirements within the planning horizon to develop a Bulk Electric System (BES) that will operate reliably over a broad spectrum of System conditions and following a wide range of probable Contingencies.

The purpose of the standard has not changed from the version currently in effect in Québec, TPL-001-4. However, the French translation of the standard has been slightly improved, without changing its meaning.

1.3. Regulatory Context

In accordance with Section 85.6 of the *Act respecting the Régie de l'énergie* (hereinafter, the “Act”), the Coordinator submits for adoption by the Régie de l'énergie (hereinafter, the “Régie”), Reliability Standard TPL-001-5.1 established by the North American Electric Corporation (hereinafter, “NERC”) and its Québec Appendix.

1.3.1 Regulatory Context in the United States

The following subsections (i–iii) provide the regulatory context that led NERC to draft Reliability Standard TPL-001-5.1.

i. NERC Project 2015-10 – Single Points of Failure – TPL-001-5¹

a. FERC Order No. 754 and NERC’s preliminary work

In October 2011, the Federal Energy Regulatory Commission (hereinafter, “FERC”) issued Order No. 754² in which it stated that there may be a potential system protection issue with the study of a single point of failure³ on Protection Systems. To address this issue, FERC requested that NERC make recommendations to resolve this issue. This was followed by work at NERC and the creation of two (2) committees, the System Protection and Control Subcommittee (hereinafter, the “SPCS”) and the System Analysis and Modeling Subcommittee (hereinafter, the “SAMS”). These two (2) committees produced assessments and studies on single points of failure on Protection Systems. In September 2015, NERC presented the results of these studies in their report, Order No. 754 Assessment of Protection System Single Points of Failure Based on the Section 1600 Data Request⁴ (hereinafter, the “Report”). The Report recommended modifying Reliability Standard TPL-001-4 and its findings have been summarized in Section 2 of this document.

b. FERC Order No. 786 and the reference to MOD standards

As the SPCS and SAMS committees were working, FERC adopted Reliability Standard TPL-001-4 in October 2013 through its Order No 786.⁵ In this order, FERC issued two (2) directives to NERC regarding the upcoming revision of TPL-001. These instructions are summarized in Section 2 of this document.

In addition to the withdrawal of MOD-010 and MOD-012 on June 30, 2016, in the United States, NERC was required to replace references to MOD standards in TPL-001-4.

c. FERC approval of TPL-001-5

Reliability Standard TPL-001-5 was adopted by the NERC Board of Trustees on November 7, 2018, and approved by FERC on January 23, 2020, through Letter Order No. RM19-10-000.⁶

ii. Erratum to TPL-001-5

Following FERC approval of TPL-001-5, NERC submitted a request to FERC on April 23, 2020, to modify Reliability Standard TPL-001-5 in order to correct a typographical error. The nature of this typographical error is presented in Section 2 of this document. This typographical error correction resulted in Reliability Standard TPL-001-5.1.

¹ NERC Project 2015-10, accessed on January 19, 2023, at <https://www.nerc.com/pa/Stand/Pages/Project-2015-10-Single-Points-of-Failure-TPL-001.aspx>

² FERC Order No. 754, accessed on January 13, 2023, at https://ferc.gov/sites/default/files/2020-05/E-4_29.pdf

³ An electrical single point of failure could correspond to a system component, such as a Protection System component, for which a failure of this component could lead to complete system failure.

⁴ Order No. 754 Report – Assessment of Protection System Single Points of Failure Based on the Section 1600 Data Request, accessed on January 13, 2023, at

<https://www.nerc.com/comm/PC/System%20Protection%20and%20Control%20Subcommittee%20SPCS%20/FERC%20Order%20754%20Final%20Report%20-%20SPCS-SAMS.pdf>

⁵ FERC Order No. 786, accessed on January 13, 2023, at https://ferc.gov/sites/default/files/2020-05/E-2_30.pdf

⁶ Letter Order RM19-10-000, accessed on January 13, 2023, at

[https://www.nerc.com/FilingsOrders/us/FERCOOrdersRules/Order%20Approving%20Reliability%20Standard%20TPL-001-5%20\(Transmission%20System%20Planning%20Performance%20Requirements\).pdf](https://www.nerc.com/FilingsOrders/us/FERCOOrdersRules/Order%20Approving%20Reliability%20Standard%20TPL-001-5%20(Transmission%20System%20Planning%20Performance%20Requirements).pdf)

iii. Conclusion on the regulatory context in the United States

Therefore, Reliability Standard TPL-001-5.1 resulted from NERC's work, FERC Order No. 754,⁷ the directives in FERC Order No. 786,⁸ the replacement of the reference to MOD standards and the correction of a typographical error in TPL-001-5.

