EirGrid Group

Policy for Implementing Scheduling and Dispatch Decisions SEM - 11 - 062

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1 INTRODUCTION

On the 26th August 2011 the SEM committee published its decision on the "Principles of Dispatch and the Design of the Market Schedule in the Trading and Settlement Code" (SEM-11-062[1]). The purpose of this Operational Policy document is to provide an explanation as to how the TSOs (EirGrid and SONI) give effect to the SEM-11-062 decision in scheduling and dispatching generation on the island.

2 SUMMARY OF DECISION FROM A DISPATCH PERSPECTIVE

The key message in SEM-11-062 is that the TSOs should continue to *"adhere to an absolute interpretation of priority dispatch whereby economic factors are only taken account of in exceptional situations"*. Where a situation arises that the system operators must dispatch down priority dispatch generation to maintain system security then the generation units should be dispatched in a specific order and should do so to preserve the principle of least cost dispatch. "*..the Transmission System Operators (TSOs) shall continue to dispatch the system to minimise production costs of generation, taking account of system security requirements."* The order in which these different Priority Dispatch generation units should be dispatched down is summarised in Section 4.4 of the paper:

1. re dispatch price making generation and TSO counter trading on the interconnector after Gate Closure;
2. re dispatch price taking generation:
    a. Peat
    b. Hybrid Plant
    c. High Efficiency CHP/Biomass/Hydro
    d. Windfarms, and within windfarms
        i. windfarms which should be controllable but do not comply with this requirement/are not derogated from same;
        ii. windfarms which are controllable;
        iii. windfarms which are not required to be controllable/are derogated from this requirement/those in commissioning phase.
    e. Interconnector re-dispatch;
    f. Generation the dispatch down of which results in a safety issue to people arising from the operation of hydro generation stations in flooding situations

[1] http://www.allislandproject.org/en/renewable_decision_documents.aspx?article=77d0b4de-341a-4f10-847f-df2dee9ae674

3 TIE BREAKS

The decision paper SEM-11-062 did not fully address how a tie break situation should be resolved and instead separated out the issue of the dispatch of price taking generation in a tie break situation into a second consultation document which was issued on 26th August (SEM-011-63[2]). A clarification note (SEM-11-086[3]) was subsequently published on the 12th October 2011. The key indication from this document is that when it comes to settling tie breaks in dispatch between wind generations units for curtailment reasons, tie breaks should be settled on a pro-rata basis. When generation is being constrained down to alleviate transmission constraints then this should take account of the level of firmness enjoyed by each unit. The details of this proposal are contained in the consultation document and a TSO implementation paper, similar to this one, will be issued once a decision is made on the subject.

4 RESERVE CONSTRAINED UNIT COMMITMENT

The TSOs use a linear programming based computer package to develop a generation unit commitment and indicative dispatch schedule. The tool, known as RCUC (Reserve Constrained Unit Commitment), is used in both the Day Ahead and In-Day time frames. Like all linear programming tools it works on the basis of solving a mathematical problem with an objective function that is subject to constraints. In RCUC the objective function is to minimise production costs and all constraints are stated in terms of MW limits on the schedule. For example, the provision of operating reserve is a constraint and the programme solves the production cost minimisation problem whilst ensuring that the operating reserve constraint level set in the program by the TSOs as a MW limit is not breached.

Priority Dispatch status cannot be represented as a simple MW constraint. Units with Priority Dispatch (PD), that are classified as Price Taking Units in SEM, are modelled in the SEM systems and in RCUC at a fixed MW profile which the algorithms do not try to optimise. Both the SEM and RCUC systems, as designed, deduct the MW Output profile for all Price Taking Units from the system demand and then set about solving the problem of meeting the net system demand with the non-PD generation i.e. Price Taking Units were treated as negative load.

