



DS3: Wind Security Assessment Tool Workstream

BACKGROUND

The addition of wind power generation and its increasing share in the generation portfolio significantly changes generation patterns. The variety of such patterns is virtually unlimited due to essentially a random combination of load, weather, and electricity market conditions at any given instant of time. This in turn leads to unlimited variety in both base case and contingency case scenarios in terms of:

- Power flow patterns
- Voltage profiles
- Dynamic characteristics of the power system etc.

Per government policy targets up to 37% of the electricity consumption in 2020 should come from wind power plants. This means that instantaneous wind penetration will be much higher. In order to maximise the utilisation of wind energy whilst continuing the secure, reliable and economic operation of the power system of Ireland and Northern Ireland, an on-line *Wind Security Assessment Tool* (WSAT) has been developed in EirGrid that assists power system controllers to maximise the utilisation of wind energy whilst continuing secure, reliable and economic operation of the power system of Ireland and Northern Ireland.

This document contains the description of the plan of the further development of WSAT as an important part of the on-line and off-line tools suite that are used in real-time and in the study environment in both Ireland's and Northern Ireland's Electricity Control Centres for maximizing wind generation in Ireland and Northern Ireland.

SCOPE

Near-real time WSAT has been launched in the National Control Centre (NCC) in Dublin in September 2010 as a tool that can assist Grid Controllers in assessing the maximum wind generation allowed on the system while maintaining the system security at an acceptable level.

The purpose of the project is to make WSAT a trustworthy and reliable tool that will be used by both TSOs – SONI and Eirgrid for Real Time and Near Time (Real-time WSAT) as an on-line application, and for future studies as an off-line application (Future Studies WSAT). The idea is that the structure and models of both suites of software are maintained the same and are compatible and fed with EMS/SCADA data including but not limited to EMS/SCADA generated power flow snapshot files in PSS/E format.

The objectives are:

- Fundamentally improve WSAT's accuracy through inclusion of a full dynamic model of Northern Ireland and real-time network information
- Improve WSAT's existing functionality based on the experience garnered in NCC
- Implement WSAT in SONI
- Extend WSAT capabilities as an on-line tool that can give the Grid Controller more comprehensive information on the security of the system.

The Success of the Project is defined by the following criteria:

- Real-time WSAT
 - WSAT is run on-line both in NCC and in Castlereagh House Control Room (CHCR) every few minutes based on real-time power system snapshots.
 - WSAT outputs are recognised by Grid Controllers as being valid to the best of our knowledge and within the limitations of the dynamic models.
 - WSAT recommendations maximize the wind generation on the system while maintaining the acceptable level of operational security. WSAT will provide real-time information on the levels of wind curtailments needed for reducing the risk of system instability.
 - NCC and CHCR Controllers consult the output from WSAT in their decisions with regard to power system control actions required to maintain the security of the power system.

- A high level plan with milestones and indicative timelines for Phase 1 is described in Appendix 1.

APPENDIX 1 – HIGH LEVEL PLAN

All-Island EMS Snapshot	Lead Responsibility	Timeline
• Tests of the snapshots	TSOs	Oct 2011
• Developing interface between WSAT and new EMS	TSOs	Oct 2011
• Comparison of all-island power flow against state estimator	TSOs	Nov 2011
• Final approval of functioning new snapshot in WSAT	TSOs	Jan 2012
• Installation of redundant server	TSOs	Apr 2012
Merging SONI model and all-island wind forecast data into WSAT		
• Creating all-island dynamic and contingency files	TSOs	Feb 2012
• Implement All-system WSAT in the test server	TSOs	Mar 2012
• All-Island Wind Forecast Streaming to WSAT	TSOs	Jun 2012
• Implement All-system WSAT in the pre-prod and NCC server	TSOs	May 2012
Validation and tuning on-line all-island TSAT dynamic models		
• Governor model adjustments and cross-validation	TSOs	Apr 2012
• Implement revised governor models in Eirgrid's WSAT	TSOs	Mar 2012
Implementation WSAT in CHCC		
• Install WSAT pre-prod monitor at near-time section in SONI	TSOs	Jun 2012
• Install WSAT NCC monitor in CHCC	TSOs	Jun 2012
• Run WSAT pre-prod in test mode, correct errors	TSOs	Jun 2012
• Establish if WSAT is performing as per SONI acceptance criteria	TSOs	Jul 2012
• Install All-island WSAT at NCC server and lunch monitor in CHCC	TSOs	Aug 2012
Official Launch WSAT simultaneously in NCC and CHCC		Sep 2012