

# 2016 DS3 Control Centre Tools Workstream Plan

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May 2016



## Context

EirGrid and SONI are the Transmission System Operators (TSOs) in Ireland and Northern Ireland. As Transmission System Operator (TSO) in Ireland and Northern Ireland, it is our job to manage the electricity supply and the flow of power across the island of Ireland. This work is done from the National Control Centre (NCC) in Dublin and the Castlereagh House Control Centre (CHCC) in Belfast. Electricity is generated from gas, coal and renewable sources (such as wind and solar power) at sites across the island. Our high voltage transmission network then transports electricity to high demand centres, such as cities, towns and industrial sites. We operate the transmission system in a safe, secure and economical way.

Our 'Delivering a Secure Sustainable Electricity System (DS3)' seeks to address the challenges of integrating more renewable generation (up to 75%) onto our power system. The core objective of DS3 is to identify the challenges associated with integrating very high levels of renewable generation and determining and implementing appropriate solutions which deliver benefits to customers.

We operate two transmission system Control Centres on the island of Ireland; the Dublin and Belfast Control Centres. This workstream aims to facilitate the integration of renewable generation on the all-island power system through the development and implementation of new Control Centre Tools and Capabilities. Much of the activity in this workstream will be driven by the outputs of other DS3 workstreams, especially those in the policy area. Other innovative solutions may also be required as future requirements for the Control Centres are not always fully defined and will continue to evolve.

## Objective

The objective of the Control Centre Tools and Capability (CCTC) workstream is to ensure the timely provision of the Tools and Capability to enable the Transmission System Operators (TSOs) operate the power system securely with increasing levels of renewable generation.

## Work Completed

### Wind Forecasting and Wind Dispatch Tools

A wind energy forecasting (WEF) project was completed in 2014, featuring a number of initiatives to improve forecast accuracy and user interaction with the tool. At present, forecasts are supplied by two external providers and made available to the Control Centres using an internal tool.

The new Energy Management System (EMS) Wind Dispatch Tool (WDT) went live successfully in both Control Centres in 2014. The primary driver for the implementation of the enhanced tool was the SEM decision paper on tie-breaks in dispatch. This decision determined that defined constraint groups of wind farms be implemented to alleviate certain network constraints. Within these groups dispatch down is “grandfathered” based on category, firmness and gate. A new WDT was developed to ensure this requirement was manageable from a Control Centre perspective.

### **EMS Integration Project and ongoing developments**

Initial versions of Inertia and Rate of Change of Frequency (RoCoF) monitoring have been implemented in the EMS. These implementations will be reviewed and developed as more information becomes available from other DS3 workstreams.

A major upgrade of the EMS is due to be completed by early 2016 which will provide a single all-island EMS; thereby facilitating all-island power system operation. The EMS Integration Project (EIP) is outside the scope of the DS3 programme, however, many elements of EIP will facilitate the DS3 programme.

### **Phasor Monitoring Display Project**

A project was delivered in Q2 2014 to present data recorded by Phasor Monitoring Units (PMUs) to the Control Centres in a useful fashion. PMUs are currently installed at a small number of locations on the transmission system and may be rolled out further in future. The data measured by PMUs is of a substantially higher resolution (approximately 20ms) than the SCADA data (seconds) which is currently used in the EMS. An interface was created which allows Control Centre engineers to monitor system frequencies, relative phase angles and power oscillations across the locations where PMUs are installed. Alerts are provided if certain measured values violate operational limits.

### **Reserve Constrained Unit Commitment (RCUC)**

RCUC is the day-ahead and in-day generation unit commitment and scheduling tool used jointly by both Control Centres. Among other inputs, RCUC uses the technical and commercial data from the Single Electricity Market (SEM) and produces an optimised generation schedule. The schedule is framed by reserve, transmission and other constraints. A RCUC update was implemented in November 2014 which integrates minimum system inertia and maximum RoCoF metrics into the scheduling process to ensure optimised and secure generation schedules.

## EMS Short Circuit Analysis Tool

In 2015 the EMS Short Circuit Analysis Tool was launched. The tool enables real-time monitoring of such ratings as opposed to reliance on explicit offline studies (study functionality is also available). Significant benefits have been realised following implementation of the EMS Short Circuit Tool. Transmission substations which had previously been sectionalised for short circuit purposes can now be coupled as standard. This results in a more robust transmission network, improved economy of power flow and smoother system voltage profiles.