In the recent past this approach has at times resulted in the RCUC algorithm failing to solve during periods of high wind generation. This is because during periods of high wind generation the total output of price taking generation plus any “constrained on” price making generation exceeded system demand. In order to manage this problem a function called Price Taking Optimisation (which the operators can enable or disable) was introduced in RCUC in 2010 to allow RCUC to dispatch price taking units. To date it has normally been enabled only during periods of high wind as it slows down

[2] http://www.allislandproject.org/GetAttachment.aspx?id=f7730519-4c9e-422e-b97e-8c22ff956384
[3] http://www.allislandproject.org/en/renewable_current_consultations.aspx?article=baec321e-5542-44d9-8fb2-491fffab7972&mode=author

the computation time of RCUC. To give effect to the SEM-11-062 decision the TSOs will enable Price Taker Optimisation at all times in RCUC. To ensure that RCUC dispatches price taking units in a manner consistent with the SEM-11-062 decision the TSOs set a negative price, below Price Floor, for these units. This ensures that traditional price making generation is dispatched down by RCUC before the price-taking Priority Dispatch generation is dispatched down. The unit prices have been set so that the further down a unit type appears in the hierarchy level outlined in section 2 above, the lower the price assigned to it.

5 IMPLEMENTATION OF HIERARCHY IN DISPATCH

The following section outlines how the hierarchy outlined in section 2 above is implemented by the TSOs. Where there is a surplus of generation and priority dispatch plant needs to be dispatched down RCUC will indicate how much should be dispatched down and in what order. It will do this using pre-set unit prices below the price floor to solve the optimisation problem, with prices for each of the following units set in decreasing order:

a. Interconnector Residual Capacity Unit
b. Peat
c. Hybrid not applicable at the moment
d. CHP, Biomass, Hydro
e. Wind

1 **Re-dispatch price making generation and TSO counter trading on the interconnector after Gate Closure**

There is no change in the scheduling and dispatch of Price Making units. All units will be dispatched down or de-committed to a level commensurate with maintaining system security. The key system security constraints which are likely to cause price making generation to remain on the system are

- the requirement to have sufficient units on load to provide operating reserve
- the requirement to have sufficient inertia on the system to maintain system stability
- the requirement to not exceed 50% system non-synchronous penetration on the island
- various transmission security based criteria which apply from time to time and are documented in the Transmission Constraint Groups document posted on the TSO websites[4]

The concept of TSO counter trading on the Interconnector after Gate Closure to facilitate priority dispatch is a new introduction in the TSO scheduling and dispatch process. Heretofore use of TSO trading on the Moyle Interconnector was limited to managing system emergencies. To give effect to TSO trading a unit in RCUC called the Interconnector Residual Capacity Unit

[4] http://www.eirgrid.com/media/Transmission%20Constraints%20Groups.pdf

(IRCU) will be used to give RCUC the option of "selling" power to National Grid (UK). In accordance with existing balancing services agreements between National Grid and SONI trades will normally be scheduled in blocks, dependent on the IRCU profile scheduled by RCUC, generally up to a maximum of 200MW. Trades can only be agreed and treated as firm 2 hours in advance of the trading period in question. Where RCUC indicates that a trade should be sought, the control rooms will attempt to enter into a trade with National Grid. If this is unsuccessful then the TSOs will set the capacity on the IRCU to 0MW and will re-run RCUC. It should be noted that EirGrid and SONI are currently investigating options for arranging trades via a Power Exchange which would allow firm trades to be entered into further in advance and should increase the availability of opportunities to trade.

EirGrid and SONI will only trade on the interconnector for reasons of system security or facilitation of priority dispatch. Trading will not occur for any other reasons (e.g., economic).