Approved by FERC on June 10, 2020, via Letter Order No. RD20-8-000,⁹ Reliability Standard TPL-001-5.1 will become effective in the United States on July 1, 2023.¹⁰ In addition, the Coordinator has pointed out that the typographical error in Reliability Standard TPL-001-5 was corrected via NERC's typographical error correction process, which did not require approval from the NERC Board of Trustees for submission to FERC.

1.3.2 Regulatory Context in Québec

The following subsection provides the regulatory context of the TPL-001-5.1 Reliability Standard in Québec.

i. Docket R-4233-2023 – Docket concerning the Adoption of the TPL-001-5.1

On June 23, 2023, the Coordinator submitted Docket R-4233-2023 to the Régie, seeking the adoption of Standard TPL-001-5.1. Prior to this filing, the Coordinator held a public consultation from March 20 to April 30, 2023. As part of the filing and consultation, the Coordinator proposed maintaining the scope of the BPS network under Standard TPL-001, with an effective date aligned with NERC's implementation plan for the same version of the standard from Project 2015-10.

On August 31, 2023, the Coordinator submitted additional evidence. The Régie issued two requests for information, on November 1, 2023 and December 20, 2023, which the Coordinator responded to on November 20, 2023, and January 24, 2024, respectively.

On November 6, 2023, the Régie de l'énergie issued a favorable decision regarding the methodology for identifying elements of the Main Transmission Network (RTP). On March 12, 2024, the Coordinator informed the Régie of the withdrawal of its application in Docket R-4233-2023 to allow for a study on expanding the scope of Standard TPL-001-5.1 to the RTP according to the new methodology. A hearing was held, and the docket was suspended pending the outcome of this study.

The study identified the reinforcements needed to ensure compliance of the non-BPS RTP network with Standard TPL-001-5.1. These reinforcements primarily include the addition of circuit breakers and network automation systems. Expanding the scope of Standard TPL-001-5.1 to the RTP network is deemed relevant, provided that the adjustment of voltage thresholds (EHV and HV) reflects the intent of the approach used in establishing the RTP methodology criteria.

⁷ FERC Order No. 754, accessed on January 13, 2023, at https://ferc.gov/sites/default/files/2020-05/E-4_29.pdf

⁸ FERC Order No. 786, accessed on January 13, 2023, at https://ferc.gov/sites/default/files/2020-05/E-2_30.pdf

⁹ FERC Letter Order No. RD20-8-000, accessed on January 11, 2023, at <https://www.nerc.com/FilingsOrders/us/FERCOrdersRules/TPL-001-5%20Letter%20Order.pdf>

¹⁰ NERC's One Stop Shop document summarizing Reliability Standards implementations, accessed on January 11, 2023, at <https://www.nerc.com/pa/Stand/AlignRep/OneStopShop.xlsx>

1.4. Specific Provisions for Québec

i. *Specific provision regarding the applicability of the standard*

- For Reliability Standard TPL-001-5.1, the Coordinator proposes to modify the scope of the standard by applying it to the Main Transmission Network (RTP)
 - The rationale for modifying the scope is presented in the document titled “*Summary of the Planning Coordinator’s Study on the Expansion of the Applicability of the TPL-001-5.1 Reliability Standard*”
- Le Coordinator proposes to amend Note 3 of the table as follows :
 - References to the Main Transmission Network (RTP) concern Extra High Voltage (EHV) facilities, defined as operating above 400 kV, and High Voltage (HV) facilities, defined as networks operating at 400 kV and below. The EHV and HV designations are used to establish different performance criteria regarding the authorized use of firm transmission service interruptions and non-consequential load loss.

ii. *Other specific provisions*

The Coordinator proposes to remove the specific provision for Requirement R1 stating that “Every reference to the standards MOD-010 and MOD-012 is replaced by reference to the standard MOD-032-1” since NERC has updated this requirement to reflect this.

