MANUAL

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Transfer Capability Assessment for Near-Term Transmission Planning Methodology

Issue 1.0

This document describes the IESO's methodology to perform an annual assessment of Transfer Capability in the Near-Term transmission Planning Horizon.

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Table of Changes

Reference (Section and Paragraph)	Description of Change
All	This manual supersedes IESO_PRO_0885, Transfer Capability Assessment for Near-Term Transmission Planning Methodology

1. Introduction

The Independent Electricity System Operator (IESO) is responsible for conducting periodic assessments to identify the limitations on the IESO-interconnected grid and its ability to reliably transfer energy. The Transfer Capability Assessment for Near-Term Transmission Planning document was created in compliance with NERC standard FAC-013-2. The purpose of this document is to describe the methodology for performing the annual assessment of Transfer Capability in the Near-Term Transmission Planning horizon.

– End of Section –

2. Study Parameters and Criteria

The study parameters, assumptions and criteria used by the IESO to perform the assessment shall be consistent with the IESO's planning practices, as described in this document and in the Ontario Resource and Transmission Assessment Criteria (ORTAC) document.

The criteria used by the IESO in its assessment include, but are not limited to, the items listed below. The details of each of these criteria are described in the ORTAC document.

- Base Case
- Contingency criteria
- Pre-Contingency Voltage Limits
- Voltage Change Limits
- Transient Voltage Criteria
- Steady State Voltage Limits
- Congestion
- Line and Equipment Loading Criteria
- Load Forecasts and Load Modelling
- Local Area Requirements
- Power Transfer Capability

The parameters and criteria used in the assessment to determine limit restrictions shall respect known System Operating Limits for the transmission planning study.

The Ontario Transmission System has been divided into ten geographical zones, which are connected by interfaces, composed of a group of transmission circuits with limits placed on the directional flows across them. Transfer scenarios are developed to increase the power flow in a given direction through both internal Ontario interfaces and Ontario's interties with neighbouring systems respectively.

– End of Section –

3. Study Methodology

The study methodology described in this section provides the IESO's basic approach to conducting a transfer capability assessment for transmission planning. It is not intended to be an in-depth instructional guide for performing power system studies, and as such, certain details have been omitted.

Typical sets of system conditions that can be used to evaluate the study can be found in ORTAC, section 2.8. However, not all conditions need to be evaluated. Studies may be conducted on one or two of the most stressful system conditions. Pre and Post-Contingency system conditions are described in section 4 of ORTAC.

The methodology below is carried out after the scope of the transfer capability transmission study has been established.

3.1 Create/Adjust Base Case

The first step is to obtain the appropriate base case for the transmission study. Using the appropriate load forecast, adjust total load level, load distribution and power factor. If an actual or reasonable forecast dispatch is available, adjust the base case to reflect this dispatch. Dispatch generation to meet the desired system condition, as described in section 3.1.1 of this document. The criteria for base cases and load forecasts are described in ORTAC, section 2.3 to 2.4.

3.1.1 Generation System Conditions

The IESO system generation dispatch is modeled based on economic dispatch in accordance with the demand to be served and the resource projections for the scenario under study.

Generation redispatch is conducted to account for units that are taken out of service due to long term planned outages that span the entire study period.

Planned generation additions scheduled to be in service within the transmission planning study period shall be included and the generation dispatched such that it stresses the system in a manner that is consistent with the established study conditions. The criteria for generation connection is described in ORTAC, section 6.

3.1.2 Transmission System Conditions

The transmission system topology should be accurately represented in the base case for the planning study period.

Planned transmission outages, additions and retirements shall be implemented in the base case if they span the entire study period. Transmission changes that occur only for a portion of the study period may be implemented in the base case if their removal, addition or change results in a reasonable worst case scenario. The criteria for transmission connection is

described in ORTAC, section 5. The conditions for exports and imports are described in ORTAC, section 3.2.