## Focus Areas 2016 - 2017

A review of Control Centre Tools completed in 2015 identified a number of new deliverables required for higher SNSP. The focus areas for 2016 and 2017 are as follows:

- Implement changes to tools associated with new system services. New products may require scheduling in RCUC and monitoring in the EMS for example.
- Enhance control centre security analysis with “look ahead” functionality so potential problems can be anticipated early.
- Review traditional methods of voltage control and implement necessary enhancements to control the increasing number of service providers
- Review renewables forecasting application and implement necessary enhancements e.g. visualisation of potential high wind speed shutdown, solar forecasting

## High-Level Plan

Task no.	Task/action	Responsible	Original due date	Due date
<b>Establishing the Necessary Tools for the Operation of Today's Power System</b>				
CCTC1.1.1	Drafting business rules for wind dispatch into business requirement specification (BRS) (SEM-11-105)	TSOs/SEMC	New task	Complete
CCTC1.1.2	Costs and timelines for implementing BRS (SEM-11-105)	TSOs	New task	Complete
CCTC1.2.1	Design and Testing of EMS Wind Dispatch Tool in Dublin	TSOs	New task	Complete
CCTC1.2.2	Design and Testing of EMS Wind Dispatch Tool in Belfast	TSOs	New task	Complete
CCTC1.2.3	Roll-out of Wind Dispatch Tool and Settlement Interface in Dublin	TSOs	Q2 2014	Complete
CCTC1.2.4	Roll-out of Wind Dispatch Tool and Settlement Interface in Belfast	TSOs	Q2 2014	Complete
CCTC1.3	Implementation of Online Short Circuit Analysis Tool in Dublin Control Centre	EirGrid	Q2 2013	Complete
CCTC1.4	Inclusion of an Inertia Monitoring Capability in Control Centres	TSOs		Complete
CCTC1.5.1	Scoping of EMS Integration Project	TSOs	Q3 2012	Complete
CCTC1.5.2	EMS Integration Project	TSOs	Q2 2015	Complete
CCTC1.7.1	Implementation of incentives for forecasting accuracy of service providers	TSOs	Q1 2013	Complete
CCTC1.7.2	Implementation of Regional Forecasting	TSOs	Q1 2013	Complete
CCTC1.7.3	Sending live wind farm signals to Wind Forecast Service Providers to improve modelling.	TSOs	Q1 2013	Complete
CCTC1.7.4	Collate Operations Requirements for Wind Forecast Tender	TSOs	New task	Complete
CCTC1.8	Facilitate Implementation of Phasor Monitoring Display Project	TSOs	New task	Complete
CCTC1.9	Inclusion of Inertia and ROCOF Considerations in RCUC	TSOs	New task	Complete

Development of Tools to Accommodate 75% System Non-Synchronous Penetration				
CCTC2.1	Develop revised roadmap for Control Centre Tools	TSOs	New task	Complete
CCTC2.2.1	Scope and specify System Services Tools interim requirements, e.g. Scheduling Tools (EMIP), EDIL, EMS, Trader etc.	TSOs	New task	Complete
CCTC2.2.2	Implement System Services Tools interim requirements, e.g. Scheduling Tools (EMIP), EDIL, EMS, Trader etc.	TSOs	New task	Q3 2016
CCTC2.3.1	Feed into I-SEM scope EMS Look Ahead Analysis	TSOs	New task	Q2 2016
CCTC2.3.2	Feed into I-SEM Implementation & Testing of EMS Look Ahead Analysis	TSOs	New task	Q4 2016
CCTC2.4.1	Scope Ramping Tool	TSOs	New task	Q4 2016
CCTC2.4.2	Implementation of Ramping Tool	TSOs	New task	Q2 2017
CCTC2.5.1	Review Renewables Forecast Application and Scope Enhancements	TSOs	New task	Q4 2016
CCTC2.5.2	Implement Enhanced Renewables Forecast Application	TSOs	New task	Q4 2017
CCTC2.6.1	Review and Scope Enhancements requirements for enhanced EMS control for new technologies	TSOs	New task	Q1 2017
CCTC2.6.2	Implement enhanced EMS control for new technologies	TSOs	New task	Q4 2017
CCTC2.7.1	Review and Scope Renewables Dispatch Tool Enhancements	TSOs	New task	Q4 2017
CCTC2.7.2	Implement Renewables Dispatch Tool Enhancements	TSOs	New task	Q4 2018
CCTC2.8.1	Scope for Voltage Trajectory Tool	TSOs	New task	Q3 2017
CCTC2.8.2	Implement Voltage Trajectory Tool	TSOs	New task	Q4 2018
CCTC2.9.1	Review requirement for Frequency Regulation Tools	TSOs	Q1 2015	Q2 2017
CCTC2.9.2	Review potential impact of DSM on tools	TSOs	New task	Q2 2017
CCTC2.9.3	Review potential impact of Solar on tools	TSOs	New task	Q2 2017