1.5. Proposed effective dates

The NERC Project 2015-10 Implementation Plan¹¹ proposes that TPL-001-5.1 become effective in three (3) separate stages:

1. First, the standard’s effective date is proposed to be thirty-six (36) months following regulatory approval, with the exception of Requirement R2.7 for non-redundant components of a Category P5 Protection System in Table 1, as specified in footnote 13 items a, b, c, and d.
2. Next, an additional twenty-four (24) months is proposed for the development of Corrective Action Plans to address failures related to Category P5 in Table 1.
3. Lastly, an additional forty-eight (48) months is proposed for TPL-001-5.1 to come into full effect.

Considering the importance of a mandatory reliability regime harmonized with the United States, the Coordinator proposes that Reliability Standard TPL-001-5.1 comes into effect on the first day of the first calendar quarter¹² that is thirty-six (36) months after the Régie’s approval. In addition, the Coordinator proposes, such as in the NERC implementation plan, an additional twenty-four (24) months to develop Corrective Action Plans for Category P5 in Table 1 involving single points of failure in Protection Systems. Lastly, the Coordinator also proposes to use an additional forty-eight (48) months for the standard to come into full effect.

¹¹ NERC Project 2015-10 Implementation Plan, accessed on January 11, 2023, at https://www.nerc.com/pa/Stand/Project_201510%20Single%20Points%20of%20Failure_TPL001_DL/2015-10_TPL-001-5_Implementation_Plan_Clean_10112018.pdf

¹² In decision [D-2015-168](#), the Régie set the effective date of the standards as the first day of the calendar quarter following the date of the standard’s adoption.

Furthermore, the Coordinator considers that its proposal respects the Régie’s requirement that a standard come into force at least 60 days¹³ after it is adopted.

To summarize, the following table demonstrates the Québec Coordinator’s proposed implementation plan for TPL-001-5.1.

Requirements	Proposed implementation date for TPL-001-5.1 in Québec
All except Requirement R2.7 for non-redundant components of a Category P5 Protection System in Table 1 of the standard, as specified in footnote 13 items a, b, c, and d. Note: The first annual Planning Assessment must be completed in accordance with TPL-001-5.1, except for revisions to the Category P5 Corrective Action Plans, by this date.	The first day of the first calendar quarter that is thirty-six (36) months after the Régie’s approval.
Requirement R2.7 to develop Corrective Action Plans to meet the mandatory performance requirements for Category P5 in Table 1 of the standard only, except for the bolded part of Requirement R2.7 that states “Revisions to the Corrective Action Plan(s) are allowed in subsequent Planning Assessments but the planned System shall continue to meet the performance requirements in Table 1 ” and only for Category P5 events concerning non-redundant components of a Protection System identified in footnote 13 items a, b, c, and d. Note: All Planning Assessments after this date must include Corrective Action Plans for any Non-Compliance with the performance requirements established for Category P5 events in Table 1, when identified.	The first day of the first calendar quarter that is sixty (60) months after the Régie’s approval.
All requirements are applicable.	The first day of the first calendar quarter that is one hundred and eight (108) months after the Régie’s approval.

1.6. Standard to retire

The table below summarizes the regulatory background of the standard to be replaced in this project.

Standard to replace	Régie decision	Régie file number	Effective date in Québec
TPL-001-4	D-2017-110 ¹⁴	R-3944-2015 ¹⁵	October 1, 2017

¹³ In decision [D-2016-011](#), the Régie set a minimum of at least 60 days between adoption of a standard and its effective date.

¹⁴ Régie Decision D-2017-110, accessed on January 11, 2023, at http://publicsde.regie-energie.qc.ca/projets/332/DocPri/R-3944-2015-A-0083-Dec-Dec-2017_09_27.pdf (French only)

¹⁵ File No. R-3944-2015, accessed on January 11, 2023, at <http://publicsde.regie-energie.qc.ca/layouts/publicsite/ProjectPhaseDetail.aspx?ProjectID=332&phase=1&Provenance=A&generate=true> (French only)

The Reliability Standard TPL-001-4 must be retired on the date Reliability Standard TPL-001-5.1 comes into effect.

Revision four (4) of TPL-001 was the result of merging Reliability Standards TPL-001, TPL-002, TPL-003 and TPL-004. It also provided for clarifications in connection with planned load shedding.

1.7. Changes to the Glossary

No change to the Glossary.

1.8. Changes to the Register

As a result of the Coordinator's proposal regarding the scope of application—namely, to apply Standard TPL-001-5.1 to the Main Transmission System (RTP)—the scope of the BPS network becomes obsolete in Québec, as no current or future standard applies to that scope.