When phase shifters on the Ontario-Michigan intertie are out service, parallel (loop) flows may occur on both Michigan and New York interfaces. If the system conditions are such that this scenario occurs, adjustments to the corresponding interconnections should be made accordingly.

3.1.3 System Demand

Load forecasts and load modeling used in transmission planning studies are to be consistent with the IESO's and the Ontario Power Authority's (OPA) latest forecasts. Details on system demand used in transfer capability studies can be found in ORTAC, section 2.4.

3.2 Prepare simulation files

Several files are required as part of the simulation. These will determine how the system is stressed, what results are captured, as well as the system's performance relative to the conditions established. Multiple files may be created to meet the different study conditions needed to assess the transmission system.

Not all transfers described below need to be prepared and tested for the particular study year. If the expected system conditions in the vicinity of the interface the transfer is stressing has not changed significantly from the previous study year, no new analysis is required for that interface, and inclusion of that transfer into the study case is not required.

3.2.1 BLIP Transfer

This transfer stresses the BLIP interface in the flow West direction. The source and sink for this transfer are as follows:

- Source - Scale up generation East of BLIP
- Sink – Scale down generation West of BLIP in the following order:
    1. Generation in Ontario
    2. Generation in Michigan

3.2.2 NBLIP Transfer

This transfer stresses the BLIP interface in the flow East direction. The source and sink for this transfer are as follows:

- Source – Scale up generation West of BLIP
- Sink – Scale down generation East of BLIP.

3.2.3 FABCW Transfer

This transfer stresses the power system in the Bruce and Southwest zones by transferring power from the generation in the Bruce zone to the Southwest and Toronto zones. The source and sink for this transfer are as follows:

- Source – Scale up generation West of FABCW
- Sink – Scale down generation East of FABCW.

3.2.4 FETT Transfer

This transfer stresses the power system in the Bruce and Southwest zones by transferring power from the generation in the Bruce zone to the Southwest and Toronto zones. The source and sink for this transfer are as follows:

- Source – Scale up generation West of FETT
- Sink – Scale down generation East of FETT.

3.2.5 QFW Transfer

The source and sink to stress the QFW interface are as follows:

- Source – Scale up generation in New York and at Beck.
- Sink – Scale down generation in the Bruce and Toronto zones.

3.2.6 TEC Transfer

This transfer stresses the power system in eastern Toronto. The source and sink for this transfer are as follows:

- Source – Scale up generation West of TEC
- Sink – Scale down generation East of TEC.

3.2.7 FIO Transfer

This transfer stresses the power system in Ottawa by transferring power from generation outside of the Ottawa zone through to Quebec via the HVDC at Hawthorne. The source and sink for this transfer are as follows:

- Source – Scale up generation outside of the Ottawa zone
- Sink – Increase exports to HQ over the HVDC connected at the Hawthorne 230 kV bus.

3.2.8 FN Transfer

This transfer stresses the power system connecting Northern and Southern Ontario in the south to north direction. The source and sink for this transfer are as follows:

- Source – Scale up generation in Southern Ontario.
- Sink – Scale generation and load in the following manner:
    1. Scale down Northern Ontario generation.
    2. Scale up load in Northeastern Ontario.

3.2.9 FS Transfer

This transfer stresses the power system connecting Northern and Southern Ontario in the north to south direction. The source and sink for this transfer are as follows:

- Source – Scale up Northern Ontario generation.
- Sink – Scale down generation in Southern Ontario.

3.2.10 Intertie Transfers

These transfers stress the tie lines at the Ontario-Michigan, Ontario-New York at Niagara and Ontario-New York at St. Lawrence interfaces. Conceptually, the source and sink are represented by generation on each side of the studied intertie.

For the Michigan to Ontario intertie transfer, the flow on the phase shifters is to be preset at a certain MW. Natural gas generation close to the intertie on the Ontario side is reduced (or increased), and generation east of Toronto is increased (or reduced) with an equivalent amount, in MW, based on the difference between the known interface value and the preset phase shifter flow. This generation redispatch allows the flow on the Michigan to Ontario intertie transfer to be stressed.

