

Single Electricity Market Committee

**Criteria to apply for a Regulatory Decision
on Dual Rated Generator Units**

Decision Paper

SEM-10-074

9th November 2010

Table of Contents

- 1. Introduction..... 3
- 2. Consultation on Decision Criteria 4
- 3. Responses to the Consultation 5
- 4. Decision Criteria 9
- 5. Next Steps..... 10

1. Introduction

The SEM Committee published a consultation on 29th October 2008 on the “Criteria for any Regulatory Decision on Dual Rated Generator Units” (SEM-08-160). This followed a Modification Proposal¹, raised by SEMO, which sought to introduce a new generator type, a Dual Rated Generator Unit, under the Code.

Although the original Modification Proposal refers specifically to the Kilroot Generator Units, this problem is not necessarily confined to such Units. The essential underlying problem is that the Code rules and the MSP Software are limited in the range of Unit configurations which can be effectively modelled in the process of determining the Market Schedule Quantities for each Generator Unit and the System Marginal Price (SMP). As part of the legal drafting which implements the Modification, paragraph 2.34A states that consent is required from the Regulatory Authorities for the registration of any generator as a Dual Rated Generator Unit.

This Modification Proposal Mod_34_08 was recommended for approval by the Modifications Committee on 2nd November 2009 and subsequently approved by the SEM Committee at its meeting on 26th January 2010. The Central Market Systems and the associated Code changes which implement this Modification are expected to go-live on 19th November 2010. Therefore, it is now timely to make a final decision on the criteria to apply to determine whether an application for a Dual Rated Generator Unit will be permitted.

Four responses were received to the consultation paper. These were received from the following:

- NIE Energy – Power Procurement Business;
- Viridian Power and Energy;
- Bord Gáis Energy; and,
- Premier Power Limited.

In addition, the Regulatory Authorities held discussions with SEMO during the course of the consultation process.

¹ The background to the Modification Proposal (Mod_34_08) as well as the Final Recommendation Report are available on SEMO's website www.sem-o.com/MarketDevelopment/Modifications/Pages/Modifications.aspx?Stage=Active .

2. Consultation on Decision Criteria

The issue that has been revealed by SEMO's analysis of the behaviour of the MSP Software when dealing with the data submitted in respect of Kilroot² is that, not only is the software (and the Code rules that it implements) unable to represent the Generator Units' detailed technical characteristics, but that the effect of this limitation is (on occasion) to produce market schedules that are infeasible (in reality) and Shadow Prices that do not represent market conditions. While strictly speaking this can be said of all Generator Units to a certain extent, it is particularly evident in the case of Kilroot due to the particular nature of Generator Unit. This is because the MSP Software models the Generator Units as having a single ramp rate from Minimum Stable Generation to Maximum Generation and therefore assumes a high degree of flexibility in moving from 220MW on coal to 260MW on oil where such flexibility does not exist. If the dwell time between the two positions was modelled, the software would not schedule a Kilroot unit on oil in preference to lower priced plant which might have to be brought on.³

This suggests that the key criteria as to whether a Dual Rated Generator Unit should apply should relate to a combination of improper modelling, both represented by the rules within the Code and by the MSP Software which implements those rules, of the commercial and technical behaviour of the Generator Unit and the effect on the Market Schedule and SMP of that modelling inaccuracy.

Further, given that this solution being brought about by the implementation of this Modification Proposal is in some ways a "sticking plaster" rather than a full permanent solution, one criterion should be that there is no alternative way of representing that Generator Unit in the SEM at present (for example by registering it as two separate Generator Units or by having Dual Fuel bidding in the SEM), which would be equally if not more effective in avoiding the errors.

