

# Business Process

## BP\_SO\_2.2 System Constraints Calculation

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## 1 ASSUMPTIONS

Assumptions made during the design of this process include:

- This is an all-island business process, meaning the same process will be used across both jurisdictions on the island, Ireland and Northern Ireland;
- The following business process addresses all requirements, including roles, tools, and activities that will enable the TSOs to achieve scheduling objectives; and
- All required systems are in place. They offer all required functionalities to support business needs.

## 2 PROCESS REFERENCES

### 2.1 RELATED RULES REFERENCES

The following table provides references to the documents that govern the design of this business process.

Document Title	Relevant Section	Description
SONI Grid Code	SDC1 Scheduling and Dispatch Code No. 1	The Scheduling and Dispatch Codes for SONI and EirGrid are under common governance and details the obligations on the TSOs and Grid Code Users in relation to scheduling and dispatch activities.
EirGrid Grid Code	SDC1 Scheduling and Dispatch Code No. 1	The Scheduling and Dispatch Codes for SONI and EirGrid are under common governance and details the obligations on the TSOs and Grid Code Users in relation to scheduling and dispatch activities.
SEM-15-065	System Operation in the I-SEM	Sets out high level guidance related to the scheduling and dispatch process.
SONI Operating Security Standards	All	This document outlines the standards to which SONI operate the Northern Ireland transmission system.
EirGrid Operational Security Standards	All	This document outlines the standards to which EirGrid operate the Ireland transmission system.
Operational Constraints Update (monthly)	All	This document outlines the key systems and generator constraints that are included in the scheduling process. It should be read in conjunction with the Weekly Constraints Update document.
Weekly Operational Constraints Update	All	This document provides data on forecasted network congestion and restriction on dispatchable generation. It should be read in conjunction with the Monthly Constraints Update document.

### 2.2 RELATED DOCUMENTS

The following table provides a list of documents that are related to this business process.

Document Title	Relationship	Description
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Balancing Market Principles Statement	Information	Public guide to the scheduling and dispatch process.
BP_SO_2.1 Constraints Changes in Scheduling Runs	Related process	The Constraints Changes in Scheduling Runs process may be triggered by this process, System Constraints Calculation, as it covers updating MMS to ensure it is fully reflective of system constraints.

### 3 PROCESS CONTEXT

#### 3.1 BUSINESS MODEL RELATIONSHIP

The 'System Constraints Calculation' process sits within the 'Constraints Management' group within the Transmission Systems Operator (TSO) processes. These cover the ongoing management of the Transmission Constraint Groups (TCGs), within the Market Management System (MMS) to ensure the correct data in relation to the network is available and used for the purposes of scheduling and dispatching the system. They also cover the activities that the TSOs are required to perform in relation to forecasting and reporting against costs associated with constraints to the market.

#### 3.2 BACKGROUND AND SCOPE

##### Background

In order to produce secure Operations Schedules the TSOs determine transmission network constraints that act as an input in to the scheduling and dispatch process. To enable the efficient and secure operation of the system, generation is dispatched to certain levels to prevent equipment overloading, voltages outside limits or system instability in accordance with Operational Security Standards. Restrictions or limits on generation are represented by TCGs in the scheduling process. The constraints applied through TCGs are complimented with constraints applied through the application of a network model in scheduling and dispatch. This network model is used to monitor schedules using a DC load flow to ensure schedules do not breach thermal limits.

Network constraints as represented by TCGs can be categorised into three types as per Table 1 below.

TCG Type	Description
MW	Limit MW output of unit or units assigned to a TCG
MWR <sup>1</sup>	Limits (the total MW + Primary Reserve - the area demand) from assigned resources
NB	Limit to the status (On/Off) of the unit or units assigned to a TCG

*Table 1: Types of Transmission Constraint Groups used in scheduling*

Permanent system constraints are typically represented by 'NB' type constraints and they are not calculated as part of this process. Other constraints such as 'MW' and 'MWR' vary with system demand, wind levels, generation and transmission configurations and can change throughout the year and throughout the day.

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<sup>1</sup> A more detailed description of this constraint is available in the document "Information Note on Inter-Area Flow (North-South Tie Line) Constraints".