In summary, the Coordinator proposes to remove all information related to the BPS network from the Registry as of the effective date of Standard TPL-001-5.1, which coincides with the withdrawal date of Standard TPL-001-4. To that end, the Coordinator proposes adding a footnote to the column headings in Annexes A and B concerning Bulk facilities, indicating that these columns will be removed during the first update of the Registry following the effective date of TPL-001-5.1.

2. ASSESSMENT OF RELEVANCE

Reliability Standard TPL-001 is one of two (2) Transmission Planning Reliability Standards that establishes requirements for the PC and TP to develop studies on their portion of the Transmission System. Reliability Standard TPL-001 requires that PCs and TPs conduct an annual Planning Assessment for their portion of the Transmission System on a variety of System Conditions and Contingencies described in the standard.

The proposed standard uses a risk-based approach to contingency planning and requires corrective actions if the entity's System cannot meet the standard's requirements. This risk-based approach was carried over from the previous version, TPL-001-4.

2.1. NERC's preliminary work and FERC Order No. 754 | Single points of failure in Protection Systems

The SAMS and SPCS Report concluded that to address issues associated with single points of failure in Protection Systems, TPL-001 needed to be modified.

As a result, a series of revisions were proposed for planning entities to complete a more thorough analysis of single points of failure in the Protection Systems on their Systems and to take appropriate action to correct potential issues. In concrete terms, these actions manifest through the revisions to the following items in Reliability Standard TPL-001-5.1:

- In Table 1, Category P5 now requires a planning entity to assess the impact of Delayed Fault Clearing on their System to operate as designed upon failure of a Protection System's non-redundant component acting on a Faulted Element;
- Table 1, extreme stability events 2.a through 2.h now require a planning entity to assess the impact on their System from a three-phase fault with failure of a Protection System's non-redundant component, resulting in Delayed Fault Clearing; and

- Table 1, footnote 13, now specifies the Protection System equipment to be considered in assessing Category P5 events and extreme stability events 2.e through 2.h.

The Report concludes that the risks associated with single points of failure are lower for higher voltage Systems. The Coordinator concluded that the probability of an event occurring on a single point of failure is lower on the BPS system (a predominantly extra-high voltage system) than on the BES system (a predominantly high-voltage system). However, the Coordinator agrees with the Report's conclusion that the risk is sufficient to modify TPL-001 in order to identify Protection Systems where single points of failure may exist and reduce the risk of an Adverse Reliability Impact. This modification is therefore relevant in Québec.

2.2. FERC Order No. 786 approving TPL-001-4

In addition to reliability issues associated with single points of failures in Protection Systems, Reliability Standard TPL-001-5.1 also addresses two (2) directives in FERC Order No. 786.¹⁶ These two (2) directives are summarized as follows:

- Modify Reliability Standard TPL-001 to address the concern that the six (6) month threshold in Requirement R1.1.2 could exclude planned maintenance outages of significant facilities from future Planning Assessments (par. 40).
- Ensure that the next revision of Reliability Standard TPL-001 requires the Registered Entity to perform an assessment of critical long lead-time equipment in accordance with the entity's spare equipment strategy (par. 89).

The NERC Project 2015-10 Drafting Committee¹⁷ responded to the FERC directives in this revision of the standard.

The Coordinator is of the opinion that the modifications to the standard resulting from the directives in FERC Order No. 786¹⁸ are also relevant for Québec in that they improve System planning by considering planned maintenance outages of less than six (6) months that may have a non-negligible impact on the System's capacity to handle the Load, even in Off-Peak periods. It also improves the standard by considering outages of critical long lead-time equipment in the Planning Assessment.

2.3. Modification to the reference to MOD standards

In July 2016, NERC Project 2015-10¹⁹ was further modified when Reliability Standards MOD-010 and MOD-012 were withdrawn. To that end, any reference to Reliability Standards MOD-010 and MOD-012 in TPL-001 Requirement R1 was changed to MOD-032.

This modification is relevant for Québec: a special provision was already included in the Québec Appendix to correct the reference to MOD standards. With the reference now changed in the standard, the special provision can be removed.