Therefore, the SEM Committee proposed in the consultation paper that the criteria that would need to be fulfilled by any Generator Unit to be registered as a Dual Rated Generator Unit should be:

1. The generator design is such that it can use more than one fuel type in normal operation;
2. The effective rating (i.e. Maximum Generation) of the generator is different depending on which fuel it burns;
3. Having considered the advice of the Market Operator on the criteria below, submitted in the form of a report (that would be published), that the SEM Committee is satisfied:

² Please refer to the SEMO website: <http://www.sem-o.com/>

³ While the Single Ramp Rate used in the MSP does not model dwell times exactly, they are used in the calculation of the Ramp Up Time and Ramp Down Time where Single Ramp Up Rate = $(\text{Max(Availability)} - \text{Min(Minimum Stable Generation)}) / \text{RampUpTime}$ and Single Ramp Down Rate = $(\text{Max(Availability)} - \text{Min(Minimum Stable Generation)}) / \text{RampDownTime}$. Also the ramp rates are determined from Max Availability rather than Maximum Generation as per the equation above.

- a) that the process for transfer between fuels for the generator is such that the MSP software is likely to determine infeasible Market Schedules for that Generator Unit (i.e. were the schedule cannot be replicated in actual dispatch) unless it is registered as a Dual Rated Generator Unit;
- b) that the MSP Software is likely to determine an uneconomic SMP on occasions unless the Generator Unit is registered as a Dual Rated Generator Unit;
- c) that in relation to items a) and b) above, that the generator concerned is materially different from other Generator Units registered in the Pool (which are not Dual Rated Generator Units); and,
- d) that there is no practical way (other than registration as a Dual Rated Generator Unit) that the generator could be represented in the market which would avoid the problems in a) and b) above.

3. Responses to the Consultation

Four responses were received to the consultation paper.

- NIE Energy – Power Procurement Business (part of which is marked confidential);
- Viridian Power and Energy;
- Bord Gáis Energy; and,
- Premier Power Limited.

The RAs have summarised these comments under the three headings below:

Comments about the Modification Proposal and Background Comments

1. NIE PPB corrected a number of inaccuracies in the consultation paper and provided a number of clarifications including:
 - PPB submit the offer Data on behalf of Kilroot;
 - PPB has not included a 6-hour dwell time within the Technical Offer Data for the Kilroot Units; and,
 - It can take up to 3 hours to change back from oil to coal, not one hour suggested in the consultation paper.

The RAs are grateful for these corrections.

2. The RAs note that each of the four respondents made comments on the original Modification Proposal. These comments included the perception that the problem could be narrowly defined and the fact that the Modification Proposal is not a full dual fuel solution i.e. an enduring solution.

These are not comments about the criteria, rather comments about the relevant Modification Proposal (Mod_34_08) and therefore these comments are not addressed here. It is open to

anyone to propose a Modification to the Code as they see fit to address perceived inefficiencies or errors in the Code.

3. The RAs note that a number of respondent made the comment that it was not appropriate for the SEM Committee to consult on this topic when the underlying issue of how best to deal with Dual Rated generators under the SEM Trading and Settlement Code was still under consideration by the Modifications Committee.

The SEM Committee consultation paper had referred to this and the paper further noted that such a consultation did not make any assumptions about a future decision by the SEM Committee (on proposals by the Modifications Committee in respect of Mod_34_08).

Comments about the Criteria

There were a number of comments provided by the respondents which stated that the criteria as described in the consultation paper do not offer sufficient clarity as to what is a Dual Rated Unit.

4. Comments on Criteria 1/2: Many units within SEM can use more than one type of fuel in normal operation and these units use different ratings depending on which fuel it burns. These ratings would apply to MaxGen, ramp rates, MinGen etc. Participants believed that the criteria need to have a materiality test with respect to the ratings on different fuels, although they appreciated that it is difficult to establish this on a generic basis. Viridian believes that criterion 1 and criterion 2 are too broadly defined because they arguably cover most generators on the system.