Temporary 'NB' constraints may be required to facilitate transmission outages and these are identified through this process. The output of these studies may result in generators' indicative operations schedules being increased or decreased from their Physical Notifications to meet these requirements in scheduling and dispatch.

### **Scope**

Near Time will perform an analysis for the following week covering a range of scenarios to determine the transmission constraint values for that week. If there are significant changes during the week then an update is made to the constraints. The output of this process is the Weekly Constraints Report which is made available to Real Time.

Publication and management of TCGs in the Group Constraints Manager in MMS is managed as part of the Constraints Changes in Scheduling Runs process.

## 4 PROCESS OBJECTIVE

The objective of this Business Process is to meet the following obligations under the EirGrid and SONI Grid Code, namely:

- SDC1 Scheduling and Dispatch Code No.1, SDC 1.4.7.3 and SDC 1.4.7.5

## 5 ROLES AND RESPONSIBILITIES

### 5.1.1 NEAR TIME

The following table provides a summary of the obligations of Near Time relating to Systems Constraints Calculation process:

Team Name	Responsibility in relation to process	Timeline Associated
Near Time (Process Owner)	<ul style="list-style-type: none"><li>• Carry out analysis of system constraints</li><li>• Update Near Time Constraints Report with active constraints and distribute to agreed recipients</li></ul>	At a minimum weekly, but may be as required if there are changes mid-week that require an update

### 5.1.2 REAL TIME

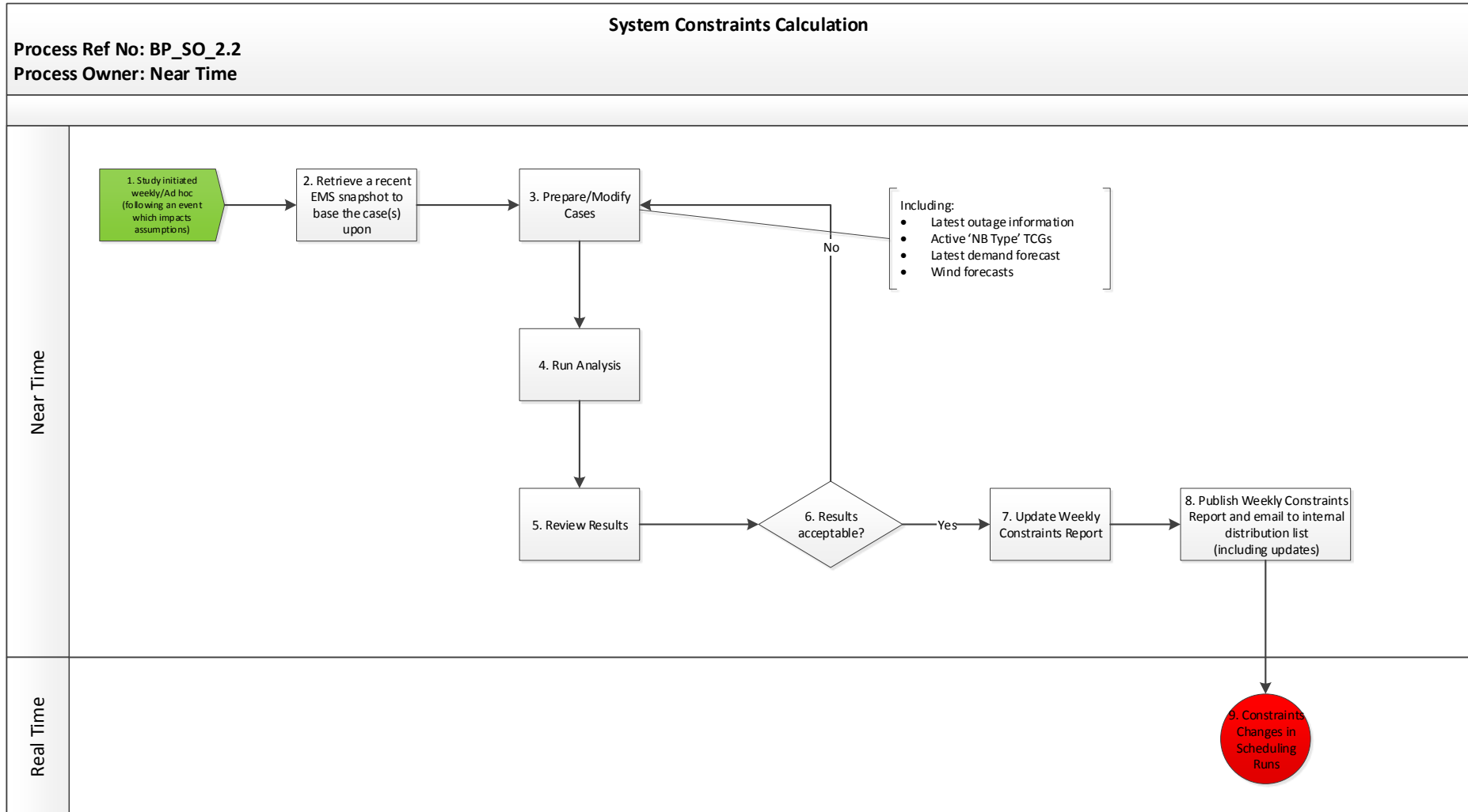
The following table provides a summary of the obligations of Real Time relating to Systems Constraints Calculation process:

Team Name	Responsibility in relation to process	Timeline Associated
Real Time	<ul style="list-style-type: none"><li>• Manage Constraints Changes in Scheduling Runs process</li></ul>	As required.

## 6 PROCESS DESCRIPTION

### 6.1 LEVEL 3 PROCESS

#### 6.1.1 PROCESS MAP



6.1.2 PROCESS STEPS



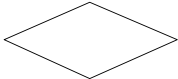




#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/Frequency	System
1	Study initiated weekly/ Ad hoc (following an event which impacts assumptions)	System constraints studies are completed on a weekly basis. If significant changes occur during the week then a new study will be initiated.	Near Time User	System constraints	Weekly/As required	N/A
2	Retrieve a recent EMS snapshot to base the case(s) upon	Retrieve recent peak and valley power flows from the WSAT output directory (located on a mapped network drive). Use these cases as the starting point, and then modify accordingly.	Near Time User	Recent Case	As required	WSAT Windows Explorer
3	Prepare/Modify Cases	Prepare/Modify Cases. This includes data such as: <ul style="list-style-type: none"> <li>• Latest generation and transmission outage information</li> <li>• Active 'NB Type' TCGs</li> <li>• Latest demand and wind forecast</li> <li>• Latest network model including operational switching</li> </ul>	Near Time User	Cases representing assumed future state of network	As required	PSAT
4	Run Analysis	Run analysis on the case.	Near Time User	Analysis	As required	VSAT
5	Review Results	Review results from analysis.	Near Time User	N/A	As required	VSAT
6	Results acceptable?	Following review of analysis output, Near Time User must decide if the results are acceptable? This will involve ensuring the solution has solved and all contingencies are within normal operating limits.  If yes go to step 7. If no revert to step 3 and	Near Time User	N/A	As required	VSAT



#	Step	Step Description	Responsible Role	Outputs	Indicative Timing/ Frequency	System
		begin process again until results are acceptable.				
7	Update Weekly Constraints Report	Near Time User updates the Weekly Constraints Report with details of the new constraint.	Near Time User	Weekly Constraints Report	As required	Excel
8	Distribute updated Weekly Constraints Report to Distribution List	Near Time User issues updated Weekly Constraints Report to the distribution list of internal recipients.	Near Time User	N/A	As required	Email
9	Constraints Changes in Scheduling Runs	The end of this process is the potential trigger for another process – Constraints Changes in Scheduling Runs process, which is completed by Real Time.	Real Time User	N/A	As required	N/A

## 7 APPENDICES

### 7.1 PROCESS FLOWCHART KEY

FLOWCHART KEY	
	Trigger
	Process step
	Process decision / question
	Reference to another process
	Another business process to be implemented following current step (current step is a trigger for another process)
	Process end
	System (automatic step)