3.3 Criteria

Prepare the required criteria for the transmission system being studied. This may include criteria information such as steady state voltage limits, transient voltage limits, and line loading limits. Record this information in the appropriate format compatible with the simulation software being used. The criteria used in the assessment shall adhere to the requirements detailed in the ORTAC document.

3.4 Contingencies

Develop a list of contingencies appropriate for the simulation. This may include single equipment (lines, generators, transformers), double line, breaker failures, and dynamic fault contingencies. If a prior contingency list is used as a starting point, ensure that modifications to the contingencies are made such that they reflect the changes to the base case in use. The criteria for the development and use of contingencies are detailed in ORTAC, section 2.

3.5 Monitoring and Interface

Prepare a file in the appropriate simulation format containing the interface and other transfer definitions, as well as other equipment identified for monitoring. This may include, but is not limited to, buses, generators, and lines.

3.6 Special Protection Systems

A special protection system (SPS) is defined by NERC/NPCC as a protection system designed to detect abnormal system conditions and take corrective action(s) other than the isolation of faulted elements. Such action(s) may include changes in load, generation, or system configuration to maintain system stability, acceptable voltages or power flows.

The decision to employ the use of each SPS in transfer capability assessments for transmission planning should be made for each study condition, such that it meets the requirements set out in NPCC Directory1 and in the ORTAC document.

3.7 Conduct Simulations/Perform tests

After incorporating all the simulation files, the simulation can proceed to determine maximum transfer levels, limiting elements, and limiting contingencies at each interface and defined transfer. Simulations for transient response may also be conducted.

Violations from the output of the simulations shall be examined. Pre and post-contingency violations can be addressed by adjusting the base case through generation redispatch, load adjustment, bus voltage set point adjustment, and use of available shunt elements. Post-contingency violations can also be solved by use of SPS, if the SPS meets the requirements for the study. If a deficiency or problem is identified in the results, the area should be further examined by adding elements or transfers for monitoring in the corresponding monitoring and interface simulation files.

Transmission service is not sold in Ontario; transactions at the interties are scheduled based on economic merit. Access to transmission is via the energy market. Resources that clear the market are allowed to flow.

3.8 Produce Transfer Capability Transmission Study Report

After a study is performed, the study work and findings must be documented. The report must address the items in the scope of the study.

– End of Section –

4. Publishing and Maintaining the Transfer Capability Assessment for Near-Term Transmission Planning Document

4.1 Publishing Transfer Capability Methodology

The IESO will revise and re-publish the Transfer Capability methodology as necessary. The document will be made available on the IESO's public website for adjacent Planning Coordinators, Transmission Planners within Ontario and any entity that has a reliability-related need for the methodology.

Before implementing a new or revised Transfer Capability methodology, the IESO will notify adjacent Planning Coordinators and Ontario's Transmission Planners by email. Also, the IESO will provide the methodology via email, within 30 days of a written request at orcp@ieso.ca from a functional entity that has a reliability-related need for it.

Within 45 calendar days of receiving a request by any recipient of the Transfer Capability methodology, the IESO will provide a documented response to the requester.

4.2 Publishing Transfer Capability Transmission Study Report

After documenting the results of the Transfer Capability assessment, the IESO will provide those results to adjacent Planning Coordinators and Ontario's Transmission Planners by email. Also, the IESO will provide the assessment's results via email within 45 calendar days of a written request from a functional entity that has a reliability-related need for them.

Access to IESO's data to support the assessment results can be arranged upon written request at orcp@ieso.ca. Within 45 calendar days of receiving a request by any entity that has received the Transfer Capability methodology document; the IESO will provide the requested data available to the requestor, subject to the conditions specified in requirement R6.

– End of Section –

References

Document Name	Document ID
Ontario Resource and Transmission Assessment Criteria	IMO_REQ_0041
Internal Manual 2: Market & System Operations Part 2.14: Determine Operating Security	IMP_PRO_0049

– End of Document –