The RAs accept that the first two criteria are broadly drafted, but consider this to be the correct approach in that these criteria determine whether it is appropriate for a party to apply for registration as a Dual Rated Generator Unit. The detail is set out in the different elements of the third criteria which should exclude most of the generators which can use alternative fuels. In order for the SEM Committee to reach a decision in favour of a generator being registered as a dual rated unit, it would need to be satisfied that all three of the criteria are met, including all four elements of the third criterion.

5. Comments on Criterion 3. This requires SEMO to submit a report to the SEM Committee, based on certain other criteria which include reference to 'uneconomic SMP'. Participants stated that it is not at all clear what is meant by this phrase or how it would be determined by SEMO. In addition the meaning of the phrase 'infeasible Market Schedules' was felt by participants to be vague as these additional criteria again could cover many other units within SEM and the criteria must be more prescriptive. Finally, in relation to part d of criterion 1, one participant thought there probably is a practical solution to the problem other than registration as a Dual Rated Generator Unit and this is something that should be explored further.

The RAs note the comment on the phrase "uneconomic SMP". The intent of this is to advise that the MSP Software algorithm is likely (on the basis of normal COD and TOD submitted in respect of the generator concerned) to schedule plant and calculate SMP in such a way that the calculated value does not approximate to the cost of the marginal scheduled plant in the period.

In relation to infeasible market schedule, the RAs note that the consultation paper said “...infeasible Market Schedules for that Generator Unit i.e. where the schedule cannot be replicated in actual dispatch” and believe that this is very clear.

Since the consultation was carried out, the RAs and SEMO have discussed the issue further and have concluded that it may be more appropriate for the RAs to prepare the report, as opposed to SEMO themselves. However, should the need arise, it may be necessary for the RAs to discuss the matter further with SEMO, but the responsibility of the production of the report will lie with the RAs.

6. Participants agreed that the report produced by SEMO should be published however also believe that, as per the consultation relating to this Kilroot issue, future applications and granting of Dual Rating status should be consulted upon within SEM.

The RAs agree with participants that such a report should be published.

7. Comments on the Approval Process. On reviewing the proposed criteria it is perceived that the definition lacks objectivity thus requiring a complex approval process involving the MO and the RAs. Recognising the fluidity of the proposal modification at this stage, a participant believed that it is still appropriate to reconsider the approach to setting the criteria.

The RAs agree that it would be much simpler if it were possible to define clear and unambiguous roles which could be operated by the Market Operator to lead to a decision by the RAs on a Dual Rated Unit. However, they do not believe that this is the case (a view that is supported by the comments of some respondents) and that, in the end, some element of judgement will be necessary. The decision therefore must remain with the Regulators, which will be taken based on the criteria in this decision paper.

8. General comments on the Criteria: Participants believed that defining criteria based on the output of a process is never as easy or unambiguous as defining the criteria based on the inputs, particularly with multivariate problems such as the one the MSP software processes. In such complex mathematical problems many input scenarios could produce the same outcome. This Dual-Rated problem is a function of the characteristics of the Generator Unit which are submitted to the MSP software and the way the software handles these characteristics. Hence the definition should focus on these input characteristics rather than outcomes. It is considered feasible to identify the scenarios under which this problem can occur and to define the relevant input characteristics. Setting the criteria based on input characteristics of the Generator Unit removes the ambiguity in the decision and hence removes the need for the RAs to be involved in the approval of Dual-Rated Generators, as this can be defined as a clear set of rules operated by the MO.

The RAs are grateful for these comments, which help to focus the explanation of the process that the SEM Committee proposed. The RAs agree that the Dual-Rated problem is a function of the characteristics of the Generator Unit, however they do not agree that this is the only factor. The treatment of the generator Technical and Commercial Offer Data by the MSP Software is also a key factor and it is a combination of the two elements which result in the issues addressed by the third proposed criterion. Because of this combination of factors,

the RAs believe that it is vital that the expertise of SEMO in the behaviour of the MSP Software is applied to the issue.