2 **Re dispatch price taking generation:**

a. Peat units: There is no change in the management of Peat Units. Peat units will be dispatched down to their minimum stable generation value but not de-committed. This is in accordance with the following statement in Section 4.4 of SEM decision *"The hierarchy proposed by the TSOs is considered by the SEM Committee to be pragmatic and a reasonable balance of the various requirements on the TSOs under the governing framework and the specific matters that the SEM Committee requested be factored into their proposed approach given the matters set out in the TSOs submission (please see Appendix A)*." Appendix A goes on to clarify that "*The hierarchy refers to dispatching and not re-scheduling or de-committing plant*."

b. Hybrid Plant: There is no dispatchable Hybrid Plant on either system at the moment.

c. High Efficiency CHP, Biomass, Hydro: There is no change in the management of CHP and Hydro units. CHP Plant will be dispatched down to minimum stable generation (see discussion on peat above). Hydro will be dispatched down to the extent that no threat to public safety exists due to a flooding situation. There is no dispatchable Biomass plant on either system at the moment.

d. Windfarms, and within windfarms

   i. windfarms which should be controllable but do not comply with this requirement/are not derogated from same;

   ii. windfarms which are controllable;

   iii. windfarms which are not required to be controllable/are derogated from this requirement/those in commissioning phase.

This represents a change in existing processes in that heretofore the TSOs dispatched Variable Price Taking units ahead of Autonomous units. Attached to this document is

a detailed explanation of the key differences between each hierarchy level and the definition of controllable. The document also lists all wind units >5MW that the TSOs control or should control, categorised according to the three hierarchy levels above.

Where a unit is not controllable but should be (hierarchy level (i) & in some cases level (iii)) and no active power control system is working the TSOs will dispatch down the unit by opening the High Voltage Circuit Breaker. All controllable windfarms under EirGrid's control (hierarchy level (ii)) will be dispatched via the EirGrid Wind Dispatch Tool on a pro-rata basis (pro-rata of Availability, not MEC or output). All controllable windfarms under SONI's control (hierarchy level (ii)) will be dispatched on a rota basis until such a time as the Energy Management System upgrades are completed. Note: As each TSO implements wind dispatch on the units within their control a calculation will be done ahead of dispatch to determine the amount of wind to be dispatched in each jurisdiction. This will be based on a pro-rata of wind availability across the two jurisdictions. For example: If the wind availability in EirGrid is 1000MW and in SONI is 250MW and 500MW is to be dispatched down. EirGrid will dispatch (500)*(1000/1250) = 400MW and will do this in the order (i), (ii) and (iii) above – similarly for this example SONI would dispatch down 100MW. Within each level (i), (ii) and (iii) dispatch will be on pro-rata of availability of the units within that level.

e. Interconnector Re-Dispatch: The System Operators will invoke an emergency assistance dispatch with National Grid and failing that will reduce the interconnector Net Transfer Capacity (NTC) values to 0MW import or as required.

f. Generation the dispatch down of which results in a safety issue to people arising from the operation of hydro generation stations in flooding situations: Self-explanatory

Anyone modelling the dispatch process outlined above needs to be aware of the requirement of the TSOs to hold negative reserve. Negative reserve is the difference between a unit's output and its minimum stable generation. Negative reserve is required to manage frequency regulation and can only be provided by units with free acting governors. In EirGrid negative reserve is normally held on priority dispatch units (Peat and CHP) to a total value of 100MW. In SONI, a total of 50MW of negative reserve is held on conventional units.

6 CONCLUSION

This document outlines how priority dispatch generation on the island shall be dispatched down where there is a potential over generation situation in line with the SEM Committee Decision SEM-11-062. Where generation units have to be dispatched down to manage a transmission constraint all price-making generation will be dispatched first and only then will priority dispatch generation be used to manage the constraint. The priority dispatch generation used will be based on the hierarchy above but only units which effectively manage the constraint will be used i.e. wind generation units in

Donegal will not be dispatched down to alleviate a constraint in Waterford as they will have no impact on it. The Tie Break consultation goes into further detail on this subject and the TSOs will issue a paper on how the final set of approved proposals will be implemented.

Any comments or queries on the implementation process should be directed to Info@eirgrid.com and enquiries@soni.ltd.uk