¹⁶ FERC Order No. 786, accessed on January 13, 2023, at https://ferc.gov/sites/default/files/2020-05/E-2_30.pdf

¹⁷ NERC Project 2015-10, accessed on January 19, 2023, at <https://www.nerc.com/pa/Stand/Pages/Project-2015-10-Single-Points-of-Failure-TPL-001.aspx>

¹⁸ FERC Order No. 786, accessed on January 13, 2023, at https://ferc.gov/sites/default/files/2020-05/E-2_30.pdf

¹⁹ NERC Project 2015-10, accessed on January 19, 2023, at <https://www.nerc.com/pa/Stand/Pages/Project-2015-10-Single-Points-of-Failure-TPL-001.aspx>

2.4. Erratum leading to Version 5.1

When TPL-001-4 was revised to TPL-001-5, several sub-requirements were renumbered. However, in Requirement R2.7, the reference to Requirement R2.1.4 had not been updated to reflect the numbering in the standard's new version. In addition, TPL-001-5 referred to Requirements R2.1.4 and R2.4.3 in its Requirement R2.7 when Requirements R2.1.3 and R2.4.3 should have been referenced. It was necessary to correct this reference to avoid any potential confusing in the interpretation of this part of the standard.

In short, this correction resulted in Version 5 of the standard being revised to Version 5.1.

2.5. Conclusion of the relevance assessment

In the United States, FERC concluded that Project 2015-10 submitted by NERC would improve Reliability Standard TPL-001-4 by addressing: 1) the study on single points of failure in the Protection Systems, and 2) planned maintenance outages and the stability analysis for the entity's spare equipment strategies. Furthermore, FERC deemed that Reliability Standard TPL-001-5.1 is a just, reasonable, not unduly discriminatory or preferential, and in the public interested. FERC also made clear in its Letter Order RM19-10-000²⁰ that the issues raised by Order No. 754 and 786 have been addressed.

In addition, the neighboring New Brunswick²¹ and Ontario²² systems also adopted Reliability Standard TPL-001-5.1.

In accordance with the 2009 agreement between the Régie, NERC and NPCC, with the Québec government's authorization,²³ this revised standard was developed and approved by organizations recognized in North America, including in Québec and neighboring jurisdictions. The Coordinator is of the opinion that Reliability Standard TPL-001-5.1 contributes to the reliability of the Québec System, is pertinent to the reliability of the Québec Interconnection and contributes to harmonization with neighboring systems. The Coordinator is of the opinion that these requirement modifications improve the Reliability Standard and are relevant to Québec.

3. PRELIMINARY IMPACT ASSESSMENT

Standard TPL-001-5.1 includes several requirement changes compared to the previous version. However, this standard applies to only one entity in Québec. Nevertheless, expanding the scope of TPL-001-5.1 to the Main Transmission System (RTP) with an EHV threshold of 400 kV would require moderate investments.

The following table presents preliminary impact estimate on all Québec entities.

²⁰ FERC Letter Order RM19-10-000, accessed on January 13, 2023, at [https://www.nerc.com/FilingsOrders/us/FERCOrdersRules/OrderApprovingReliabilityStandardTPL-001-5\(TransmissionSystemPlanningPerformanceRequirements\).pdf](https://www.nerc.com/FilingsOrders/us/FERCOrdersRules/OrderApprovingReliabilityStandardTPL-001-5(TransmissionSystemPlanningPerformanceRequirements).pdf)

²¹ New Brunswick Energy & Utilities Board, Reliability Standards, accessed at <https://nbeub.ca/reliability-standards>

²² Independent Electricity System Operator (IESO), NERC Reliability Standards and NPCC Criteria Enforcement Dates, assessed on January 13, 2023, at <https://www.ieso.ca/-/media/Files/IESO/Document-Library/orcp/Standards-Roadmap-Milestone-Oct-21.ashx>

²³ Agreement entered into pursuant to Decree No. 443-2009 issued on April 8, 2009. http://www.regie-energie.qc.ca/audiences/normes_fiab_tranp_elec/Entente_Regie_NERC_NPCC_5mai09_en.pdf

TPL-001-5.1	Low	Moderate	High
Implementation of the standard		X	
Enforcement of the standard		X	
Compliance monitoring		X	

Legend:

Low: Normal industry practice or standard that only requires minor adjustments to existing processes or practices.

Moderate: Change that requires the mobilization of some physical, human or financial resources to implement the proposed standard, enforce it or monitor its compliance.

High: Change that requires provision and mobilization of significant physical, human or financial resources to plan and implement the proposed standard, enforce it or monitor its compliance.

4. FINAL IMPACT ASSESSMENT

This section will be completed upon receipt of the impact assessment forms and at the conclusion of the consultation process prior to filing of the Standard with the Régie.