9. In determining what would class as a Dual Rated Generator the concept has been broadened to a Multiple Rated Generator allowing the definition to cope with future variations that are not currently perceived. The principle works equally well for Dual Rated Generators. The following definition is proposed:

- A Multiple Rated Generator has the capability to operate on multiple fuels resulting in different maximum output capacities (Maximum Generation) and to changeover between these fuels without shutdown but with a consequential effect on Technical Characteristics and an incremental cost of Changeover.

The above definition would be further specified by defining the term Technical Characteristics, thus allowing precision on the items that have effect on the outcomes of the MSP software runs, such as Ramp Rates, Maximum Generation, Start Costs, Dwell Times etc.

Again, the RAs take the view that this suggestion ignores the effect of the MSP Software characteristics in the decision. In addition, it is possible that the suggested definition would apply equally to other multi-fuel plant where the definition of dual rating is neither necessary nor appropriate.

Comments about the application process for how to apply for Dual Rated Status

10. PPB queried the process for applying for Dual Rated Generator Status and what were the consequences of not applying for Dual Rating Status. In addition, a question was asked on whether PPB needed to apply for Dual Rating Status for the Kilroot Units.

The RAs believe that at the stage where the generators begin discussions with SEMO for registering the unit, consideration could be given to whether it is appropriate for that unit to apply for registration as a Dual Rated Generator Unit. At this stage, it is not believed necessary to impose an obligation on a Participant to seek to have its generator registered as a Dual Rated Generator Unit. However, this may be reviewed if necessary.

In addition to the above comments, SEMO made the point that any report on an application for Dual Rated status should be seen as a technical analysis of the application of the criteria to the Generator Unit concerned. Any judgement of the applicability of the criteria should be for the Regulatory Authorities.

4. Decision Criteria

The SEM Committee have considered the comments received to the consultation paper and have decided that it will adopt the following criteria in the consideration of whether a generator should be registered as a Dual Rated Generator Unit:

1. The generator design is such that it can use more than one fuel type in normal operation;
2. The effective rating (i.e. Maximum Generation) of the generator is different depending on which fuel it burns;
3. Having considered the issue (and on advice from the Market Operator, as necessary), the SEM Committee must be satisfied:
 - a) that the process for transfer between fuels for the generator is such that the MSP software is likely to determine infeasible Market Schedules for that Generator Unit (i.e. where the schedule cannot be replicated in actual dispatch) unless it is registered as a Dual Rated Generator Unit;
 - b) that the MSP Software is likely to determine an uneconomic SMP on occasions unless the Generator Unit is registered as a Dual Rated Generator Unit;
 - c) that in relation to items a) and b) above, that the generator concerned is materially different from other Generator Units registered in the Pool (which are not Dual Rated Generator Units); and
 - d) that there is no practical way (other than registration as a Dual Rated Generator Unit) that the generator could be represented in the market (e.g. as more than one Generator Unit) which would avoid the problems in a) and b) above.

The SEM Committee may review the Decision Criteria from time-to-time to ensure it is fit for purpose.

5. Next Steps

In relation to this work, the next steps are expected to be as follows:

1. The changes associated with Mod_34_08 go-live on the 19th November 2010;
2. In tandem with the changes being implemented in systems, the RAs (with any assistance necessary from SEMO) will prepare a short report detailing any units considered to be a Dual Rated Generator Units, in line with the criteria published in this decision paper. This report will then be published. This report provides written consent for SEMO to register the relevant Generator Unit as a Dual Rated Generator Unit.
3. Following the publication of the short report, the Participant will then register the unit/s in question as Dual Rated Generator Units.
4. For generator units not currently operating in the market, at the stage where the generators begin discussions with the RAs and SEMO for registering the unit, consideration could be given to whether it is appropriate for that unit to apply for registration as a Dual Rated Generator Unit and the process outlined above should be followed.